Coping with crisis: The paradox of technology and consumer vulnerability

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Acknowledgements: The authors gratefully acknowledge the valuable support and contributions of the editor, Professor Justin Paul, the Associate Editor Professor Bernadett Koles, and the five anonymous reviewers of this manuscript. We commend them for their continued professionalism in this extraordinary time.

Conflict of interest: The author declares no conflict of interest.

Funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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Article type : Review Paper

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Abstract

The COVID-19 pandemic has created unprecedented disruptions in consumers' daily lives. Regulations imposing social distancing, quarantine, and full-scale lockdowns have heightened the risks amongst vulnerable consumer groups such as the elderly and socially or financially disadvantaged. However, these restrictions have also caused transitory vulnerability in many people who are not considered vulnerable under normal circumstances. Digital technology has become central to almost every aspect of consumers' lives in response to restriction measures and in coping with pandemic-induced stress and anxiety. Technology-mediated consumption as a coping strategy amidst a crisis is an under-researched topic within the marketing literature. This paper discusses four paradoxes of technology central to understanding the nexus between technology consumption and consumer vulnerability. We propose a comprehensive research agenda and call for future research that could overcome the limitations of traditional research designs. Our work serves as a springboard for future scholarship and opens doors for other researchers to continue exploring this critical research area.

Keywords: Consumer vulnerability, technology paradox, consumption coping, COVID-19 pandemic, disaster, consumer welfare

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1.0 Introduction

The COVID-19 pandemic has caused one of the most severe disruptions in the global economy in modern history (Gössling et al., 2020). When challenged by this dramatic disruption and instability in our lives, an understanding of consumer vulnerability and the consumption-related repercussions of this pandemic merits further exploration (Kirk and Rifkin, 2020). Overall, past research has not sufficiently addressed vulnerability issues relating to technology consumption in the wake of a disaster. The discourse of technology consumption has often been framed from either utopian (focusing on the opportunities that technology presents) or dystopian perspectives (focusing on the negative consequences of technology consumption) (Zolfagharian and Yazdanparast, 2017). However, in reality, technology consumption may not always be represented by this binary opposition; that is, human-technology relations are more complex than this deterministic view (Katz and Rice, 2002). Prior research points to a paradoxical fascination and anxiety about technologies (Foehr and Germelmann, 2020). The term 'paradox' is defined as "a situation, act, or behavior that seems to have contradictory or inconsistent qualities" (Jarvenpaa and Lang, 2005, p.7), which suggests that "polar opposite conditions can simultaneously exist" (Mick and Fournier, 1998, p.124). We adopt the lens of paradox in our theoretical investigation following Mick and Fournier's (1998, p. 124) argument that paradox is "a highly relevant and resonant concept for advancing knowledge of contemporary consumer behaviour."

We found three conceptual articles relevant to the central premise of our work. The first article by Sheth (2020) discusses how the pandemic has disrupted consumers' lives and how they have learned to cope and improvise new habits in the contexts of social spaces, co-working spaces, technology, and natural disasters. While Kirk and Rifkin (2020) documented consumer behavioral patterns across three phases, i.e., reacting, coping, and long-term adapting to the pandemic outbreak, Zwanka and Buff (2021) explored consumer behavioral shifts, e.g., buying patterns, global consumer characteristics, and psychographic behavior during COVID-19. Taken together, these commentaries offer valuable insights into the broad impact of COVID-19 on consumer behavior. Our work builds upon these articles with a specific focus on post-disaster technology consumption given that the COVID pandemic has

put technology at the center of consumers' daily lives (Roose, 2020). We adopt a paradoxical lens and discuss the nexus between technology consumption and consumer vulnerability. Coping with the aftermath of the COVID-19 pandemic may place consumers in a state of vulnerability (Baker et al., 2007). We define the notion of vulnerability in this research as a temporary state of powerlessness stemming from a lack of control and agency in consumption situations resulting from sudden unforeseen disasters (Okazaki et al., 2015; Baker et al., 2005). Adding to this pressure is the challenge of coming to grips with overwhelming technology demands and other issues, including internet and smartphone addiction, safety, and privacy concerns. When disentangling the interplay between vulnerability and consumption, being able to cope with technologies is a crucial factor related to warnings about the gaps between the academic representation of vulnerability and how vulnerable consumers are protected in policy terms (Stewart and Yap, 2020).

Several critical reviews on technology use during the COVID-19 pandemic provide a broad understanding of what technologies have been used and how humans have approached technology during the pandemic (Herath and Herath, 2020; Mbunge et al., 2021; Vargo et al., 2021). Other conceptual works have focused on a narrower aspect of technology such as online gaming (King et al., 2020) and contact tracing systems (Spears and Padyab, 2021). Most of these conceptual discussions offer implications for information system and technology management. With consumer welfare in mind, we take a different approach by focusing on consumer issues that are essential to understanding technology consumption during the crisis through the lens of consumer vulnerability. Against this backdrop, this article identifies, assimilates, and critically discusses four paradoxes that represent fundamental tenets underpinning the topic. Each paradox is then used to chart promising avenues for further research to advance knowledge on this vital subject.

Our critical review offers a threefold contribution. First, we extend previous conceptual research that has largely taken either a positive standpoint (Riva et al., 2020) or a negative view of technology use, such as digital inequalities (Beaunoyer et al., 2020) and challenges associated with technology use (He et al., 2021), by developing new understanding about post-disaster technology consumption as paradoxes (i.e., adopting the 'both/and' thinking). Such theoretical insights from a consumer vulnerability perspective, which is lacking in consumer studies, are crucial for advancing current theorizing on this topic. Second, our discussion on the four paradoxes stimulates further thinking among

scholars by drawing attention to a set of potential avenues of research that remain open to critical inquiry. Third, we extend the conceptual work of Sheth (2020), Kirk and Rifkin (2020), and Zwanka and Buff (2021) through an in-depth focus on technology consumption and by recommending a range of methodological approaches to guide future work. We call for a systematic literature review to "assemble, arrange and assess" (Paul et al., 2021a, p.1) the extant literature in the domains of technology consumption and consumer vulnerability during crises as a critical next step to this important inquiry. Gaining a better understanding of the connection between technology use and consumer vulnerability has important implications for scholars, social marketers, and public policymakers. Our critical review could also stimulate further conversation within the framework of Consumer Principles (United Nations, 2016; Consumer International, 2016) among various stakeholders. Businesses and policymakers need to consider the paradox of technology and consumer vulnerability while protecting consumers' interests and meeting their legitimate needs for access, inclusivity, safety, and information during and post-pandemic.

2.0 Understanding consumer vulnerability in times of crisis

Consumer vulnerability issues have become central to many governments, businesses, not-for-profit organizations, and institutions, given their significant policy and marketing implications (Stewart and Yap, 2020; Harrison and Gray, 2010). Scholars have approached the notion of vulnerability using several classifications and have proposed various definitions to define vulnerable or disadvantaged consumers. A predominance of studies have tended to focus on specific groups who are disadvantaged by their personal characteristics and circumstances. For example, vulnerability may arise due to stigmatizing circumstances such as consumers with limited language proficiency (Jayasundara et al., 2020; Jang and Kim, 2019), low literacy (Staden et al., 2017), poverty (Choudhury et al., 2019), gendered vulnerabilities (McKeage et al., 2018; Voola, 2019), elderly consumers' limited capacity to navigate in the marketplace (Hwang and Nam, 2017), and disabled consumers living with impairment (Eskytė, 2019; Higgins, 2020). The theoretical understanding of vulnerability that is synonymized with disadvantaged (at-risk or neglected) consumers adopts a fixed rather than a temporal state (Elms and Tinson, 2012).

While the studies mentioned above focus on internal characteristics, other scholars have argued that all consumers can experience vulnerability, not only disadvantaged groups (Shi et

al., 2017). Their studies emphasise external factors that can elicit states of vulnerability such as the market place discrimination (Wünderlich et al., 2020), the natural environment, e.g., disasters and pandemics (Milaković, 2021), marketplace and service interactions (Echeverri and Salomonson, 2019), societal problems and economic conditions (Koos et al., 2017). The notion of vulnerability can also be understood as both cognitive, e.g., poor consumer choice attributable to a limited information processing ability, and behavioral levels of vulnerability resulting from cognitive responses, e.g., favorable responses to fraudulent activities, avoidance of interactions with store personnel, etc. (Moschis et al., 2011).

Baker et al. (2005) assert that consumer vulnerability is much more complicated than labels such as stigmatization, discrimination, unmet needs (Baker et al., 2005), risks (Baker, 2009), and disadvantaged or neglected consumers (Elms and Tinson, 2012). Therefore, consumers who are disadvantaged based on individual characteristics (e.g., disabled people, low-literate and low-income groups) and demographic groups (e.g., children, elderly, women, and racial minorities) should not be equated with vulnerability despite these traits potentially impeding their purchase and decision making (see Baker et al., 2005, for a review of what consumer vulnerability is not). Notwithstanding the lack of consensus on what constitutes a state of vulnerability and its impacts on consumers (Hill and Sharma, 2020; Echeverri and Salomonson, 2019; Stewart and Yap, 2020), there have been several important developments. These include defining vulnerability beyond personal characteristics and the market activities that impact consumer vulnerability, and recognizing that vulnerability is a complex, multidimensional, transitory, and context-specific concept (Brennan et al., 2017; Scott et al., 2020; Milaković, 2021). The current COVID-19 pandemic has induced an adverse setting causing consumer vulnerability and/or resilience that affect consumer consumption decisions (Milaković, 2021). As Brennan et al. (2017) suggest, vulnerability is more about the situation people encounter than themselves. Therefore, people may become vulnerable during the consumption process in a time of a crisis.

The COVID-19 pandemic has activated consumer vulnerability in many ways. For instance, low-literate consumers may lack the ability to decipher important information about pandemics (Stewart and Yap, 2020). Individuals with mental health issues may be adversely affected by social isolation (Smith and Judd, 2020). The pandemic has not only aggravated the risks of vulnerable groups but has also created new vulnerabilities. During the COVID-19 pandemic, a person not normally considered vulnerable may have suddenly become

vulnerable due to, for example, loss of a job, lack of social interaction, and access to healthcare services (Kirk and Rifkin, 2020). In this research, we consider that situational or temporary conditions such as disasters can trigger vulnerability experiences in consumers, including those not normally classified as disadvantaged. There are four alternative approaches to studying vulnerability in disaster research (see Table 1 for a summary). The limitations of the demographic and taxonomic approaches have prompted disaster scholars to shift towards situational approaches (Baker, 2009).

[INSERT Table 1 HERE]

Based on the literature mentioned above, we build on the work of Baker et al. (2005) and Okazaki et al. (2015) and define consumer vulnerability as follows:

> *A temporary and fluid state of powerlessness stemming from the inability of consumers to cope with the uncertainty and instability brought by sudden unforeseen disasters such as human-made disasters (e.g., war and terrorist attacks) and natural disasters (e.g., earthquakes, wildfires, tornadoes, hurricanes, etc.) that threaten lives and disrupt the functioning of a community or a society. Powerlessness occurs when consumers experience a lack of control and agency in consumption situations, which hinders their consumption goals, and ultimately, leads to a loss of consumer welfare*.

This definition contains several key elements of consumer vulnerability. First, it focuses on the experience of fragility resulting from a disaster rather than analyzing who is vulnerable. This conceptualization that views vulnerability as a condition as opposed to a status avoids the generalization of equating vulnerability to particular demographic populations. While our definition implies that everyone has the potential to experience vulnerability at some point, the state of vulnerability can be amplified for vulnerable groups with pre-existing conditions. Second, consumer vulnerability is multidimensional in nature, indicating that situational (e.g., post-disaster financial burden, lack of social support) or temporary conditions can affect the intensity of consumer vulnerability. The temporal aspect of the definition highlights consumers' ability to mobilize their resources in order to cope with their vulnerable conditions in the pursuit of normalcy. Third, another core part of the definition is the lack of control and agency in consumption situations. For example, consumers may feel vulnerable when they are unable to purchase necessities (e.g., toilet

paper, sanitizers, and cleaning products) due to product scarcity and stock-outs or when access to facilities (e.g., public transport, healthcare) is restricted during a lockdown. The sense of losing control and agency leads to uncontrollable shopping (Kirk and Rifkin, 2020) and panic buying that has its roots in human cognition and emotion (Billore and Anisimova, 2021; Prentice et al., 2020). Lastly, the definition indicates a loss of consumer welfare arising from consumer vulnerability as consumers struggle to cope mentally, physically, or financially with the disaster (Baker et al., 2005).

Consumers might also experience different vulnerabilities in the process of meeting different needs during a disaster, for example, their basic needs (e.g., food, water, rest, safety, security), their psychological needs (e.g., belonging, accomplishments), and their needs for self-fulfilment (e.g., realizing their full potential, creativity). During the COVID-19 pandemic, consumers have relied heavily on technology (especially the internet and social media) to enable basic consumption activities that meet almost all their needs (Stuart et al., 2021). To some extent, these various needs may become competing needs, and how a consumer fulfills one need might be at the expense of the other need(s). For example, when consumers resort to spending more time online to learn, work, and stay connected with others, they face greater risks of online fraud and misinformation/fake news. When they turn to online shopping/home delivery as a safer way to get their basic supplies, the convenience of e-commerce might also increase the risks of over-spending and misuse of their personal data. This paper aims to discuss such paradoxes.

Restoration of control and resilience building among disaster-affected consumer communities is a task of utmost importance in post-pandemic recovery efforts. We believe an understanding of vulnerability concerning technology consumption amid the COVID-19 pandemic deserves academic attention, a direction we pursue with a brief review of technology paradoxes as follows.

3.0 Understanding the paradoxes of technology

Throughout this article, what we refer to broadly as technology includes techniques, methods, and processes that have potential applications in pandemic management and resilience building. This includes mobile applications, cloud, analytics, drone, robotics techniques, artificial intelligence (AI), 4G/5G, and high-speed internet. On the one hand, government

bodies rely on digital technologies to disseminate advice and information. Technology innovation has created flexibility in various services, from essential services such as food delivery (Mehrolia et al., 2021) to high human contact services such as tourism and education (Hall et al., 2020). On the other hand, extant research has acknowledged the adverse effects of digital technology, including sleep disturbance and declining school achievement (Woods and Scott, 2016), cyberbullying, violent content exposure, child safety (Fox and Moreland, 2015), increased consumer harm and materialism (Berg, 2018; Dávila et al., 2018). These adverse effects could exacerbate vulnerability at both the individual and community levels (Zolfagharian and Yazdanparast, 2017). According to this line of research, technology consumption "creates situations that have contradictory qualities" (Zolfagharian and Yazdanparast, 2019, p.1055), which has been labeled as paradoxes of technology (Mick and Fournier, 1998). 'Paradox' is defined as "contradictory yet interrelated elements … elements that seem logical in isolation but absurd and irrational when appearing simultaneously" (Lewis, 2000, p.760).

The idea that consumption experience is paradoxical is not new. For example, Skandalis et al. (2016) discuss the paradoxical nature of transitional consumption experience in the post-modern era. Among the scant studies on the paradoxical technology experience, Jarvenpaa and Lang (2005) reported several mobile technology paradoxes that shape consumption experience, such as independence/dependence, competence/incompetence, planning/improvization, engaging/disengaging, and public/private. In their highly cited paper, Mick and Fournier (1998) theorized eight paradoxes of technology wherein post-modern consumers must accept and cope with the multiple contradictory consequences. They assert that paradox is "a highly relevant and resonant concept for advancing knowledge of contemporary consumer behavior … [and can] be used to extend, modify, or develop new theories in the field" (p.142). Neglecting the complexity of paradox could mean overlooking the multiplicity, dynamism, and simultaneity of conflicting technological forces that underpin consumer vulnerability (Schad et al., 2016).

In sum, prior research has explored the paradoxes of technology consumption. However, no study has yet focused on the paradoxical technology consumption experience during a crisis that could activate consumer vulnerability. While there are different definitions of consumer vulnerability and informal usage of the term in the literature (Hill and

Sharma, 2020), we adopt the situational approach to view a disaster such as the current pandemic as a context in which consumer vulnerability may occur.

Unifying the literature in this area, we shift away from simplistic polarized conceptions of technology and adopt a paradoxical lens (Lewis, 2000). Thus, we draw on paradox research to theorize technology consumption in the face of a disaster and how it can potentially aggravate or mitigate consumer vulnerability when technology is used to combat the crisis. These paradoxes will be discussed next. Table 2 presents a synthesis of the current insights.

[INSERT Table 2 HERE]

3.1 Paradox 1: Technology-mediated consumption as a coping strategy

Consumption plays a role in maintaining consumers' self-identity and their ability to exercise control when facing sustained uncertainty after disruptive events such as illness, natural disasters, terrorism, or global infectious diseases (Mehta and Belk, 1991; Pavia and Mason, 2004). That is, consumption often functions as a coping strategy for consumers to deal with the vulnerability brought about by uncertainty. Prior studies have identified different forms of coping strategies related to consumer vulnerability, such as a proactive or reactive approach with explicit or implicit articulation (Echeverri and Salomonson, 2019), impulsive and compulsive buying (Sneath et al., 2009), and resilient consumption (Arnal Sarasa et al., 2020). Deciding which coping strategies to adopt is dependent on consumers' economic and social resources, personal skills, everyday life configuration (Koos et al., 2017), and self-efficacy and adaptability (Milaković, 2021). These coping strategies can help consumers to anchor themselves in the present (approach) or distance/escape from the current reality (avoidance) in challenging times (Pavia and Mason, 2004; Sneath et al., 2009).

Consumers' coping processes during the COVID-19 pandemic may have profoundly impacted their perceptions of self and control, future consumption practices, and ultimately, their well-being (Yap and Kapitan, 2017). Within the marketing literature, technology-mediated consumption as a coping strategy has received scant academic attention. This section discusses digital consumption activities, including internet shopping, online gaming, and other forms of entertainment mediated by technology as coping actions.

For many consumers, shopping is an integral part of their lives. However, the onset of the pandemic has made the completion of simple shopping tasks more challenging for most people. To make matters worse, restricted mobility and limited transportation services during lockdowns is likely to have exacerbated the conditions of vulnerable groups in consumption contexts. For instance, we have witnessed the challenges faced by single parents and elderly consumers in acquiring necessities (e.g., medications and groceries) during the pandemic. In this regard, the internet provides a viable shopping channel that can prevent the spread of the virus. Consumers' sense of control may be reinstated not just by consuming hedonic products but also through the process of acquiring goods as a way to cope with the uncertainty brought about by the pandemic (Kirk and Rifkin, 2020; Billore and Anisimova, 2021; Prentice et al., 2020). In terms of restoring normalcy, internet shopping plays an essential role in emancipating and empowering vulnerable populations to accomplish their consumption goals, thereby helping in vulnerability management.

The pandemic has also led to a surge of digital gaming traffic and related entertainment, e.g., sports betting and bingo, videogame streaming, etc. (Király et al., 2020). Some consumers have engaged in these activities as a coping mechanism to mitigate the psychological impacts of isolation and idleness (Hume and Mort, 2011). Ironically, these technology-mediated consumption activities can have grave repercussions for consumer well-being. Previous research has demonstrated that fear, anxiety, and the threat of death associated with disaster often lead to irrational consumer behavior (Aronson, 2008). For instance, consumers may indulge in impulsive and/or compulsive buying that offers short-term gratification in a time of crisis (Ruvio et al., 2014) as they struggle to restore stability and equilibrium. The prevalence of online shopping that enables consumers to buy new products with just a few clicks may encourage excessive spending, resulting in deleterious outcomes such as social difficulties, guilt and remorse, and financial debt (Kyrios et al., 2004) that exacerbate vulnerability.

While online gaming could be a form of entertainment for some individuals to mitigate the negative effects of isolation caused by movement restrictions, vulnerable consumers are particularly susceptible to digital abuse. For instance, mounting evidence points out that addictive use of digital technology among children is related to low sleep quality (Woods and Scott, 2016), exposure to violence, cyberbullying, harassment, and sexual exploitation

violence (Fox and Moreland, 2015), and harmful psychosocial outcomes such as suicide, depression, self-harm, and anxiety (Sampasa-Kanyinga and Hamilton, 2015). A prolonged period of technology-based leisure activities elevates the risk of potential harm related to violence and addiction. Consumers may find it challenging to readapt in the future (King et al., 2020). Therefore, an understanding of the dark side of these technology-mediated consumptions has a strong implication for consumer well-being in the long run.

Despite the adverse effects of screen use mentioned above, some scholars have presented evidence (albeit limited) that supports the positive association between digital screen use and young consumers' well-being (Przybylski and Weinstein, 2019). However, Przybylski et al. (2020) found that less screen usage time among children leads to a positive association between digital consumption and psychosocial functioning. Most cross-sectional studies have produced mixed findings regarding the relationship between digital technology use and well-being (Orben and Przybylski, 2019). Consequently, Przybylski and Weinstein (2017) conclude that "the possible deleterious relation between media use and well-being may not be as practically significant as some researchers have argued" (p. 213). These findings seem to suggest insufficient evidence for supporting the link between screen use and well-being. In this case, stigmatization and ill-informed policy measures targeting online gamers based on unsubstantiated evidence can compound the risks for online gaming communities (Aarseth et al., 2017). Bruggeman et al. (2019) speculate that exposure to digital media at a young age might help build children's resilience to potential harmful impacts in later life. If so, ignoring child empowerment may lead to missed opportunities to help young consumers achieve better-adjusted digital lives. While some scholars tend to take the protective view, further research on a balanced perspective in understanding how digital screen use promotes or hinders consumer well-being is warranted. The next section focuses on several potential avenues for future research associated with the first paradox (see Table 3).

[INSERT Table 3 HERE]

Paradox 1: Research Direction

The rise of big data has resulted in the increasing popularity of sentiment analytics – the use of text mining, natural language processing, and biometrics to systematically extract public opinions and digital content derived from massive textual data (Schmitt, 2019). Future

research could consider the use of sentiment analysis to study consumer sentiments about post-pandemic technology-based coping actions and their changing lifestyle as they enter a 'new normal.' While social support from close ties is crucial for post-disaster recovery, future scholars could also apply sentiment analytics to explore how coping resources are developed and shared among weak ties within online community contexts. Rigorous data science, such as machine learning algorithms, could also be deployed to predict technology usage behavior during a pandemic. These insights are potentially helpful in developing consumer education programs and protection policies that promote consumer welfare. Future research could also benefit immensely by employing a combination of qualitative methods such as participants' diaries, autobiography, projective techniques, and visual analysis to unravel the complex cultural meanings associated with the interactions between humans and technologies as well as the social practices that take place in the digital space during times of crisis. Adopting the conceptual tools from Latour's (2005) actor-network theory that views non-human factors (e.g., objects, processes, ideas, etc.) as important actors in social situations, future research could explore the agentic role of non-human factors such as technology in stabilizing a network of communities and help to restore normalcy resulting from the pandemic.

Contactless delivery services supported by drones and robotic technologies have further triggered the tremendous growth of online shopping businesses on a global scale. Scholars could utilize demand forecast tools commonly applied in the field of Economics, such as time series and econometrics (Jiao and Chen, 2019), to derive accurate and comprehensive forecasts of the impact of the COVID-19 pandemic on online businesses. Future research could also examine the situational influences on consumers' decision to adopt online shopping. Also, empirical attention should be devoted to reaching out to those with poorer digital resources. For instance, drawing upon regulatory focus theory (Crowe and Higgins, 1997), an experimental study could be designed to examine whether consumers with a stronger (vs. poorer) possession of digital resources are more likely to activate a promotion focus, which results in more favourable responses towards online shopping platforms with promotion-focused advertizing appeals. Grocery shopping is considered a routinized consumption activity. One avenue for future research is to apply practice theories as a theoretical lens to explore the discontinuous events occurring in the day-to-day routines of consumers that hinder or facilitate their online grocery shopping. Furthermore, we have witnessed the widespread chaos created by hoarding of necessities goods and panic buying, which have aggravated the already vulnerable conditions of some consumer groups. Future

work could consider incorporating crisis planning into the online system design to elevate such risk.

The divergent findings regarding the impacts of online gaming are partially due to factors such as the low quality of the research base, the proprietary nature of the dataset that restricts systematic analyses, and the cross-sectional dataset limit causes and effects test (Aarseth et al., 2017; Orben and Przybylski, 2019). Future research should address these methodological challenges. The conventional wisdom regarding the destructive effects of digital gaming is oversimplified (Granic et al., 2014). Experimental and survey studies are encouraged to examine the underlying mechanisms behind the impact of disaster-induced vulnerability on compulsive technology-mediated consumption behaviors such as online gaming and shopping. For example, future research could consider the moderating role of individuals' perception of social control and social cohesion, gaming time, and gaming features (e.g., complexity and interactivity). As social capital (i.e., resources gained from relationships with community members) can help promote healthy behaviors (Yap et al., 2019), future research could also study the role of social capital dimensions (i.e., bridging and bonding) in addressing disaster-induced addictive screen consumption. We also encourage future research to adopt a conceptual approach – an argumentative review to analyze and challenge existing assumptions, arguments, and philosophies regarding the empowerment versus protection of digital technologies in postmodernity, which would serve to provide a radical view of post-disaster vulnerability in the digital age.

Neuroscientific research using various psychophysiological methods (e.g., eye-tracking, facial electromyography methods, skin conductance, heart rate response) can be fertile tools for collecting objective behavioral data on consumers' cognitive, emotional, and spontaneous responses towards online gaming and the concurrent social interactions with other gamers in times of crisis. It would be fruitful to conduct longitudinal studies that collect multiple data sources, for example, a combination of neuroscience-based measures and qualitative data using visual research approaches (e.g., videography) and diary studies. For example, future research could use these data to examine the extent to which vulnerable groups turn to online gaming or entertainment for constructive coping and at what point playing games becomes deleterious maladaptive coping (Granic et al., 2014). Scholars (e.g., Granic et al., 2014; King et al., 2020) have argued for a more balanced perspective on online gaming. An attempt to understand how best businesses and governments could work together to design balanced and

effective approaches to digital entertainments that promote psychosocial well-being could be a fruitful future research direction.

3.2 Paradox 2: Social media as a resource for consumer resilience

Resilience, the adaptive capacity of a social system to recover from disturbances in the face of adversity, can influence consumer well-being (Koos et al., 2017). Past crisis/disaster management literature has reported increased social media use for disaster communications, resilience building, and collective coping (Houston et al., 2015). To help contain COVID-19, governments have introduced temporary rules, from social distancing measures to full-scale lockdowns. These restrictions could elicit transitory vulnerability in many people who are not considered vulnerable under normal circumstances. The social tensions emerging from these restrictions have prompted consumers to engage in coping actions that are interactive in nature (Richardson and Maninger, 2016). Online technologies play an important role in meeting this need. Consumers turned to social media to view entertainment, to discover news, to find health and fitness content, or as a way of escapism. Consumers have also tried out new ways of social networking such as fitness classes and church services via Facebook and 'cloud clubbing,' i.e., parties involving live performances by D.J.s via TikTok (Roose, 2020).

Furthermore, the use of Zoom, a videoconferencing service, has increased exponentially since the start of the pandemic, providing an essential communication tool not only for businesses and education but also for social connections (Morris, 2020). Ultimately, these technologies make it possible for people to stay connected with their communities when they are forced to shelter at home (Wiederhold, 2020a). The role of technology in bringing people together in positive ways during the pandemic stands in sharp contrast to the dystopian perspectives that regard technology as destructive to humanity.

Paradoxically, while social media has been a useful resource for social connectedness and resilience-building during the pandemic, a related threat has emerged: excessive use of social media can exacerbate feelings of anxiety, depression, isolation, and fear of missing out (Robinson and Smith, 2020), and even lead to the new affliction coined "Zoom fatigue" (Wiederhold, 2020b). Numerous studies have emerged in various disciplines on the adverse effects of social media exposure on mental health during the pandemic. The impacts of social media on young people's mental health are of particular concern because Gen-Z (born after

1996) is the largest and most active group of social media users (Viens, 2019). Evidence shows that they are also the most vulnerable to internet harassment and cyberbullying/cybervictimization, posing severe threats to the psychological well-being of this group (ŞAhİN, 2012; Ybarra, 2004).

The hyper-connectivity of social media is a double-edged sword. During the COVID-19 pandemic, social media has served as a good tool to swiftly disseminate essential public health information such as handwashing, quarantine measures, and raising awareness about the disease and its symptoms. The flip side of this has been the spread of misinformation that causes not only confusion but fear, anxiety, and panic among consumers (Arafat et al., 2020). Rumors and conspiracy theories about the origin of COVID-19 have prompted a spike in racial attacks, xenophobic violence, and discrimination against Asians and people of Asian descent. To this end, the need to combat the pandemic of social media is urgent. This requires proactive engagement from businesses/researchers to develop capabilities to rapidly detect public rumors/fake news, which would, in turn, enable public health authorities to respond with intervention campaigns that can mitigate misinformation.

Against the backdrop of social media participation during the COVID-19 pandemic are population groups who are excluded from digital services. One such population group is older adults who often lack experience, skills, and access to the internet (Seifert et al., 2018). It is well documented that the elderly population relies on emotional and social relationships with their family members and friends for their health and well-being (Cornejo et al., 2013). Digital technology could help the elderly to maintain these social connections, especially during quarantines and isolation. However, their nonparticipation in the digital world during the COVID-19 pandemic implies that they are not only unable to leverage social media for social connectedness, but they are also missing out on useful contents disseminated via social media such as health information, digital social events, and social networking.

The heavy reliance on digital technology during the pandemic has further magnified digital inequalities (digital divide) that could hamper vulnerable populations' access to information and services. During the COVID-19 pandemic, social media has proved a powerful tool in building self-resilience at consumers' disposal. However, we must consider those who are unable to rely on technology as others do, and those who continue to face

barriers to technology use even if they have access to it (Wilson, 2020). Table 4 presents several potential avenues for future research related to the second paradox.

[INSERT Table 4 HERE]

Paradox 2: Research Direction

COVID-19 has further augmented the pervasive power of social media in consumers' daily lives (Sheth, 2020) while providing businesses and governments unprecedented opportunities for consumer/citizen engagements. The lockdowns have skyrocketed consumers' usage of social technologies and the internet. As Nowland et al. (2018) summarize, several studies have shown an association between the use of social technologies (i.e., online resources that connect network members socially) and loneliness, but this relationship might differ among different age groups. Drawing upon the lens of social cognitive theory (Bandura, 1997), future research could investigate the self-belief and self-regulatory mechanisms that underlie the process of digital resilience building to minimize vulnerability among consumers of various age groups. Accordingly, Nowland et al. (2018) stress the importance of a longitudinal study to delineate the bidirectional and dynamic relationship between loneliness and social technologies. The prolonged COVID-19 pandemic presents valuable opportunities for longitudinal studies to be conducted in this area.

Donthu and Gustafsson (2020) raise a chilling question: "… what happens to us when the 'real life' is lived online and becomes a way to escape the physical world?" (p.285). Such concern is even more alarming when extant literature has found various adverse effects of excessive social media use on mental health, especially among young people. Future research could consider adopting the paradox theory (Lewis, 2000) from the management/organizational behavior discipline to examine how best to manage the paradox of social media consumption. To this end, firstly, it is important to recognize that the use of social media does not have exclusively negative or positive consequences (Barcelos and Rossi, 2014). Secondly, adolescents/young people are active participants and producers of their internet consumption processes (Batat, 2008). Therefore, a youth-focused approach aiming to capture their voices within their consumption setting, e.g., ethnographic research, could be a fruitful avenue to gain valuable understanding of young people's behavioral strategies in social media consumption and risk negotiation (Barcelos and Rossi, 2014). Such

insights could considerably inform school/educational programs on how best to manage the paradox of social media consumption.

The sharing of fake news or misinformation on social media platforms is a global concern and could have detrimental effects during disasters or pandemics. However, research on the motives that underpin such sharing is still in its infancy (Talwar et al., 2020). Qualitative studies, including projective techniques such as the thematic apperception test, might be fruitful avenues to explore the psychological motives behind the intentional creation and/or sharing of fake news. Experimental studies could also be conducted to investigate what drives fake news sharing behaviors. For example, future research could draw on the spotlight effect theory, a tendency to overestimate how much an individual's actions are noticed by others (Gilovich et al., 2000), to examine the mechanisms that underpin consumer indulgence in various forms of deception, including dissemination of fake news in online social situations. The effects of fake news or intentional misinformation on vulnerable consumers also warrant some urgent research attention.

Although many elderly consumers are digitally-savvy, there remain older people who are IT illiterate and reluctant to use technology. Future studies aimed at developing some forms of protection and support are imperative. Research topics such as tension-filled post-disaster coping and consumer vulnerability can be susceptible to social desirability and topical sensitivity. Visual materials such as projective stimuli can overcome this problem by projecting an informant's feelings and thoughts onto another situation or person (Doherty and Nelson, 2010). Zaltman Metaphor Elicitation Technique (ZMET) works particularly well in delving into consumers' unspoken thoughts and feelings below the conscious level (Zaltman and Coulter, 1995). As a participant-led approach, ZMET probes consumers' subconscious opinions about a product, a brand, or a service experience and thus overcomes the "depth deficit" of traditional qualitative approaches (Mulvey and Kavalam, 2010). Using laddering and project techniques interviews, ZMET is applied to mine the deeper motivations and emotions of consumers. Future research could use ZMET to discover the meaning and experience of older adults (or other vulnerable groups) and their barriers concerning online technology use.

3.3 Paradox 3: Innovations – the good, the bad and the ugly

Since the start of the COVID-19 pandemic, technological innovations have functioned as life-saving tools. Four major types of new digital applications have been widely used to combat the pandemic: 1) telehealth services, 2) flow modeling, 3) location tracking, and 4) contact tracing applications (Cantú et al., 2020). At the heart of all these innovations is the collection and usage of personal data. There has been a long-standing debate on the subject of privacy versus data-driven innovations and the need to protect consumers. However, the urgency of responding to the pandemic and the infectious nature of COVID-19 have arguably tipped the scales in the privacy debate in favor of innovations. Nevertheless, while it is of utmost importance to save lives, the increased access to personal data and its collection and sharing have heightened consumers' risks of privacy violations and data security, including the risk of leaks or misuse of data (Cho et al., 2020; Cantú et al., 2020). In addition, systemic flaws and vulnerabilities within the networks and platforms when accessing and transmitting the data could compromise data security (Bond, 2020). It seems that the more powerful technology is, the less power people have to control it.

Contact tracing and surveillance systems can endanger individuals' privacy by reducing their control over some of the most sensitive types of personal information, including health and location data (Cho et al., 2020). These tracing and surveillance systems significantly increase the vulnerability of people who have been forced to replace offline activities with online activities and those infected by the virus (Brough and Martin, 2021). Stringent surveillance can also engender a sense of being controlled, negatively impacting people's motivation, productivity, and well-being (Lepper and Greene, 1975). These adverse effects may trigger people to escape surveillance and reaffirm their autonomy. A case in point is contact tracing. In many countries, bars, cafes, and restaurants have been instructed to record their patrons' contact details should the authorities need to track outbreaks and spread of the virus (Cantú et al., 2020). Trust and privacy concerns might well underpin these practices, but one cannot rule out the possibility of psychological reactance as consumers attempt to reaffirm their autonomy (Steindl et al., 2015).

As activities traditionally performed offline have moved online due to stay-at-home orders, more personal information has been collected and stored. For example, many consumers who create new online shop accounts for essential goods and services are required to disclose personal information (Brough and Martin, 2021). Some consumers who feel

"pushed" to move online due to the pandemic may lack the knowledge to fully understand their privacy risks. These consumers are often particularly vulnerable populations such as the elderly or the IT illiterate, who are most likely late adopters of e-commerce. The pandemic has pushed people to adopt smart and mobile technology; at the same time, it is widening the digital divide.

Throughout the pandemic, digital government initiatives have connected governments with people worldwide, combating fake news, sharing the latest information on the virus, addressing data protection and privacy, and optimizing supply chains via digital government services (UN DESA, 2020). At the government level, transparent rules and clear communication are vital in building strong public support. Ethical and legal frameworks need to oversee data protection regulations and policies to ensure the data used during the pandemic is temporary (Cantú et al., 2020). These regulations need to be revisited after the pandemic to ensure our current endeavors do not threaten our future well-being. Ultimately, consumers should have control over their personal information. For consumers, the main questions here are what role individuals play in reconciling the paradox of privacy and the use of digital technologies during and post-pandemic; and what consumers could do to protect their privacy and welfare.

Other innovations that are most pertinent to consumers during the COVID-19 pandemic include contactless payment systems, also known as "tap-and-go" in some countries. These are cashless payment methods using credit/debit cards or payment-enabled devices such as smartphones (Puriwat and Tripopsakul, 2021). COVID-19 has been a massive catalyst in the shift to a cashless and online shopping society. Many businesses have implemented "payments by cards only" to reduce hand-to-hand interactions, fanned by public concerns that cash changing-hands could transmit COVID-19 (Kerigan, 2020). The contactless payment system is easy and convenient for those with access to a payment-enabled card or device and a bank account. However, this does not consider those who are elderly, homeless, fleeing domestic violence, or unbanked who depend on cash. Getting necessities can become an arduous task for these consumers who are often most vulnerable in society. For victims of domestic violence, cash is often a necessary means of survival. When businesses refuse to accept cash from these consumers, it exposes these consumers to greater marketplace vulnerability and possibly even further domestic violence.

High-contact services such as hospitality, travel/tourism, restaurants, and bars have been among the hardest-hit during the COVID-19 pandemic due to the imposition of lockdowns and social distancing. While millions of people have lost their jobs during the pandemic, humanoid robotics, autonomous vehicles, drones, and other intelligent robots are increasingly used in hospitals, airports, hotels, restaurants, etc., as ways to reduce human contact and the potential spread of the virus. These intelligent robots are replacing human-beings in "delivering materials, disinfecting and sterilizing public spaces, detecting or measuring body temperature, providing safety or security, and (even) comforting and entertaining patients" (Zeng et al., 2020, p.724).

Technological unemployment is commonly defined as job losses caused by new technologies and innovations. There is an ongoing concern about technology's impact on the future of work (Huang and Rust, 2018). However, the pandemic has accelerated the drive to replace humans with machinery as businesses struggle to avoid workplace COVID-19 infections and keep operating costs low (Semuels, 2020). As AI robot adoption accelerates, scholars and the public press suggest that concerns over human job losses and data privacy will decrease (Zeng et al., 2020). In sum, innovations such as intelligent robots have kept businesses open, protected humans from the risks of being infected by COVID-19, and they might have saved many lives during the pandemic. While we have so much to be thankful for, some population groups have taken the brunt of immediate job and income losses. As it stands, unemployment during the pandemic could persist well beyond the pandemic with potential adverse impacts on vulnerable, disadvantaged, or underrepresented populations in the labour market.

Policies directed at protecting people who are vulnerable to exploitation should pay attention to low-skilled (and low-paid) work and the nature of job and employment relationships, without losing sight of the benefits technology can bring. Table 5 outlines the current issues related to paradox three and future research directions.

[INSERT Table 5 HERE]

Paradox 3: Research Directions

With increased surveillance and greater sharing of sensitive personal information, concerns have been raised regarding data security and consumer rights. Longitudinal research could

investigate the impact of health surveillance on behavioral changes related to digital technologies. In-depth interviews might be conducted to explore the psychological impact of health surveillance on users of digital technologies. The underlying motivations and psychological impacts can be identified through thematic analysis of those consumers' narratives. We see a potential to examine the impact of mandatory digital technology use (e.g., contactless payment methods) on consumer vulnerability in the marketplace. For example, future work could use the psychological reactance theory (Brehm, 1966) to predict how and why forced use of digital technologies affects outcomes such as anxiety, embarrassment, satisfaction level, and attitudes. Insights gained from qualitative studies can shed light on the possible drivers and constraints of digital technologies adoption, which are useful for effective health apps design.

To uncover the long-term impact of health surveillance on consumer well-being, incorporating the themes identified from the qualitative studies suggested above, longitudinal surveys that cover a brand range of consumer populations would have the advantage of developing and validating a measurement scale for consumer well-being associated with health surveillance digital technologies. A longitudinal study of this kind could also reveal how the privacy norm has been changed by the pandemic. If collecting data from countries with different cultural values is possible, then the results might indicate how cultural values influence the privacy norm and how culture as a moderator interacts with the pandemic's main effect on the change of the norm. These insights would be helpful for consumer protection, both during the pandemic and in the post-COVID-19 era. These studies could also offer suggestions for public and private companies when designing digital health surveillance apps.

Experimental research should be implemented to examine the perceived invasiveness of the different digital apps to determine the comfortable level of invasiveness that consumers are willing to accept. Future work could draw from the user-centered theory (Vischer, 2008) to systematically study various users' experience of digital apps and consider the dynamic and interactive nature of the various types of users and the digital tools. Again, the insights would help app designers understand what puts users off and consequently to improve the effectiveness of the apps.

Increasing consumers' awareness and privacy efficacy is critical to empowering consumers and improving data privacy protection (Bandara et al., 2020). For privacy regulators and social policymakers, the question is how to establish a fair and socially responsible market to protect consumer privacy. Drawing upon the attribution theory, the psychological process by which individuals assign causes of actions and events (Folkes, 1988), future research should investigate the adequacy and fairness of current legal provisions through large surveys and case studies to offer policymakers recommendations. Since privacy issues vary based on the context (Nissenbaum, 2009), future research should study the topic in different contexts, including different countries, social groups, and consumption activities (e.g., online shopping, social networking, and telehealth).

The social distancing and lockdown measures used to combat the COVID-19 pandemic have amplified the already existing global societal challenge of loneliness, which is referred to as the loneliness epidemic (Courtet et al., 2020). Technological innovation such as social companion robots has provided tremendous help with the loneliness that is threatening well-being across age groups (Odekerken-Schröder et al., 2020). However, adopting companion robots also raises ethical concerns as these robots replace human companions. Future studies could explore how these robots affect the users' beliefs and behaviors after the pandemic through ethnographic research. In-depth interviews would help in understanding how these companion robots, which function as human substitutes, impact service workers' job security and long-term well-being. This line of research could consider applying the appraisal theory of emotion (Arnold, 1960) to understand individuals' perception of the situation/event (e.g., current job demand, stress level) and how this affects their action/outcome (e.g., job satisfaction, job performance, health/well-being).

Researchers within various fields, including consumer behavior, public health, and marketing communication, can benefit from the future studies suggested above to understand the role of consumers in reconciling the paradoxes of the digital technologies deployed to combat the pandemic.

3.4 Paradox 4: The blessing and pitfall of telehealth services

The COVID-19 pandemic has accelerated the rapid growth of telehealth (Clipper, 2020) – the use of telecommunications and the internet to deliver health service at a distance (Standing et

al., 2018). Telehealth focuses on providing service to patients at a distance, including monitoring patients' condition, managing high-risk patients who are not able to visit their health providers, or for faster chronic disease check-ins, to ensure safety for both healthcare professionals and patients (Clipper, 2020). Ironically, even though telehealth was not viewed as essential healthcare service before the pandemic, it now plays a critical role in handling the current global health crisis. Telehealth protects health professionals and patients, enables remote work for providers, conserves hospital beds and medical supplies for those in urgent need, supports speciality care (e.g., psychiatry, cardiology), and brings care to the wider populations in need (Vidal-Alaball et al., 2020).

Telehealth has aimed to close the healthcare gap in rural populations (Marcin et al., 2016). However, the gap between groups in a country, even worldwide, might be widening due to technological, economic, social, and political factors (Dorsey and Topol, 2016; Scott Kruse et al., 2018). While telehealth services offer the promise of transforming healthcare in an inspiring way, they also introduce potential negative consequences that could impact those who need telehealth the most (Agarwal et al., 2020). Vulnerable populations, including racial/ethnic minorities, people with low income, and those living in rural areas, might have limited access to the digital technologies and devices needed to receive telehealth services. This inaccessibility further magnifies the pre-existing digital divide among vulnerable populations (Anderson and Kumar, 2019; Anderson, 2018). Often, these vulnerable populations are the ones that need healthcare the most.

Telehealth provision varies in different countries due to asymmetry among economic development, the social environment, technology infrastructure, and the healthcare system (Scott and Mars, 2015). Healthcare systems can affect health and health inequalities (Reibling et al., 2019). In other words, low-income people living in countries with private healthcare systems might experience higher vulnerability than those in countries with public healthcare systems. Therefore, lack of or a low level of digital and health literacy, mistrust of medical providers, and differences in the healthcare system continue to increase disparities in healthcare access and outcomes for those who are most vulnerable in times of crisis (Ramsetty and Adams, 2020).

The most critical challenges of telehealth adoption for patients are indeed rooted in the digital divide and mistrust surrounding data use, privacy, and security (Nittas and von Wyl,

2020). Being older, of lower socioeconomic status, a minority, or of lower educational background are the key drivers of the divide (Scott Kruse et al., 2018). In the current battle against the pandemic, the focus ought to be bridging the digital divide gap, to enable the provision of telehealth care to those who are vulnerable and most needy. After all, the fundamental aim of telehealth is to increase access to healthcare from the patient's perspective (Dorsey and Topol, 2016).

More consumers are now willing to choose virtual care visits to reduce the risk and fear associated with the virus (Wosik et al., 2020). We can anticipate telehealth will increasingly be accepted and may eventually become the preferred means of interaction with health providers when receiving noninterventional care (Clipper, 2020). The patient-doctor relationship is also expected to evolve as the interface changes from human interactions to technology-mediated interactions for facilitating remote care. Such remote care may place a greater demand on ensuring personalized care and, therefore, a higher expectation of developing and maintaining proper relationships over distance and time (Dorsey and Topol, 2016).

Although the pandemic has led to improved digital literacy and telehealth access to facilitate physical distancing, many clinical conditions require physical examinations or interventions (Blandford et al., 2020). In such instances, telehealth might lead to vulnerability for those who need care provided in face-to-face settings. In envisioning a telehealth-enabled future, people should be given options for ways of receiving care – either face-to-face or at a distance or the combination of both.

By and large, telehealth is a complex and sophisticated system that requires collaboration and knowledge sharing across organizational boundaries to address issues related to healthcare infrastructure and policies, including insurance coverage. Therefore, telehealth expansions should be reconfigured after the pandemic through resource allocation, funding schemes, and reimbursement (Thomas et al., 2020) to regularly support health conditions and improve prevention efforts for those who are vulnerable (Hoffman et al., 2020). Table 6 outlines the current issues and future research related to this paradox.

[INSERT Table 6 HERE]

Paradox 4: Research Direction

Past research has conducted systematic reviews on the requirements, facilitators, and barriers to adopting telehealth. More empirical studies are needed to address patients' voices on improving the effectiveness of telehealth services (Standing et al., 2018). Prior research has highlighted both the benefits and the challenges of delivering care via telehealth. The pandemic has shaped the expectations on delivering care and has called for redesigning the healthcare system to reduce healthcare inequalities. Therefore, it is timely and vital to explore telehealth's role in the future delivery of healthcare (Thomas et al., 2020).

Despite the convenience of telehealth, some people desperately want and need face-to-face interactions with a doctor for various reasons. Therefore, future research should explore what needs to be done to enable an effective delivery of healthcare services. Healthcare providers need to identify individuals who are most likely to benefit from telehealth care or conventional healthcare services through in-depth analysis of patients' experiences.

Future research needs to pay more attention to patients' role in telehealth services. For example, future work could apply customer journey mapping – a market research tool traditionally used to help businesses uncover consumer behavior (Crosier and Handford, 2012) – to identify and map patients' telehealth service journey. Such research enables a good understanding of users' needs and experiences, and thus, strategies can be developed to support the patients, telehealth providers, family members, and community. Furthermore, surveys and focus group investigations will help identify patients' different needs and vulnerabilities among various groups in relation to factors such as age, income, mobility, digital capability, and social norms. Studies following design thinking methodology can help blueprint a service process, e.g., a virtual visit. The critical incident technique can also assist in identifying potential failure points and the root causes of such failures. Such research can provide engineers and health professionals with substantial evidence to design or redesign virtual care, e.g., a new or updated app, device, or a process.

A qualitative study employing in-depth interviews and observations could investigate the long-term impact of telehealth service on consumers' health and health behavior. For example, biosensors and wearables could be used to record individual health conditions and daily activities such as exercise and sleeping patterns; doctors could then provide advice remotely based on the data captured. Such a longitudinal study could discover the long-term

psychological effect of self-management on individuals' health when they are aware of being "monitored." The data collected through digital devices could also give a good indication of changes in behavior patterns. These behavior pattern changes could then provide health experts, psychologists, and social scientists with clues to developing effective programs for health management, disease prevention, and long-term psychological well-being.

Extensive surveys could be carried out to compare the usage of telehealth across different populations. The comparison might reveal which groups are vulnerable regarding access to telehealth services as well as their primary concerns. This finding could help healthcare providers deliver care to those who need it the most. Telehealth research requires interdisciplinary collaboration with medical science, electronic engineering, design, marketing, and sociology. Further research is needed to grasp paradoxes such as close/remote, connect/divide associated with consumer vulnerability using telehealth during and after the pandemic.

4.0 Concluding thoughts

This critical review responds to the call for more conceptual work by leading marketing scholars (MacInnis, 2011; Yadav, 2010) who recognize the significant contributions of conceptual research to the vitality of the discipline. Our paper adds value to existing research streams in consumer welfare, technology consumption, and disaster management by (1) linking the rapidly growing and yet fragmented literature on technology use during the pandemic across disciplines (i.e., *theory synthesis*), (2) applying a paradox lens to understand post-disaster technology consumption and consumer vulnerability (i.e., *theory adaptation*), and (3) categorizing and discussing the four paradoxes that underpin technology use during a crisis (i.e., *typology*) (Jaakkola, 2020). We encourage scholars to build on our work to advance this research area further.

The point of departure for future work is not to discover that technological paradoxes are prevalent but to study how we could embrace and confront these paradoxes and capitalize on the opportunities brought by technological advancement. We call for new and robust methods to overcome the limitations associated with the traditional research designs prone to response bias and that produce only limited insights. We see our work as a springboard for future scholarship and opening doors for other researchers to continue exploring this

important and challenging area. In particular, we call for a systematic literature review of technology consumption during crises as a critical next step in providing a state-of-the-art understanding of a research topic and in helping identify knowledge gaps and future research directions (See Paul and Criado, 2020; Paul et al., 2021b; Paul et al., 2021a). Such reviews are extremely valuable in knowledge advancement as they provide a robust theoretical infrastructure to direct future research systematically (for example, Paul et al., 2019; Paul and Feliciano-Cestero, 2021; Paul and Singh, 2017). The COVID-19 pandemic has brought unprecedented challenges and changes in our daily lives. We are living in a time when everything is different from what it was before. Those things that we considered to be certain are being revealed as uncertain. The pandemic has created different impacts or actions for different individuals living in different physical and social environments. We call for future studies to test the causality effects of the various pandemic conditions on consumer behavior as a critical step to examining and advancing our extant knowledge.

In closing, we would like to pose two fundamental questions that bring us back full-circle: 1) How might paradox serve as a theoretical framework to develop new understandings around the interplay between consumer vulnerability and contradictions associated with technology consumption? 2) How do we master the paradoxes arising from technology consumption to achieve a balanced position that allows us to realize economic and social goals, both in the short term and the long term? We keenly anticipate the solution to these questions from future scholarly development.

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Table 1: Approaches to Defining Consumer Vulnerability

Approaches	Description	Limitation
Demographic approaches	• View vulnerability as a status wherein all individuals within particular demographic groups (e.g., women, undereducated, low-literate, African Americans, the elderly, the poor) are vulnerable (Baker, 2009).	• Treating particular demographic populations as vulnerable is fundamentally flawed, leading to the generalization problem (Baker et al., 2005). • The static, one-dimensional view of vulnerability ignores the dynamism of vulnerability (Baker, 2009). • Confusion between the concepts of risk and vulnerability (Wisner, 2004).
Taxonomic approaches	• Using classification schemes such as physical (e.g., living in disaster-prone areas), economic (e.g., lack of resources), social (e.g., access to social support), or informational (e.g., emergency response training) to delineate different types of vulnerability (Baker, 2009). • Considered as a more advanced classification compared to demographic approaches (Wisner, 2004).	• As with the demographic approaches, the static, one-dimensional view of vulnerability ignores the dynamism of vulnerability (Baker, 2009). • The same conceptual confusion between risk and vulnerability as the demographic approach (Wisner, 2004). • The same generalizability criticism as the demographic approach (Baker, 2009).
Situational approach	• Treat vulnerability as a dynamic, multidimensional rather than a static state as in demographic and taxonomic approaches (Baker et al., 2005). • Whether vulnerability exists	• The same generalizability criticism as the demographic and taxonomic approaches (Baker, 2009). For example, the empirical findings from one disaster lack generalizability to other disaster

	depends on a combination of factors (e.g., context, individual characteristics, and situation) (Wisner, 2004). • Recognize the temporary state of vulnerability (Baker, 2009).	situations (Wisner, 2004).
Contextual and proactive	• Community-based participatory approaches (Baker, 2009). • Community members define their perceived strengths and weaknesses, as well as what risks they can live with and what risks need to be managed, and importantly, outsiders do not (Baker, 2009).	• People may be constrained by a short-term time orientation and everyday life activities that make taking time to engage in self-protection or empowerment-building opportunities difficult (Wisner, 2004).

Table 2: A Synthesis of Current Insights

Paradox	Current insights
Paradox 1: Technology-mediated consumption as a coping strategy	• The significant role of consumption as coping strategies for dealing with vulnerable experiences associated with disruptive events. • Impact of post-disaster coping processes on consumer well-being. • Internet shopping – empower and emancipate vulnerable groups in consumption goals accomplishment. • A surge of digital entertainment and gaming as adaptative coping actions in response to the COVID-19 pandemic is witnessed. • Compulsive technology-mediated consumption can exacerbate vulnerability and the challenges to readapt in the future. • Technology-related fatigue brings deleterious psychological side effects.
Paradox 2: Social media as a	• The roles of social media in building self and community resilience during a disaster and/or everyday life.

resource for consumer resilience	• The role of technology in bringing people together during the pandemic contradicts the dystopian perspective that considers technology destructive. • Social media and consumer well-being: is social media a friend or foe? • The virality of misinformation / fake news. • Digital inequalities exacerbate vulnerability.
Paradox 3: Innovations – the good, the bad, and the ugly	• Vulnerable consumers lack the knowledge to understand the privacy risk associated with data collection and sharing. • Mobile applications used to trace and contain the spread of COVID-virus may trigger psychological reactance as consumers attempt to retain their control, which may ultimately affect their motivations to adopt these measures. • The balancing act of using digital technologies and privacy protection. • Impact of forced technology use (e.g., contactless payment methods) on consumer vulnerability in the marketplace. • The importance of regulations for data protection in the post-pandemic era. • Fear of technological unemployment further exacerbate consumer vulnerability.
Paradox 4: The blessing and pitfall of telehealth services	• The critical role of telehealth during the COVID-19 pandemic. • The digital divide in telehealth magnifies the state of vulnerability among disadvantaged groups. • Critical challenges of telehealth adoption relate to the digital divide, data privacy, and security. • The significance of developing and maintaining an effective patient-doctor relationship in a technology-mediated medical environment facilitated by telehealth. • The potential negative impacts of telehealth on those vulnerable consumers who need healthcare services most.

Table 3: Paradox 1 – Future Research

Gaps & opportunities	Research directions
Capitalize on big data to understand sentiments about post-disaster technology use, coping, & changing lifestyle as people enter a 'new normal'	• What are consumer sentiments about technology-mediated coping strategies as well as the changing lifestyle beyond COVID-19? • How are coping strategies and resources developed and shared among weak ties digitally? How do they utilize these co-created resources to manage disaster-induced stress? • What education and training are needed to promote constructive post-disaster coping through technology-mediated consumption? • What role do human-technology interactions play in helping consumers to restore normalcy during a crisis?
Application of demand forecast tools to capture data on how the COVID-pandemic impacts online business performance	• What cultural meanings do consumers attach to online technologies? How do these meanings shape their coping through technology-mediated consumption in times of crisis? • How do non-typical or novice online shoppers perceive the act of shopping through digital means during a disaster? • What are the situational factors that stimulate consumers' interests and decisions to shop online?
Research opportunities to address challenges of vulnerable groups' marketplace navigation capability caused by digital divide	• How might the provision of online shopping infrastructure be best addressed to support consumers with poorer digital resources during a pandemic? • What are the intermittent events occurring in consumers' daily routines during a crisis that hinder or facilitate their online grocery shopping? • How should businesses incorporate crisis planning into their online shopping system and service design?

Methodological challenges that underpin the divergent findings regarding the effects of online gaming consumption	• To what extent do social factors (e.g., individuals' perception of social control and social cohesion), gaming time, and game-related attributes (e.g., gaming time and features) moderate the relationship between disaster-induced stress and compulsive technology-mediated consumption behavior? • What are the daily patterns of online gaming and entertainment among vulnerable segments during a pandemic? What long-term impacts can these online consumption preferences and patterns have on their cognitive and emotional development? To what extent do intervening variables such as individual traits, social and cultural capital, and socioeconomic status alter this impact?
Current literature dominated by protective view towards digital use, neglecting a balanced perspective on how screen use promotes or hinders well-being	• Which vulnerable subgroups face the greatest risk of compulsive technology-mediated consumption behaviors? • How best can corporations and governments work together to develop and promote balanced and effective approaches to digital gaming and entertainment?
The potential of neuroscientific methods for collecting objective data of consumers' post-disaster online behavior	• What consumer education programs, policies, and regulations are needed after the pandemic to a) empower vulnerable populations so that their resilience and coping capacity can be strengthened; and 2) protect vulnerable groups from the potential harm of online technology usage? • How could knowledge about post-disaster technology-based coping among older people be applied in the development of social, economic, and public policies?

Table 4: Paradox 2 – Future Research

Gaps & opportunities	Research directions
The prolonged COVID-pandemic presents research opportunities for longitudinal studies to examine the dynamic relationships between self/community resilience, social technologies, and consumer well-being	• How has social media been used in building self and community resilience during the COVID-19 pandemic? What have we learned from this pandemic that could be applicable to other disasters/crisis communications? • How has the increased social media use during COVID-19 lockdowns affected the online experiences of consumers? Do the experiences differ across different age groups, e.g., elderly vs. younger populations? • What are the effects of repeated media exposure about COVID-19 in traditional and social media on consumers' mental health? In particular, the young people? How can well-being be promoted?
Insights into how best to manage the paradox of social media consumption are warranted to advance the field of consumer studies	• How does misinformation/fake news affect various consumer groups during the pandemic? Are there any longer-term effects? What have we learned from this *infomedic* experience? • What could be done to curb the virality of misinformation/fake news? Who is/are responsible?
Research opportunities to explore the psychological motives behind intentional creation and/or sharing of fake news and its long-term effects	• What factors motivate/underpin the spread of misinformation and/or fake news? How do consumers perceive fake news? How equipped are various consumer groups (e.g., age, digital literacy, internet connectivity) to discern information from misinformation/fake news?

The potential of visual research and projective methods to delve into older consumers' unconscious thoughts/feelings concerning social media use	• Would the forced use of online technologies among the elderly exacerbate their vulnerabilities and create further social tension during a crisis? • How can vulnerable elderly segments who have been compelled to use online technologies such as social media amid the pandemic be protected? • In what ways do the preferences of the elderly in terms of digital technologies differ from younger people? • What can be done to increase elderly consumers' sense of autonomy and heighten pleasurable responses from using online technologies such as social media?

Table 5: Paradox 3 – Future Research

Gaps & opportunities	Research directions
Longitudinal studies to investigate the long-term effect of health surveillance and the changes in the privacy norm on consumer well-being	• How can we design health surveillance apps to control COVID-19 and any future pandemic, and at the same time, ensure that they do not hurt individuals' well-being? • How do consumers perceive the invasiveness of different mobile apps for health surveillance? What are the drivers for adopting the apps? What are the key factors influencing the usage of these apps?

Applied nature of research that provides insights into consumers' psychological and behavioral responses towards digital technology adoptions, which are valuable for health promotion apps design	• How can public or private companies design programs to educate vulnerable consumers and help them to understand the privacy risk associated with online activities and digital app usage? • What are the psychological and behavioral consequences of health surveillance for individuals? • How can governments and policymakers ensure privacy protection so that individuals are more likely to follow public health advice?
Research opportunities to reconcile the paradox of post-pandemic technology use and privacy protection	• What are the data collection measures, access, sharing, and usage that should be revisited and revised after the pandemic? • How has the privacy norm been changed by the pandemic? • What role do individuals play in reconciling the paradox of privacy using digital technologies during and post-pandemic? • What could consumers do to protect their privacy and welfare? • What are the implications for future privacy and public policy to protect consumers' rights? • How do innovations such as contactless payment impact vulnerable consumers?
Investigation into how fear of technological unemployment may exacerbate consumer vulnerability merits academic attention	• How do companion robots affect users' beliefs and behaviors? • How does technological unemployment impact service workers' wellbeing?

Table 6: Paradox 4 – Future Research

Gaps & opportunities	Research directions
Lack of patients' voice in telehealth research	• What are the consumers' expectations of telehealth providers? • What are the most important benefits the patients look for from telehealth services?
The need for research to predict the role of telehealth in post-pandemic healthcare delivery	• Who is most likely to benefit from telehealth? • What are the different needs and challenges of using telehealth among various groups (e.g., age, income, mobility, digital capability, social norms)?
Empirical attention needed on the role of patients in telehealth services	• What is the role of patients in telehealth delivery? What is an effective practice to facilitate patients' value co-creation using telehealth?
Research opportunity for adopting design thinking methodology to help blueprint telehealth service processes	• Which way of delivering care provides the optimal value for vulnerable consumers? • How can telehealth services be designed to benefit vulnerable consumers?
Empirical studies are needed to gather objective physiological and behavioral data on the long-term impact of telehealth services on consumer well-being	• What is the role of telehealth in improving consumers' self-management of health status, health behavior ,and long-term well-being? • What are the critical elements in developing and maintaining a good patient-doctor relationship over distance and time?
