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### TECHNOSTRESS IN DIGITAL GAMES: CASE GENSHIN IMPACT

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# TECHNOSTRESS IN DIGITAL GAMES: CASE GENSHIN IMPACT

*Research Paper*

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## Abstract

*As ubiquitous and pervasive information technologies (ITs) have become prominent, technostress (i.e., stress caused by IT use) has become an issue in different contexts. This is the case even in IT use that reflects things like fun and relaxation. One of the most common types of such IT use is playing digital games, which can also bring forth negative emotions in players. However, research on technostress emergence and mitigation in playing digital games is scarce. To address this gap, we conducted a qualitative study using semi-structured interviews focusing on one game, Genshin Impact. The game was chosen due to its global popularity and the suitability of its genre for exploring technostress. We contribute to research by explaining how different game features (gacha, time limits, controls, account, content updates) and activities (grinding/farming, daily missions, combat, cooperative gameplay) contribute to technostress emergence in digital games. We also discuss different strategies, such as multi-tasking, that can be used to mitigate stressful gaming experiences. Our results provide insights for information systems and game researchers, as well as for players and game developers.*

*Keywords: Technostress, Techno-distress, Techno-eustress, Digital games, Genshin Impact.*

## 1 Introduction

Playing digital games is an increasingly popular leisure activity. Digital games (i.e., games playable on computers, game consoles, tablets, and smartphones) are a part of modern entertainment culture and affect individuals similarly to other modes of entertainment. While digital games are generally considered fun and enjoyable, and people might even use them to cope temporarily with psychological stress (Hartanto et al., 2021), they have been associated with issues such as addiction (Kuss and Griffiths, 2012; Loton et al., 2016), problematic gaming (Blasi et al., 2019; Männikkö, Billieux and Kääriäinen, 2015), and overload (Ang, Zaphiris and Mahmood, 2007). However, there are still phenomena that require further research in the digital gaming context.

One such issue is technostress, which is stress caused by information technology (IT) use (Tarafdar et al., 2007). Extant literature shows that negative outcomes of technostress are many, including decreased job satisfaction and performance, exhaustion, sleep and concentration problems, and discontinuous use intention (Ragu-Nathan et al., 2008; Maier et al., 2015b; Salo, Pirkkalainen and Koskelainen, 2019; Tarafdar et al., 2007; Tarafdar, Tu and Ragu-Nathan, 2010). While early research on technostress focused on the adverse effects of technostress at work, there is growing interest in the role of technostress in personal IT use contexts. Furthermore, recent research shows that technostress is a complex phenomenon including not only negative (techno-distress) but also positive outcomes (techno-eustress) (e.g., Tarafdar, Cooper and Stich, 2019; Califf et al., 2015; Srivastava et al., 2015; Salo et al., 2018; Califf, Sarker and Sarker 2020; Califf, 2022).

Although several negative consequences of playing digital games have been studied before (Hartanto et al., 2021), the stress perspective has received less attention. This is especially true in relation to games as the source of stress, meaning that the dominant approach has been that playing digital games can alleviate stress (Hartanto et al., 2021). Some studies have explored, for example, violent games and their influence on stress (Hasan, Bègue and Bushman, 2013). However, explorations into different aspects of digital gaming (e.g., game features and game activities) and their relation to technostress are scarce. We find studying technostress in digital games essential because the number of gamers, which is already in the billions, is growing all the time (Clement, 2022), highlighting digital gaming as a significant part of IT use. While prior information systems (IS) research has shown the importance of understanding technostress and its mitigation both at work and in personal use, the digital gaming context has gained limited attention.

To address this research gap, we conducted a qualitative study using semi-structured interviews focusing on one digital game, Genshin Impact. Genshin Impact is a free-to-play open-world action role-playing game published in 2020 that is playable on different platforms, such as computers, PlayStation, and smartphones. The game has been a commercial success, being the fastest game ever to reach one billion dollars in revenue, and it is currently the third most profitable mobile game in the world (Chapple, 2021). Overall, the game has received widespread attention worldwide, highlighted by the fact that it was the most-mentioned game on Twitter in 2021 (Chadha, 2022). Genshin Impact incorporates playful and aesthetic elements from Japanese popular culture (e.g., anime and manga), eliciting affective outcomes in players that expand beyond the game itself (Woods, 2022a). Although the game is free-to-play, it employs a so-called gacha mechanic that incentivizes players to purchase loot boxes from which randomized virtual rewards, such as characters and items, can be obtained (Woods, 2022b). Loot boxes can be bought with in-game currency, which can be gained by investing real-world money or spending significant time completing repetitive tasks in the game (i.e., grinding/farming) (Woods, 2022a). Different features and activities central to the game offer interesting grounds for exploring technostress.

Therefore, the aim of the present study is to find out how individuals experience technostress while playing the game and how individuals can mitigate such experiences. We answer the following two research questions: **What parts of the gaming experience lead to technostress in the context of digital games? How can individuals mitigate technostress in the context of digital games?** Our findings highlight several game features (gacha, time limits, controls, account, content updates) and activities (grinding/farming, daily missions, combat, cooperative gameplay) that contribute to the emergence of technostress. Further, the results show that technostress in digital games is not solely negative but can also be positive. We found two game features (gacha and content updates) and one game activity (combat) producing positive technostress experiences. Our results show that to mitigate techno-distress, players use both problem-focused and emotion-focused strategies. In the digital gaming context, multitasking (e.g., watching videos, listening to music, and talking to friends while playing) seems to be a common problem-focused strategy to mitigate stress caused by dull and repetitive activities, such as grinding. Additionally, specific emotion-focused strategies include engaging in easy in-game activities to distract oneself and helping others. Our findings bring forth novel insights for IS and game research. As practical implications, the results provide information about game features and activities contributing to the emergence of technostress and possible mitigation strategies for players and game developers.

The remainder of the paper is organized as follows. Next, we present the theoretical background of our study. Following that, we outline the research methods used in the study. Subsequently, we present the results of our research. Finally, we discuss the research contributions of our study, followed by our study's limitations and possible future research directions.

## 2 Theoretical Background

### 2.1 Technostress

Technostress is stress caused by the individuals' inability to handle IT in a healthy manner (Tarafdar et al., 2007). The term was originally introduced by Brod (1982) but has gained more interest among IS

scholars during the past two decades. Technostress research in IS is based on the transactional theory of stress (Lazarus, 1966; Lazarus and Folkman, 1984), in which stress is seen as a process involving a transaction between the individual and the environment (Tarafdar, Cooper and Stich, 2019). Tarafdar, Cooper and Stich (2019, p. 8) define technostress as a process where “technology environmental conditions” are appraised as demands (i.e., technostressors) that burden the users, triggering “coping responses”, eventually leading to different types of outcomes for the individual. Prior research has discussed different technostressors, strains/outcomes, and mitigation mechanisms/strategies in different IT use contexts.

Technostressors identified in organizational settings include IT-related overload, invasion, complexity, insecurity, and uncertainty (Tarafdar et al., 2007; Ragu-Nathan et al., 2008), as well as work overload, role ambiguity, work–home conflict, and invasion of privacy (Ayyagari, Grover and Purvis, 2011). Due to rapid technological development and new ways of using IT, recent research has proposed novel stressors, such as monitoring via technology and cyberbullying (Fischer, Pehböck and Riedl 2019). Research has shown that technostress results in many adverse outcomes (i.e., strains), such as decreased job satisfaction and performance, exhaustion, sleep and concentration problems, and discontinuous use intention (Ragu-Nathan et al., 2008; Maier et al., 2015b; Salo, Pirkkalainen and Koskelainen, 2019; Tarafdar et al., 2007; Tarafdar, Tu and Ragu-Nathan, 2010).

Today, technostress is seen as a complex phenomenon that may have not only negative but also positive impacts on users (e.g., Tarafdar, Cooper and Stich, 2019). While prior research has focused mainly on negative technostress (i.e., techno-distress), in recent years, IS scholars have started to pay attention to techno-eustress, which refers to stress that might be challenging or thrilling (Califf et al., 2015; Srivastava et al., 2015; Salo et al., 2018; Tarafdar, Cooper and Stich, 2019; Califf, Sarker and Sarker 2020). For example, individuals may appraise their interaction with IT as increasing their motivation to solve problems (Tarafdar, Cooper and Stich, 2019). Previous studies on techno-eustress have identified so-called challenge-stressors (i.e., positive stressors) that are associated with, for example, IT enabling faster and more efficient work, learning IT skills, and solving problems using IT (Benlian, 2020). Thus, technostressors and the associated outcomes in the organizational context are many. Next, we discuss how the organization-focused technostress research has expanded into the personal IT use context.

## 2.2 Technostress in Personal IT Use

While most prior technostress research has focused on work-related stressors (e.g., Tarafdar et al., 2007; Ragu-Nathan et al., 2008; Tarafdar, Tu and Ragu-Nathan, 2010; Ayyagari, Grover and Purvis, 2011; Califf et al., 2015; Galluch, Grover and Thatcher, 2015), there is growing interest among scholars to understand technostress in the context of personal IT use (e.g., Lee et al. 2014; Maier et al., 2015a; Maier et al., 2015b; Salo, Pirkkalainen and Koskelainen 2019; Salo et al., 2022). Hedonic systems such as digital games and social networking services (SNSs) have shifted the motivation to use IT from utilitarian reasons to hedonic ones (Turel and Serenko, 2012). Although personal IT use is fundamentally voluntary and often reflects hedonic gratifications, such as fun and perceived enjoyment (van der Heijden, 2004; Li et al., 2015; Venkatesh, Thong and Xu, 2012), technostress is unexpectedly common in personal use contexts (Salo et al., 2022).

While some technostressors can occur both in organizational and personal use contexts (e.g., invasion and overload), some stressors are more prevalent in personal IT use, such as fear of missing out (Przybylski et al., 2013; Dhir et al., 2018), social comparison (Fox and Moreland, 2019; Salo, Pirkkalainen and Koskelainen, 2019), social overload (e.g., Maier et al., 2015a; Salo, Pirkkalainen and Koskelainen, 2019; Tarafdar et al., 2020), and compulsive use (e.g., Dhir et al., 2018; Lee et al., 2014). Encountering technostressors in personal IT use can result in strains and other outcomes such as fatigue and anxiety (Dhir et al., 2018), social relation issues (Fox and Moreland, 2019; Salo, Pirkkalainen and Koskelainen, 2019), exhaustion and discontinuance intention (Maier et al., 2015a), sleep and concentration issues (Salo, Pirkkalainen and Koskelainen, 2019), and even addiction (Tarafdar et al., 2020). Such stress experiences are especially highlighted in using different SNSs as users must deal with constant information flow due to SNSs’ characteristics (e.g., push notifications and real-time information renewability) (Salo,

Pirkkalainen and Koskelainen, 2019). As presented in the preceding two sections, IS scholars have shown that technostress is a common and harmful phenomenon in different IT use contexts. However, there is still a limited understanding of how IT users can mitigate technostress, which we will present next.

### 2.3 Technostress Mitigation

Technostress mitigation has gained limited attention especially in personal IT use contexts (Salo et al., 2022). Previous research has focused mostly on IT use in organizations in which technostress can be mitigated, for example, through organizational support (e.g., Ragu-Nathan et al., 2008; Tarafdar et al., 2011; Tarafdar, Pullins and Ragu-Nathan 2015). In addition, IT users in work contexts can employ reactive (e.g., distress venting and distancing from IT) and proactive strategies (e.g., positive reinterpretation and IT control) to deal with technostress (Pirkkalainen et al., 2019). A recent study by Salo et al. (2022) provides an understanding of technostress formation in the personal use context, activities on how technostress can be mitigated, and possible barriers to such mitigation. The results of the study show that users need self-regulation abilities to successfully mitigate technostress in personal IT use. The authors found four mitigation strategies for changing IT use practices—modifying IT use, switching to alternative IT, taking a temporary break from IT, and quitting use permanently. Additionally, the results of the study show that users need self-regulation abilities to successfully mitigate technostress.

These findings are in line with those of other studies that have applied stress literature (Lazarus and Folkman, 1984) and individuals' two main coping strategies to deal with stress—problem-focused coping (handling the problem) and emotion-focused coping (managing one's emotions). In technostress context, problem-focused mitigation focuses on reducing stressors, modifying IT features and use routines, whereas emotion-focused mitigation focuses on tolerating stressors (modifying personal reactions to IT stressors and recovering from strain), such as taking temporary breaks from IT, online/offline venting (Salo, Pirkkalainen and Koskelainen 2017), and distracting (Tarafdar, Cooper and Stich, 2019). In the present study, we take a similar approach and categorize and discuss technostress mitigation strategies as either problem-focused or emotion-focused. As we have presented the theoretical background of technostress, its emergence, and its mitigation, we move forward and apply the literature to explore a new context for technostress and its mitigation—digital games.

## 3 Research Methods

### 3.1 Data Collection

To understand individuals' digital gaming behavior and experiences in detail, we used qualitative research methods that have been highlighted as appropriate for researching emerging IS phenomena (Monteiro et al., 2022). As we are studying stress, which is a highly subjective experience, we found interviewing people about their experiences a suitable way of collecting data. The data was collected via semi-structured interviews during the spring of 2022 as a part of the master's thesis of one of the authors. The criteria for the interviewees were that they had to be over 18 years old, from Finland, and had to play Genshin Impact. Prior experience of technostress was not a criterion for the interviewees, although we eventually observed that all participants had encountered stressful experiences while playing the game. Interviewees were sought from the personal contacts of one author with the help of snowball sampling (Myers and Newman, 2007). Interviewees were also sought from a Genshin Impact discussion channel on an SNS. Although the player base in Genshin Impact is almost evenly distributed between males and females, we ended up with a majority of females due to the channels used for our recruiting. Also, even though our focus was not on different types of players (e.g., "casual" vs. "hardcore"), all interviewees were asked whether they considered themselves more casual (i.e., not taking the game too seriously) or hardcore (i.e., taking the game more seriously; the term "hardcore" is often used in the context of digital gaming). As Genshin Impact is more known for its narrative and visual elements, it was natural that our interviewees consisted mainly of more casual players. Eventually, nine interviews

of an average duration of 50 minutes were conducted. Background information of the interviewees is presented in Table 1 below.

#	Age	Gender	Experience with Genshin Impact	Adventure rank*	Player type	Average weekly game time	Game platform(s)
1	21	Female	~5 months	55	Casual /Hardcore	7-10 hours	PC, previously smartphone
2	20	Female	~10 months	56	Casual	50 hours	Smartphone
3	28	Female	~17 months	55	Casual	0-12 hours	PlayStation
4	26	Female	~6 months	57	Casual	10 hours	PlayStation
5	28	Female	~19 months	58	Casual/ Hardcore	12 hours	PC
6	30	Male	~19 months	58	Hardcore	6-7 hours	PC, smartphone
7	24	Female	~19 months	58	Casual	3 hours	Tablet, PlayStation
8	31	Male	~19 months	58	Casual	1-3 hours	PC, smartphone
9	26	Female	~1 month	41	Casual	50-60 hours	PC

\*Adventure rank measures account progression.

Table 1. Interviewee background information.

As is the nature of semi-structured interviews, we did not ask all the interviewees the same questions word for word but focused the interviews on central themes. The interviews had two main themes: 1) general feelings about playing Genshin Impact and 2) specific positive/negative experiences while playing Genshin Impact. The second theme also included questions about how the interviewees had alleviated the negative feelings they experienced while playing. We did not ask the interviewees specifically about experiencing technostress. Instead, we sought information about stressful experiences by focusing on the interviewees' negative and positive emotions while playing. The interviewees were asked questions such as "What kinds of feelings do you have during gaming sessions?" (Theme 1), "What kinds of situations, factors, or events have been associated with negative/positive emotions?" and "What concrete actions have you engaged in to alleviate the negative emotions?" (Theme 2). With these questions, we were able to elicit information about the interviewees' stressful experiences while playing, in addition to finding out what things in the game were causing stress. By asking how the interviewees had alleviated different negative emotions, we could also gain insight into different technostress mitigation strategies they had employed.

### 3.2 Data Analysis

Once completed, the interviews were transcribed by one of the authors. Already during the transcribing, the data were categorized into different themes (e.g., general feelings, negative/positive emotions, alleviating negative emotions). Thus, we engaged in thematic analysis by creating different categories within which patterns were sought later (Braun and Clarke, 2006). The analysis was done initially using Microsoft Excel and pen and paper. Later, Delve software was used to ease the coding and analysis processes. During our analysis, we observed that in addition to technostressors and strains/other outcomes, different game features (i.e., aspects that shape the game artifact) and activities (i.e., players interacting with the game artifact) seemed central to the participants' technostress experiences. We searched for patterns in our data by, for example, exploring different negative and positive emotions reported by the interviewees and tracing the source of the emotions to different situations. Thus, based on the concepts central to our analysis, we attempted to create an overall view of the phenomenon under investigation (Dey, 1993). As the current work was based on the master's thesis of one of the authors, we worked with the data collected for the thesis, analyzing the data further in this paper. For example,

we further delineated the different game features and activities associated with experiencing technostress.

By focusing on negative and positive emotions, we were able to elicit information about both distress and eustress experienced by the interviewees. Our analysis process can be described with examples. An example of distress was when an interviewee explained how time limits in events had pressured her to play, leading to negative emotions (distress caused by time limits via fear of missing out and annoyance). On the other hand, an example of eustress was when one of the interviewees explained how while playing with friends, they waited in excitement to see if one of them would receive the character they wanted (eustress caused by gacha elements via thrill and excitement). For technostress mitigation, we identified specific strategies and categorized them into problem-focused (e.g., multitasking) and emotion-focused strategies (e.g., helping others). We sought out stressful gaming situations for which different technostress mitigation strategies were used. If the stress was caused by, for example, the dullness of grinding, it was common for the interviewees to mitigate the stress by doing something on the side (i.e., multitasking), such as listening to music or chatting with friends. Finally, we read our data one more time, ensuring that our reported results aligned with what our interviewees had said, making refinements to our findings. During the analysis phase, we compiled relevant direct interview quotes (translated from Finnish to English) as evidence of our findings; these are presented in the next section, along with the results of our study.

## 4 Results

### 4.1 Techno-distress

The interviewees had experienced techno-distress while playing Genshin Impact in many ways. We present the findings by showing how the game's different features (gacha, time limits, controls, account, content updates) and activities (grinding/farming, daily missions, combat, cooperative gameplay) contribute to the emergence of techno-distress.

**Gacha**, and the randomness associated with it, is an integral part of Genshin Impact, and the uncertainty caused by it could be seen as an intended outcome of the game. Nevertheless, it was reported as leading to negative consequences, such as annoyance and disappointment due to individuals not receiving the items or characters desired. Such feelings could last for a while, as one of the interviewees described:

*Sometimes the things in the game annoy me only for a while. [...] But if I try to get a character that I have saved up for a long time and don't get it, it might bum me out for multiple hours and could also bum me out outside of the game. (Interviewee 6)*

**Time limits** are sometimes part of the content playable in Genshin Impact, meaning certain activities are only available to the players during a pre-set time frame. For many, this was stressful due to fear of missing out. Although this could be seen as an intended outcome to keep the players more engaged (similar to gacha and uncertainty), playing time-limited content was nevertheless appraised as stressful by many interviewees. This was especially the case when the interviewees were otherwise busy in their lives, unable to play to the extent the content required. Navigating such conflicts between different responsibilities and gaming can be stressful, as one interviewee described:

*You feel stressed out when you realize that you have a week left to do something, and it is a non-recurring event, so it causes stress. You think that "Okay, this takes this amount of time to do, and I have this amount of time available for the game, when should I play, and is it worth it for me to play". You must weigh the pros and cons and prioritize accordingly. (Interviewee 3)*

One of the things that caused distress for the interviewees was the **controls** of the game. Depending on the platform played on, some controls were considered complex and demanding to master, which could be annoying. This was particularly true for interviewees who played on multiple platforms, saying it was difficult to adapt to new controls. For example, aiming with certain characters and communicating were reported as difficult to do with a controller. As the only way of communicating with others in-



game is via text chat, communicating with a controller was mentioned as making the social dimension less enjoyable and even stressful, as one interviewee discussed:

*But on PlayStation, it is so annoying that you have to use the controller to search the letters from the keyboard [“on-screen” keyboard]. It is so slow and stupid. I am even less excited to participate in the social side. (Interviewee 4)*

Some interviewees experienced distress due to **fear of losing account progress**. This could happen, for example, when the device on which the interviewee had been playing the game broke. One interviewee explained how it had taken her a week to gain access to her account after breaking the device on which she used to play (due to her switching operating systems, which caused issues with her Genshin account tied to the old system), which was a stressful experience for her:

*Well, it was a bit stressful, wondering what would happen, would I lose the whole thing and have to start all over. Six months of work, and then the whole account disappears. [...] When I didn't know what happened and why it happened, then I was like, “[grunts audibly] What to... What to do?”. (Interviewee 2)*

Genshin is such a game that has regular **content updates** (e.g., new missions, areas, and characters). Although for many this was positive, some told that this contributed to anxiety due to uncertainty and overload:

*If lots of [content is updated], you feel like, “Oh no, how do I have time to do everything, where to start from?” [...] It almost brings me anxiety. Like, if a new large area comes, it is a bit stressful, like, do I remember to check every corner there. (Interviewee 1)*

In Genshin Impact, sometimes the players have to perform dull, repetitive activities (i.e., **grinding/farming**) to gain materials and progress. This was reported as stressful due to, for example, the exhaustion caused by the overload of grinding. Grinding involves specific activities, such as leveling new characters or collecting items. As one interviewee explained, this can be exhausting:

*You have to collect everything possible before a [new] character comes, and with high pressure, collect and do everything you can. So yeah, then you feel a bit exhausted, you feel like not playing, but you still play. (Interviewee 2)*

In farming, the players repeatedly do something trying to get a specific type of outcome from an activity (e.g., a particular reward from killing a monster) that is randomly generated. This is often done by more hardcore players who attempt to optimize their characters. This is done in, for example, farming for artifacts (i.e., an item that makes the character stronger). One of the interviewees who occasionally played more seriously explained that optimizing artifacts can take time due to randomness, which can be stressful:

*I farmed two to three months for artifacts for [a certain character], and now it [the character] has a new set [available], and now I have to farm again. [...] It annoys me that I wasted time on the old artifacts [...] It sucks, it really sucks. (Interviewee 1)*

The game has **daily missions** from which the players receive valuable resources with which they can, for example, develop their accounts and improve their weapons. The interviewees reported that completing these daily missions was sometimes stressful, but they still did them because the rewards were deemed necessary. As one interviewee said, she felt pressured to do them even when she did not feel like it:

*It interrupts my evening routine, and it is like, an extra job, an extra chore I still have to do. Even though it is just a game, sometimes it feels more like a job. You have to force yourself to play. (Interviewee 7)*

**Combat** (i.e., fighting enemies) was discussed as contributing to distress, especially when combat was considered too challenging. The interviewees' reports underlined that this could lead to irritation or even anger. This was especially true regarding the most challenging content in the game (i.e., Spiral Abyss). Although the content is supposed to be hard, the challenge was too much for many participants, contributing to distress. In addition, the game has a feature in which the so-called World Level can increase,

which makes the game more difficult (i.e., harder enemies and challenges). To raise the level, the players must engage in a difficult challenge, relating to which one interviewee explained:

*It is very stressful, and you feel irritated if you don't succeed. You, for example, run out of time in the battle. And if the enemies are so strong that you just can't beat them and your characters die, you feel very irritated. And sometimes, you feel like throwing the computer to the wall. (Interviewee 9)*

Even though Genshin Impact is primarily a single-player game, there is also **cooperative gameplay**. Our interviewees highlighted cooperative gameplay with their friends as a positive thing. However, playing with strangers was seen as a burden. Although cooperative gaming with strangers could elicit positive feelings in players, in our interviews, engaging in such play caused distress due to uncertainty and role conflict. Uncertainty and role conflict emerged due to, for example, the interviewees not knowing how the other players would behave. As one interviewee described:

*[Playing] with strangers is pretty stressful when you don't know what kinds of players they are. Or how they will behave. (Interviewee 5)*

As shown in this section, many game features and activities can contribute to techno-distress in Genshin Impact. Next, we present how the experienced stress might be not solely negative.

## 4.2 Techno-eustress

The interviewees also experienced techno-eustress while playing the game. Two game features (gacha and content updates) and one game activity (combat) were associated with techno-eustress. For example, the interviewees described curiosity, exploration, and adventure, when new areas or events were added to the game, and they looked forward to engaging with them. One interviewee explained that she was excited to see how the story of the game would progress and how it would feel to try out new things in the game. She said that exploring new things sparked curiosity in her:

*I'm interested to see what will happen with the story. The main story is exciting, and I am intrigued to see the new characters that will come. And I am interested in [a new game activity] and what it will be like to play it. [...] There is so much still unknown stuff, and I am interested to see and play them. (Interviewee 8)*

Eustress associated with combat was observed to be present when the challenges were neither too easy nor too difficult. Thus, when the game presents players with challenges appropriate for their skill level, positive stress can emerge due to players beating the challenges. As one interviewee stated:

*If there is [an event] where you have to defeat many [enemies] in a set time, and that is a clear challenge you have to complete, and then you complete it, you feel a sigh of relief and contentment with yourself. Like, "I am so good". Feelings of accomplishment. (Interviewee 3)*

Experiences relating to excitement were also common for the interviewees. Interestingly, concerning the game's gacha elements the line between positive and negative excitement was often blurred. However, the experiences relating to gacha described by the interviewees were sometimes stressful in a positive way, reflecting techno-eustress. For some, this was a collective experience, and one interviewee described how they waited together in excitement using screen share to see whether someone would receive a character they were hoping for.

In Table 2 below, we have compiled game features, game activities, technostressors, and strains/other outcomes (distress and eustress) we observed in our interviews associated with playing Genshin Impact.

Game feature	Technostressor(s)	Strains/Other outcomes		Example(s)
		Distress	Eustress	
gacha	uncertainty, randomness	annoyance, frustration, disappointment	-	Not getting the desired reward from the gacha system.
	thrill	-	excitement, satisfaction	Anticipating and receiving a reward from the gacha system.

time limits	overload, fear of missing out	exhaustion, annoyance	-	Engaging in time-limited events that force you to play during certain times.
controls	complexity	annoyance, irritation	-	Trying to communicate with others (by typing) in-game using a controller.
account	fear of losing account progress	anxiety	-	Breaking the device played on and losing access to one's account.
content updates	uncertainty, overload	anxiety	-	Uncertainty of (upcoming) content updates.
	curiosity, exploration, adventure	-	discovery, excitement	Exploring and discovering new game areas.
Game activity	Technostressor(s)	Strains/Other outcomes		Example(s)
		Distress	Eustress	
grinding/farming*	overload, repetition, randomness (only farming), uncertainty (only farming)	exhaustion, burnout, boredom, frustration	-	Having to do the same (dull) things repeatedly to receive rewards, especially when there is randomness associated (only farming).
daily missions	overload, interruptions, repetition	compulsion, pressure, sleep issues, boredom	-	Realizing at night that one still has to complete the daily missions.
combat	complexity, overload	irritation, anger	-	Engaging in too difficult battles.
	challenge, thrill	-	achievement, sense of accomplishment	Completing a difficult combat challenge.
cooperative gameplay	uncertainty, role conflict, interruptions	anxiety, annoyance	-	Engaging in cooperative gameplay with strangers.

\*Although grinding and farming are not synonymous, they are similar in nature (completing repetitive tasks), and for simplicity, we combined them in the table.

Table 2. Game features, game activities, and technostress.

### 4.3 Techno-distress Mitigation

We also explored how the interviewees had mitigated the techno-distress they experienced. For example, if difficult battles were the source of distress, this was often mitigated by moving away from the game or doing something else in-game. Also, the interviewees were often inclined to ask for help in such situations. On the other hand, distress associated with gacha elements was mainly handled through one's own emotions. We highlight that eustress does not call for mitigation, as it is perceived as a positive experience. However, eustress can be a part of distress mitigation, as we observed how individuals could convert distress to eustress. For example, this can be done in combat situations that are too complex and difficult by moving away from the enemies and fighting weaker enemies instead. As one of the interviewees explained:

*Sometimes you go somewhere to bully some little enemies you can kill with one hit, and then you feel like, "Yeah, I am not so bad at this game after all". (Interviewee 5)*

We observed both problem-focused and emotion-focused strategies for mitigating technostress in our interviews. **Problem-focused** strategies identified in our study include changing gaming practices, multitasking, taking temporary breaks, and switching technology. Although multitasking is often associated with causing techno-distress, many of our interviewees multitasked while playing to make dull activities, such as grinding and completing daily missions more enjoyable and less stressful (e.g., by listening to podcasts and talking to friends). As one interviewee explained:

*Podcasts and such also bring some intellectual stimulation to those routine things and annoying grinding. Your alertness levels keep up. To endure the boredom in the game, you do something else. It is pretty horrible that you have to do something else to stand playing the game, even though the game itself should be enjoyable [laughs]. (Interviewee 3)*

Some interviewees took temporary (shorter or longer) breaks from the game to mitigate the experienced distress. This happened, for example, when they burnt out due to feeling like playing the game was a burden resulting in taking extended breaks from the game. Even though the breaks helped mitigate the experienced distress, taking breaks in gacha games is not always straightforward. As one interviewee said, breaks can contribute to fear of missing out, thus increasing distress instead of mitigating it:

*Gacha games also create a bigger pressure of not stopping. It creates a feeling that if you now stop for a while or take a break, you will miss everything, so you feel pressure that it would be more difficult to return to the game. (Interviewee 6)*

**Emotion-focused** technostress mitigation strategies identified in our study include modifying attitude, distracting in-game, distracting outside of the game, venting, asking for help, and helping others. Many interviewees changed their attitudes toward stressful situations. This was done concretely by reminding oneself that it is only a game and the negative feelings will not last for long and accepting that some negative experiences are part of the gaming experience. As one interviewee said about gacha:

*I haven't let the gacha element get under my skin. I have just accepted it as it is. (Interviewee 8)*

Alternatively, some interviewees reported stepping away from the game (e.g., to drink water) to alleviate the negative feelings. Some reported venting out their frustration to mitigate the negative emotions. This was often done by sending messages to friends, but sometimes the frustration was vented out loud while alone (e.g., by cursing). One interviewee associated venting with peer support:

*The shared experience of the pain, meaning that also others have issues and are annoyed by the same things. (Interviewee 3)*

In addition to venting, it was common for the interviewees to ask for help from others if they experienced distress while playing. Help could be in the form of seeking advice or concretely asking someone to help you. For example, one interviewee said that she had moved from playing on a smartphone to playing on a PC, and the change had been difficult for her. Therefore, she was not able to beat some of the enemies on PC, which caused distress, and she sought help from her partner:

*The controls are complex on PC, which makes fighting difficult. I don't know how to dodge and always select the wrong character. [...] I tried to defeat one boss on PC, but it was not going well, and I started crying, so my partner finally did it for me. (Interviewee 1)*

In Table 3, we have compiled examples of the interviewees' problem-focused and emotion-focused mitigation strategies, along with examples.

<b>Problem-focused</b>	<b>Example(s)</b>	<b>Emotion-focused</b>	<b>Example(s)</b>
Changing gaming practices	Avoiding participating in activities that are known to be too challenging.	Modifying attitude	Modifying one's attitude in situations that are known to be stressful (e.g., situations with gacha).

	Improving one's skills so one would be able to beat the challenges that are causing distress (i.e., mastery).	Distracting in-game	Engaging in an in-game activity that is not stressful to distract oneself.
		Distracting outside of the game	Stepping away from the game and doing something else (e.g., drinking water) to reduce stress.
Multitasking ( <i>new finding</i> )	Doing something simultaneously (e.g., listening to podcasts, watching videos, chatting with friends) while engaging in a dull game activity (e.g., grinding).	Venting	Cursing, yelling, or discussing with friends to air out frustration.
Taking temporary breaks			
Switching technology	Switching to another game when experiencing exhaustion.	Asking for help	Asking for help/seeking advice in a stressful gaming situation.
		Helping others ( <i>new finding</i> )	Helping others in difficult gaming situations to receive positive feelings to mitigate own distress.

Table 3. Techno-distress mitigation.

## 5 Discussion

### 5.1 Research Contributions

Our study had two research questions: What parts of the gaming experience lead to technostress in the context of digital games? How can individuals mitigate technostress in the context of digital games? By answering the questions, our study makes three key research contributions. First, we examine the concept of technostress in the digital gaming context and offer new insights for both technostress and game research. Even though technostress research has gained attention in personal IT use, such as SNSs (e.g., Maier et al., 2015a; Maier et al., 2015b; Salo, Pirkkalainen and Koskelainen, 2019; Tarafdar et al., 2020), research focusing on technostress in digital games is scarce. We found some similarities between technostress in digital games and previously studied contexts (e.g., SNSs), especially associated with fear of missing out (e.g., Dhir et al., 2018) and overload (e.g., Maier et al., 2015a). However, as certain features and activities in the digital gaming context we studied are not present in SNSs (e.g., gacha and combat), we identified technostress experiences unique to gaming (e.g., distress caused by the randomness of gacha and positive stress associated with achieving something relating to combat). Stress as a concept has been associated with gaming, for example, focusing on stress caused by violence in digital games (Hasan, Bègue and Bushman, 2013). However, the dominant approach to stress and digital games has been that gaming can help alleviate distress (Hartanto et al., 2021). We add to research by exploring specific game features and activities and their relationships with techno-distress and techno-eustress. We observed technostressors associated with both negative and positive outcomes of stress. For example, we extend previous research by exploring gacha elements as something that contribute to the formation of techno-distress (e.g., annoyance and frustration) and techno-eustress (e.g., excitement and satisfaction). Previous studies on gacha games have primarily focused on the monetary aspects of gacha games (e.g., gambling and monetization) (Woods, 2022b). Conceptualizing gacha elements as game features that trigger stressors and strains/outcomes in digital gamers gives us new insight into the multifaceted consequences of such elements in digital games.

Second, we add to the discussion of previously less studied positive technostress (i.e., techno-eustress), which has not been studied extensively in personal IT use. In extant research, techno-eustress has been approached with the concept of challenge-stressors (Califf, Sarker and Sarker, 2020; Benlian, 2020). As challenge is often central to playing digital games, some stressors could be appraised as challenge-

stressors. However, we see that eustress is not solely associated with challenges but can also be approached from, for example, the perspective of experiencing thrill or discovering something new and exciting. Although Tarafdar, Cooper and Stich (2019) mention techno-eustress and thrill in their theoretical paper, such has not been studied further in empirical research. Also, extant research shows that the same elements of IT can contribute to both negative and positive outcomes (Chen and Karahanna, 2018). In the present study, we found that certain game features and activities can contribute to both distress and eustress, which we observed in relation to gacha, content updates, and combat. Additionally, we found that it is not always apparent whether the experienced technostress is negative or positive in certain gaming situations, and it can vary between individuals, as is the nature of stress (Lazarus and Folkman, 1984). This highlights the complexity of stress experiences while gaming, underlining the need for further exploration and explanation. Moreover, as eustress is something to strive for and distress is something to avoid, we explain how distress can be converted to eustress. For instance, when an individual experiences techno-distress due to too difficult combat, they can move on to a more manageable challenge to achieve feelings of accomplishment by defeating the challenge (i.e., eustress). Individuals could also do this by managing their expectations of upcoming experiences.

Third, our study offers new insight for research addressing technostress mitigation in personal IT use. We identify strategies for mitigating techno-distress that have not been discussed before by showing how multitasking can be used to mitigate distress while gaming. This can be done by, for example, chatting with friends, listening to music or podcasts, or watching videos while engaging in dull gameplay (e.g., grinding). Previous studies have associated multitasking with contributing to technostress (Reinecke et al., 2017; Tarafdar, Tu and Ragu-Nathan, 2010), but our results demonstrate how multitasking is not solely harmful. Although multitasking has been studied in relation to coping with different negative situations (e.g., Shin and Kemp, 2020), multitasking to mitigate technostress is a new finding. In addition, we show how helping others in digital games can be used to mitigate one's own distress caused by gaming. Also, we highlight how technostress mitigation relating to gacha games can be difficult due to, for example, fear of missing out, thus extending previous research on technostress mitigation and its barriers in personal IT use (Salo et al., 2022).

## 5.2 Practical Implications

Our study has several practical implications. As we identified different game features and activities that can contribute to the emergence of stress, our results can help game developers. Game developers can make design choices that consider the different consequences of certain game features and activities, both from the distress and eustress perspectives. For example, as time limits in events were found to cause distress for our participants, game developers can reconsider implementing such features. The same applies to certain gacha elements. Although these are at the core of free-to-play games, high levels of technostress can lead to discontinued use, and we encourage game developers to consider this. Game developers can also aim for implementing features and activities that players associate with elevated levels of eustress. From the player perspective, we identified different strategies for mitigating technostress, and the players themselves can learn from our results. As the experiences in gaming are shaped by the interaction between players and the games, the players themselves can affect the consequences of their own actions. As the stress process in gaming is very complex and dynamic due to the subjective nature of experiencing stress and unique player characteristics varying from individual to individual, more transparent communication is required between game developers and players to create gaming environments that elicit positive outcomes for different stakeholders.

## 5.3 Limitations and Future Research

Our study has several limitations. First, the number of interviews is the major limiting factor in our research. Although we believe we were able to obtain a deep understanding of the players' experiences from the nine interviews conducted, more interviews could have yielded more profound knowledge, for example, considering possible eustress associated with cooperative gaming. Thus, we do not claim reaching data saturation. Nevertheless, we consider our findings interesting, important, meaningful, and

something that future research could build on. Second, we only focused on one digital game, and it is possible that some of the things presented in our study do not apply to other games, as every game is unique. However, this is also grounds for further research, and we invite other scholars to compare our results with findings in different gaming environments. Third, as digital games have not been studied from the technostress perspective, we had to adapt concepts from different research contexts.

In future research, scholars could dive deeper into technostress mitigation in digital games, for example, by exploring means beyond problem-focused and emotion-focused strategies. We saw preliminary evidence that technostress mitigation strategies in digital gaming could be proactive and reactive. Such categorization has been used in previous technostress research (Pirkkalainen et al., 2019), and this could also be done in the digital gaming context. Also, more research on what game developers have done and can do to combat the technostress experienced by players could be carried out. It could also be interesting to study the differences in technostress experiences by comparing different types of players. Different types of players could be, for example, newer and older players or “casual” and “hardcore” players.

## 6 Conclusion

Playing digital games is an increasingly popular leisure activity. Although gaming is often considered enjoyable and relaxing, players may encounter different negative situations and experiences while playing. In this research, we studied one digital game, Genshin Impact, and identified key game features and activities that play a role in the emergence of technostress while playing the game. We showed how technostress in this context is not solely negative (i.e., techno-distress) but can also be positive (i.e., techno-eustress). Techno-eustress can emerge, for example, due to players encountering and beating challenges. We extend research on digital games by exploring gacha elements and their effects from a new perspective (i.e., technostress). Thus, our results offer novel insights for both technostress and game research. As a practical contribution, game designers and developers can use our findings to address different aspects of technostress emergence while creating games to improve player experience.

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