"My Mother Told Me These Things are Always Fake" — Understanding Teenagers' Experiences with Manipulative Designs

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ABSTRACT

Manipulative and deceptive design practices are ubiquitous, impacting technology users in various ways across several domains. Certain groups are likely more susceptible to these impacts but have not received sufficient attention yet. In this paper, we seek to characterize one such understudied group, describing teenagers' experience of manipulative design. We conducted semi-structured interviews with six teenagers between 15 and 17 years old, to understand their daily interactions with manipulative designs in three contexts: social networks, video games, and e-commerce. Using reflexive thematic analysis, our findings describe how risk is a shared experience for teenagers, and interrogate how teenagers' personal and social context shape their experience of risk. We relate our findings to existing knowledge about how the general population is impacted by manipulative design practices and consider opportunities to further understand and support the experiences of teenagers and other vulnerable groups.

CCS CONCEPTS

• **Human-centered computing** → **Empirical studies in HCI**; • **Social and professional topics** → **Adolescents**.

KEYWORDS

manipulative design, deceptive design, dark patterns, user experience, teenagers

ACM Reference Format:
Lorena Sánchez Chamorro, Carine Lallemand, and Colin M. Gray. 2024. "My Mother Told Me These Things are Always Fake" — Understanding Teenagers' Experiences with Manipulative Designs. In *Designing Interactive Systems Conference (DIS '24), July 01–05, 2024, IT University of Copenhagen, Denmark.* ACM, New York, NY, USA, 14 pages. https://doi.org/10.1145/3643834.3660704

1 INTRODUCTION

"Please stop using your phone at dinner! Do you know what time it is? You have school tomorrow, turn off the computer! Stop playing videogames, go outside and play with your friends." Manipulative designs—commonly known as "dark patterns"[1] — are "user interface design choices that benefit an online service by coercing, steering, or deceiving users into making decisions that, if fully informed and capable of selecting alternatives, they might not make" [44]. These manipulative practices have pervaded the lives of teenagers [13, 28, 53], who are considered a vulnerable population online by researchers [37, 71] and policymakers [3, 53, 55], as evidenced by the 2023 OECD report of online vulnerability in consumer protection [55]. Teenagers' specific position and understanding of the online world makes them more willing to take risks while lacking resources to cope with harm [34]. Despite the impact of manipulative designs on teenagers, which is a rising concern [24], there is still an important research gap.

In the past years, scholars have contributed to a growing body of research on manipulative design, with particular emphasis on studies that evaluate the existence of manipulative designs and seek to understand users' perceptions and behaviours in different contexts [4, 11, 24, 39, 45, 52]. The pervasiveness of manipulative designs calls for expanding this body of research to a variety of populations, which in turn will support researchers and practitioners in designing suitable interventions for users.

We aim to start a conversation about teenagers' specific needs when fighting manipulative designs by understanding their everyday experience with these designs and documenting what is unique in their ecologies of use, understood as the different structures in the environment that surrounds them [8], which might impact their experience. In collaboration with an NGO working with families at risk of social exclusion, we interviewed six teenagers to understand their relationship with manipulative designs in three scenarios: video games, social networks, and e-commerce.

Our paper makes several contributions to HCI research. To the best of our knowledge, we document the first study that focuses on teenagers' experiences with manipulative designs in their daily interactions with technology, providing insights into how their ecologies differ from the ones of adults and by explaining the effects of teenagers' environment on their relationship with manipulative designs. Our findings represent a starting point for understanding the ecologies of manipulative design in teenagers, including their potential position of vulnerability, offering a socially-focused solution space to prevent the effects of manipulative designs. By bringing an experiential perspective into the realm of manipulative designs, we aim to support designers by providing new challenges

DIS '24, July 01–05, 2024, IT University of Copenhagen, Denmark

ACM ISBN 979-8-4007-0583-0/24/07
https://doi.org/10.1145/3643834.3660704

[1]The research community is studying this phenomenon using a variety of labels, including deceptive design, nudges, anti-patterns, and most dominantly, "dark patterns." Following the ACM recommendations on diversity and inclusion [17] we hereby use the term "manipulative designs" to describe this phenomenon.

to design countermeasures to these designs. We expect to inspire further research focusing on vulnerabilities online.

2 RELATED WORK

2.1 Online Vulnerability and Manipulative Design

Scholars in the legal domain have argued that users are in a state of vulnerability online, and the consequences of this vulnerability [30, 43, 55]. Vulnerability is a multilayered construct [41] and translates into users finding themselves in a position of susceptibility towards technology, where the impact of online threats is amplified [43]. Thus, researchers have considered teenagers a special category of vulnerable population because of their risk-taking behaviors and fewer defenses to cope with potential harm [55, 71]. While we embrace the critiques towards "vulnerable" as a user category by default [41], we believe that studying this population might be a starting point to debunk assumptions and disentangle factors of online vulnerability that consequently allow us to detach it from categories of users. Some preliminary studies are pointing out socio-digital vulnerability as the idea that the environment puts users in a more susceptible position [14].

Concerns regarding harm and agency have also reached the field of manipulative design [3, 53–55]. Manipulative designs are associated with various risks, including psychological harms such as emotional distress and cognitive burden, alongside autonomy loss, financial harms, or privacy-related harms [29, 45]. As Bongard-Blanchy et al. reported [4], even the users who can identify manipulative designs remain unsure about the impact these designs might cause. For teenagers, risks online can be further described in terms of content, contact, conduct, and commerce—known as the 4C framework—which can be induced by manipulative designs [16]. Indeed, in a recent systematic literature review on teenagers' harms caused by social media, Sala et al. [57] showed how some design elements — e.g., "like mechanisms" — are associated with some emotional harms. This harm-based approach becomes even more relevant in light of new regulatory frameworks that ask companies and designers to assess the impacts of their designs; for instance, Article 34 of the EU Digital Services Act includes assessing health impacts or negative effects on minors from the platform.

Manipulative designs are complex given their ubiquity and subtle mechanisms [59], with attributes that have been defined as coercive, manipulative, deceptive, and steering in ways that users would not intentionally desire [44]. Manipulative designs have also been discussed in relation to different theories of digital nudges, sludges, and online manipulation [47, 59]. The subtlety of the mechanisms makes them hard to perceive by users; therefore, this study takes a relational approach to understand the relationship between user and manipulative design, accounting for users' felt online manipulation as a proxy, as already used in Gray et al. [21]. We explain this rationale through the idea of the relationality of manipulative designs. Borrowing Star's terms [64], manipulative designs are relational: the only way users perceive them is when an interaction leads to a negative outcome. Gray, Kou, et al. [22] anticipated this idea through Norman's gulfs [51]: manipulative designs are perceived as a mismatch between what users expect from the interaction and what they receive. Similarly, Gray, Chen, et al. [21] reflected on the idea of "temporality of manipulative designs," supporting our goal of investigating how teenagers experience that manipulation on an ecological level over time.

2.2 Experience of Manipulative Design Practices

Research on manipulative design has adopted different methods, audiences, and contexts [24]. Among user studies, the effects of behaviour change by different UI elements have been studied in the domain of cookie banners and privacy [2, 5, 26, 35, 67], streaming platforms [11], digital services [4], and social media [48]. Increasingly, manipulative design practices are not only experienced by users via specific targeted UI elements, but also as part of a user journey, system, or service delivery strategy [23]. Thus, as part of our study framing, we focus on the digital systems that users reported engaging with, while also recognizing that the larger systems and ecologies these systems are embedded within are large and complex, and are driven by different motivations (e.g., the "attention economy" or "influencer economy").

Few of these existing studies have explored how user characteristics influence the experience of manipulative designs, such as education [4, 39] or age [1, 60, 69]. In this section, we describe the main findings from previous studies that help to understand the relationship between users and manipulative designs in different contexts. While some might include young adults, none of them included teenagers.

A limited set of the literature focuses on the experiential aspect of manipulative designs. A survey conducted by Bongard-Blanchy et al. [4] showed a relationship between people's perceived self-efficacy in resisting these designs and their capacity to recognise them. Maier and Harr [42] showed undergraduate students examples of manipulative designs and their definitions, explaining how their perceptions depended on the perceived harm resulting from the designs. Gray et al. [21], resonating with Avolicino et al. [1], additionally explored the ranges of negative emotions users experience after realising the manipulation, including: distress, upset, guilt, fear, hostility, irritability, shame, and nervousness.

Experiences with attention capture deceptive patterns—deceptive patterns that impact users' attention spans—have been described on video platforms [11, 40, 49]. For instance, Lukoff [40] related these patterns with the sense of agency online. Non-consent mechanisms feel deceptive to users, who view these mechanisms as triggers of pressure to spend more time on the platform; these mechanisms include disliked ads that pop up, accidental clicks by ads, or autoplay turned on unnoticed. Chaudhary [11] also highlighted the importance of a 'mindlessness' (p.9) experience while interacting with the platform

Research on video games has explored the effects and experiences of some manipulative designs on young consumers. Loot boxes, namely features inside the videogame that provides a service or digital good with a pre-set probability determined by an algorithm, are a concern because of their relationship with potential gambling disorders [27]—which can include manipulative design patterns, as described by Zagal et al. [10, 73]. Pay-to-win and in-purchase games features have also been discussed as part of the players' self-development, socialisation, and identity within a community [9, 18, 36]. Thus, in the field of psychology, the literature aiming to

establish the relationship between problematic gaming and gambling disorders to these design systems is growing [15, 19, 74]. Still, from an experience design perspective, Dechant et al. [12] call for debunking vulnerability in videogames by exploring the harms that come from design rather than focusing on users, which aligns with the purpose of this study of exploring design with the experience of harms.

In e-commerce, Moser et al. [50] explained impulse buying through manipulative designs, and how buyers reclaimed more friction to help them reduce impulsivity. Low stock messages, hidden costs, and aesthetic manipulation can influence the users while buying online, reducing their agency [1]. In recognising these features, van Nimwegen et al. [69] found that younger users have difficulty identifying 'Sneak into basket' designs, positing a relationship between the perceived honesty of the website and perceived good navigation. Additionally, Fear-of-Missing-Out ("FOMO") is triggered by limited offers in purchases [65] but is also a rationale for giving up on privacy. Thus, users might accept settings that they do not want to, despite recognising the bad design or experience, because they want to belong to something; this is what Westin and Chiasson [70] call "participatory reluctance" using Casiddys' theories (as cited in [70]).

To the best of our knowledge, little to none of this research focuses specifically on teenagers' experiences with manipulative designs. Exploring teenagers' experiences and ecologies is necessary to understand their vulnerability and interaction with manipulative designs. Therefore, this study addresses the following research question: *How do teenagers experience manipulative designs during online interactions?* Understanding the unique factors of teenagers' experiences will give the HCI community a more detailed foundation for designing interventions to protect teenagers.

3 METHOD

3.1 Participants

Participants were recruited in collaboration with an NGO conducting socio-cultural interventions with populations at risk of social exclusion in Madrid (Spain). We opened the call for participation to all teenagers who regularly attended the activities of the NGO. The consent form was communicated to the teenagers and their families through the NGO a month earlier to give them time to read the information and formulate questions. Those teenagers whose parents and themselves brought a signed consent form could participate. This study received ethical approval from the University of Luxembourg.

Our participants' involvement in a socio-cultural organisation might suggest a higher acquaintance and awareness of manipulative elements than teenagers not being part of such a community. Noteworthily, the teenagers we interviewed did not receive any education on digital skills through this organisation; the activities the NGO conducted supported them in their homework and provided a space to spend some healthy leisure time.

In this study, we rely on an interpretative approach, aiming to unfold a phenomenon and to get a rich understanding of a small sample of participants' lived experiences. We do not make an epistemological commitment that focuses on either generalizability or representativity [63]. We describe participants' profiles to better understand their backgrounds and contexts. We assigned them pseudonyms to preserve confidentiality.

- Ineke was born in 2007 in Spain, but her family comes from Morocco, so her mother tongues are Spanish and Arabic. She identifies as female. She has two devices to connect to the internet, and the first time she did it she was 9 years old. She now uses the internet more than once a week to search for information for school, play some video games, and use TikTok, but she does not declare herself a big fan of technology. She is in the fourth year out of four of mandatory secondary education ("ESO"). She has a little brother, who she spends a lot of time playing with, and a sister. She lives with her father who is a house janitor and her mother who, in the words of the participant, "does not work." We discussed social media, video games and e-commerce websites.
- Lola was born in 2006 in Peru; her mother tongue is Spanish. She identifies as female. She has two devices to connect to the internet at home, and she was 7 the first time she used the internet. Nowadays, she spends more than 4 hours a day online. She is in the fourth year out of four of mandatory secondary education ("ESO"). She lives with her mother, who is a technical nurse, and her younger sister. She loves video games and spends hours playing with, in terms of the participant, "online friends." We talked about video games and social media but did not have time to discuss e-commerce platforms.
- Alex was born in 2007 in Peru, his mother tongue is Spanish. He identifies as male. He has three devices to connect at home and uses the internet for more than two hours a day. He started to use the internet when he was around 10 or 11 years old. He watches movies and shows on Netflix or from pirate websites. He loves video games and plays a lot on his mobile phone, where he particularly enjoys horror mobile games - although sometimes he is so scared of them that he prefers to play in 'safer' modes. He normally watches a lot of shows on the Internet as well. He lives with his mother, who is a nurse auxiliary. We discussed video games, social networks, and e-commerce platforms.
- Oskar was born in 2005 in Spain and identifies as male. His mother tongue is Spanish. He uses the internet more than two hours a day, and normally he does it to play video games, use social networks, and listen to music on Spotify. He has three devices to connect to the Internet at home, and the first time he did it he was around 7 to 8 years old. He is in the first year of Bachillerato out two. And his parents work as a dressmaker and delivery man. He chose to speak first about e-commerce because he never had the opportunity to discuss it, and later on, video games, and he finally stopped the conversation before talking about social networks.
- Victor was born in 2007 in Spain and identifies as a male. His mother tongue is Spanish. He uses the internet more than four hours a day, for school-related tasks, but also for playing video games. He loves video games, especially platform fighter ones. He has two devices to connect to the internet at home, and the first time he used the internet, he was 7 years old. He is in the third year of high school and lives with his

mother, who works in a kitchen. He enthusiastically decided to start the discussion with video games, then we talked about social media, and lastly, we discussed e-commerce.
- Anna was born in 2005 in Spain. She identifies as female and is in her senior year of high school. Her mother tongues are Spanish and Arabic. She has three devices to connect to the internet at home, and she started using the internet when she was 10. She normally uses the internet more than four hours a day, mainly for studying, watching stuff, social media, and online shopping, which she identifies as her weakness. She loves shopping and "could spend hours and hours just looking at clothes on the internet." She has a brother who often plays video games on the PlayStation and on the mobile phone. Her father works in a fruit shop, and her mother in a SME. We discussed e-commerce websites and social media. We did not have time enough to go in-depth into video games, although she gave us some main impressions.

3.2 Procedure

We conducted six semi-structured interviews with teenagers aged 15 to 17. The interviews were conducted in March and April 2023 on the NGO premises. After the introduction and a reminder on data protection and participants' rights, we proposed three discussion contexts to participants: video games, social networks, and e-commerce.

The interview guide[2] included the following topics: use of technology (social networks, video games, and e-commerce), critical incidents with technology, perceived risks, intentional coping strategies, and the role of parents. To make the interview as comfortable as possible, we offered participants to choose their preferred context(s) and to stop at any time.

Each topic consisted of two parts. Based on the critical incidents technique [62], the first part invited participants to think and reflect on the moments in which they had bad experiences and felt deceived or manipulated when navigating online. We did not show any manipulative design at the stage to avoid priming participants. In the second part, participants were shown manipulative designs and asked how they perceived them.

These examples represented three specific contexts that might require different considerations and trade-offs from users [24], which are familiar to teenagers and where manipulative design techniques are common [48, 50, 73] . To select the manipulative designs, we considered the high-level patterns from Gray et al. [25] (See Supplementary material). These were not meant to be exhaustive but to trigger a conversation with participants.

3.3 Data Analysis

After transcribing the interviews, we conducted an inductive reflexive thematic analysis [6, 7]. The transcripts were transcribed in Spanish and then translated into English with the help of automated tools so the research team could understand and discuss the themes. The transcriptions were coded with different coding strategies to enrich the analysis [58]. *In vivo* coding takes literal excerpts from participants, which becomes fundamental to give voice in their own terms for our studied population — e.g., *"I have to buy it because otherwise I miss it."* *Descriptive* coding summarises the meaning of a specific phenomenon shared by the participants — e.g., *Spending money in the game attaches to the game.* Lastly, *versus* coding looks at the data from the perspective of a dichotomy or concept opposition, which enriched the analysis by providing specific conflicts in the ecologies of teenagers - e.g. Having obligations vs Not having obligations. An example of codes and themes can be found in the Appendix.

With the coded interviews, and using maps created with MAXQDA, we constructed initial themes around main concepts (e.g., family, protection). Through an iterative discussion, we refined the themes and their relationship. Additionally, we drew on theoretical memos written by the first author that explained perceptions of the data, similarities and differences between participants, and connections with theoretical phenomena and literature. When looking at harms, we used a deductive-inductive approach, starting on the harms framework described by Gunawan et al. [29], and extending it inductively. Similarly, when explaining the manipulative designs involved in the experience of participants, we have used existing standardised terminology in the community by using Gray et al. [25][3] ontology. This ontology also gathers "attention capture deceptive patterns" from [49] and bundles it into one category within the meso-level patterns. However, attention capture deceptive patterns are a combination of 11 different design strategies. Thus, when reporting these attention-capture deceptive patterns, we will use the specific terms coined by Monge Roffarello et al. [49].

Noteworthily, during the interview, insights about internet and video game consumption emerged. This data was not deemed relevant to our research when these insights did not overlap with manipulative designs or non-planned actions of the participants caused by those designs, which is the main driver of this study.

3.4 Ethical Considerations: Research Through Care

Given the circumstances of our participants, care was our priority in conducting our interviews, justifying specific measures in recruitment, interviewing, and debriefing. To avoid burden on the teenagers, and facilitate participation, we conducted the interviews in the same slots that teenagers go to the NGO activities. However, the priority was to support the activities performed at the NGO, which thus had priority over our interview if the teenagers preferred it. Additionally, we relied on the teenagers' attendance at the NGO.

Although the interviewer was introduced as a local neighbour and researcher, we understood that this could give participants the feeling they were in an imbalanced position and that they 'had to answer' everything. For that reason, we put a lot of emphasis on their rights as participants to withdraw and not answer to anything they did not feel comfortable with. Similarly, dividing the interview into thematic blocks would give an easy option for participants to stop if they felt the need.

[2]The interview guide and protocol are provided as Supplementary Material.

[3]There is a set of the literature, especially in the legal domain, that expands financial harms to anticompetitive harms for companies. As our work focuses on the individual approach, we are not considering that type of harm

A debriefing was done with the teenagers at the end of the session, and parents were provided with a copy of the debriefing information. Participants were fairly compensated under the NGO's conditions and provided a brochure about online safety. The brochure can be found in the Supplementary material.

3.5 Positionality Statement

For this study, we embraced our position and subjectivity as a resource [20] given the commonalities and differences in our expertise and position towards the present work. The study of manipulative designs and their relationship with vulnerability has a personal drive for the first author of this paper, who shares the socioeconomic, cultural background, and neighbourhood with the study participants. The first author recognised themselves in the experiences and stories told by participants—and presented themselves as such during the interviews—but they also acknowledged their current position of privilege being now an outsider of the group. The first author is a frequent user of social media (e.g., Twitter, streaming platforms like YouTube Shorts, e-commerce, and video games), but to get a better first-person perspective of manipulative designs in different contexts, they also used TikTok, Clash Royale, FIFA, Candy Crush, Free Fire, and Fortnite before the interviews. The second author has experience in supervising HCI studies with children and teenagers, mostly in the education and preventive health domains. She does not recognize herself in the experiences of the participants but relates them to family relatives. While she does not share the participants' cultural background, she comes from a similar socioeconomic background. Her close relatives — both adults and children — are likely vulnerable online and often refer to her as a source of information against manipulative designs. The third author has experience in supervising HCI studies with design practitioners, primarily relating to UX and product management, and they have designed digital services in their past work as a designer. They come from a similar socioeconomic background as the participants, but not their cultural background, yet see similar patterns of interaction with their close family members.

4 FINDINGS

In this section, we describe teenagers' experience of manipulative design practices, explaining how the environment of teenagers impacts the experience of manipulation through the following themes: (i) risk is a shared experience, (ii) the personal and social context influence the risk experience, and (iii) the (un) conscious experience of harms.

4.1 Risk is a Shared Experience

This theme encapsulates the idea that, through their interaction with others, teenagers identify harms coming from manipulative designs enough to develop awareness that leads them to use certain mechanisms, but also engage with risks as part of a social context. The role of family and friends in this social approach to risk was a recurrent topic brought up by participants without being prompted. Family and peers helped raise awareness of risks, but peers often induced risks that may lead to harm. Lastly, family plays an important role in teenagers' coping mechanisms.

4.1.1 Seeing harm on others raises awareness. All participants described the negative effects of manipulative design on their peers and family. The effects would sometimes reach them, including scams, deceptive designs, addiction, time waste, money loss, insecurities, depression, and social comparison. For instance, Ineke described how her classmates challenged each other and showed off their new limited skins and objects on video games, incentivising others to buy them as well. Anna also explains how her brother's misuse of online video games caused a loss of money and trouble for the family. Oskar described his distrust of e-commerce websites after his mother was scammed. Similarly, participants have seen friends suffering from the negative effects of *"comparing themselves with others"* on social media. Participants showed how they are experiencing, being told about, and learning from these risks.

Seeing the effects on others made participants reflect and be aware of some of the risks of manipulative designs. They tried to take action when they started to see similar effects on themselves. Ineke, Anna, and Lola (Figure 1) explained how they sometimes needed technology detox, particularly after feeling bad from spending too much time on social media or games. Ineke purposefully stopped using TikTok for 10 days, hiding the app where she could not find it easily. When Anna realized she had spent too much time on her phone, she focused on outside activities or spending time with her family. Both explained how this happened progressively: *"scrolling, scrolling, and suddenly you spend an hour instead of 30 min."* Lola had a similar non-purposeful experience. When her phone broke, she realised that *"life offline is more calm."* Now, when she has something important to achieve, she asks her mother for help to mitigate the risk.

4.1.2 Relationships with others lead to risk. We observed that participants take some risks unconsciously, perhaps motivated by manipulative designs as a part of a shared experience. Ineke shared examples of technology unease with her friends, including an instance where she was not allowed to buy products online because her mum was the victim of a scam. Alex explained how he could only play some video games that cousins would pirate for him without being aware of the privacy risks that pirated products may carry. Oskar also mentioned being tempted to buy more items when pop-ups appeared when being with friends because they teased each other. Some participants explained spending time with their parents through the use of applications — discussing the latest news on social media or helping parents pass a level in a video game. For participants, risks from manipulative designs also came from their internal social dynamics with family and friends.

Although participants associate some positive outcomes with manipulative design practices, they often led to the extension of risks among peers. Victor, for instance, described how social pyramid tactics — i.e., inviting your friends to download mobile games — give your friends a new game to discover without realising the impact on privacy. When he was 12 years old, Oskar would waste his small savings on skins cosmetics on videogames just to *"feel cool"* among his friends. Both Victor and Lola described limited skin offers as something worth paying for. As Victor explains (Figure 2), limited purchase time and scarcity of skins on games are perceived as exclusive. Owning these items meant that the players were part of a specific moment in the game (e.g., season, battle pass), which

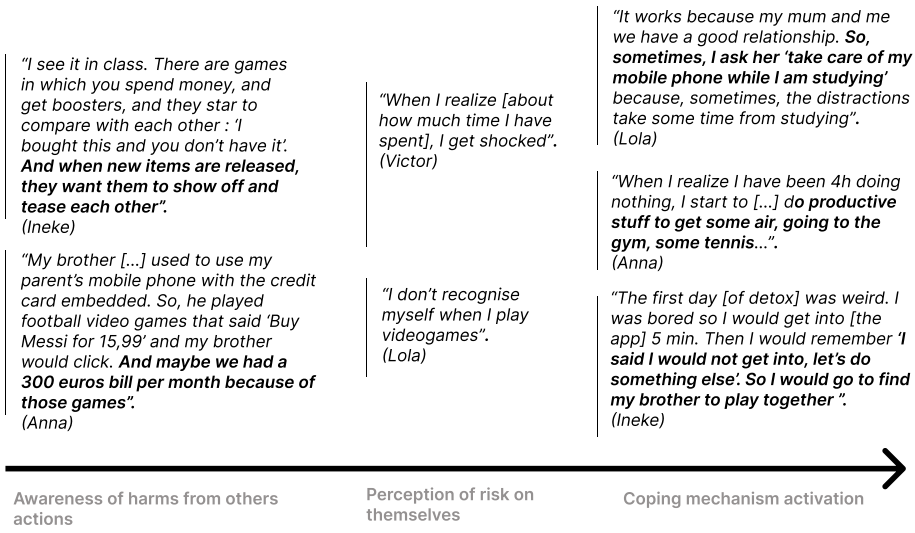


Figure 1: Examples of how risk awareness from others' actions moves to self-awareness and coping mechanisms

provided heightened status and a feeling of belongingness. It is their relationship with others and the feelings among others that make that scarcity special and worth it.

4.1.3 Family helps me to cope. Participants reported how their parents supported them in establishing coping mechanisms when they asked for help. Their parents warned them about the abusive use of social media or video games, helping them to identify protection mechanisms. Lola and Anna felt that only their mum could control their impulsivity towards online shopping. Anna also reflected on developing a certain feeling of *"annoyance"* when her parents called her out for spending so much time on the phone. Ineke uses her brother to disconnect when she is fed up with online content. Conversely, teenagers rarely talk about privacy risks with their parents, focusing only on the risks of exposing themselves online or meeting new people.

4.2 Personal and Social Contexts Influence the Risk Experience

This theme describes how contextual elements play a role in teenagers' experiences with manipulative designs and their associated risks. Their personal context might be triggered by manipulative designs, but their social context also shapes trade-offs when they encounter these designs.

4.2.1 Personal contexts influence emotions and shape one's sense of risk. Participants repeatedly expressed concerns about how the use of these platforms could affect their mental health and how they could see impacts on close friends and family. When participants were asked about their opinion of the design of social network platforms, two points stood out: *the design may trigger inner impulsive and addictive behaviours*, and *comparison may trigger inner insecurities.*

Participants identified the stimuli deployed on the platforms as triggers of potentially impulsive and addictive behaviors. Anna (Figure 3) was triggered to purchase an item impulsively when a reminder automatically added it to her basket: *"she feels like a puppet"*. Feeling bad, she wanted to exert her agency because she *"should be an adult someday and make wise budget decisions."* Similarly, Oskar felt teenagers are more susceptible to some mechanisms, like pop-ups, when purchasing. He feels *"he cannot control himself"* when windows pop up at fast-food kiosks.

Constant reminders and notifications, including unsolicited elements that pop up, seemed to affect participants, leading to self-imposed protection mechanisms.

Addiction or feeling *hooked* were common terms participants used when asked about their experiences and potential risks, expressing feelings of powerlessness.

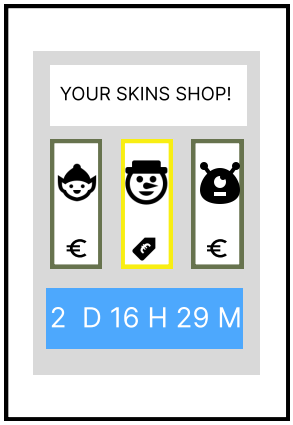
One common risk was triggering social comparisons that might cause *mental health problems.* Women in particular worried how they could be impacted by influencers and role models. They found themselves and their friends feeling sad, comparing themselves with the content, and having negative thoughts about perceptions of their own lives and bodies. Those feelings concerned participants who explained that platforms would trigger inner insecurities. They sought to avoid seeing this type of content to reduce the likelihood of triggering these insecurities.

4.2.2 Context influences the interplay of resources: never money, sometimes time, and always privacy. Participants balanced their resources in relation to their personal circumstances, which shaped the risks they took and how they perceived them. They were not willing to give money, they might give time under certain conditions, and almost always gave up privacy when they were unaware of the risks.

Teenagers' limited budget influences their conception of risk and what they can do. Participants described how spending money attaches them to video games. Spending money is a big decision, and money loss was perceived as a great risk. Participants reported "doing anything" to avoid money loss: falling for discounts and fake scarcity, seeing more ads, or spending time waiting for loot boxes

"The designs are very worthy... At the beginning I didn't want to spend on skins, ***but now it has become a part of my life.****"*
(Lola)

"I just wanted to buy something 10 euros value, ***and my friends told me 'hey! look at this'. So to try to be a cool kid, I bought it.****"*
(Oskar)



"It gives the exclusivity of the moment, right? It might disappear and in three years it will be exclusive.
[...]
If in two weeks I see someone else with that [skin] I say: 'I should have bought it'. *[...] But you cannot do it anymore.*
[...]
About exclusivity, [...] it's about thinking that you were in that moment *[...] like in real life with stickers or some video consoles, things that have that exclusivity, right? It was in that moment and those that were there could get it.*
(Victor)

Figure 2: Examples of relationships with others leading to risk in the context of limited skins on video games

containing the items they were unwilling to pay for. This sometimes led them to yield privacy or time in favor of saving money; Alex, for instance, explained how he prefers to see advertisements instead of paying.

Their perception of time as a resource influences their relationship with manipulative designs and vice versa. Participants repeatedly explained how and why they feel hooked on manipulative designs: they feel "bored" because they have free time without external regulation. Participants detailed how they got hooked in their "downtime" — on the bus, on breaks, between homework, or during the summertime. External obligations influence when they perceive "free or down" time and, therefore, the relevant risks. If they had to do something else, it was a risk; if not, it was fine. This perception of their time and lack of responsibilities contributed to having a sense of agency over what they do: they felt in control because they were managing their free time.

Other school obligations can also exert influence. Anna explained exams make her stressed and, consequently, more likely to buy clothes. They imposed some self-regulatory mechanisms to stop wasting time when they have another external obligation that outweighs it: attending school, doing homework, or spending time with family. Interestingly, Oskar explained a strategy he uses to avoid being affected by loot boxes that operate under "play-by-appointment" — meaning they can only be opened after a determined amount of time has passed. He opens them before school, attempting to match the next one after school so he doesn't risk being caught opening them in class. High school thus "imposes" on his time to open the boxes, but also what is at risk when he spends time opening them in class.

This contextual effect was also seen in instances where teenagers discovered manipulative designs. Participants mentioned having seen manipulative designs related to choice architecture and pop-ups in the physical kiosks of fast-food restaurants, a place that is part of their leisure time with friends. However, most participants only reflected on those settings as potential triggers of behavior when the interviewer provided the examples. For participants, the presence of manipulative designs were perceived as normal, and they insisted they were used to it.

4.3 The (Un)conscious Experience of Harms

This theme encapsulates the different harms that participants experience when they feel manipulated in the presence of manipulative designs. Participants expressed concerns about a variety of harms related to manipulative designs and the use of platforms, including emotional distress, labour, and cognitive burdens, attentional harms, privacy harms, financial harms, as well as identity and sociopolitical misinformation harm. We report elicited harms from the conversations with participants. While some harms are visible to participants, others have remained unnoticed yet visible to the research team. As we build on lived experiences of manipulation, we also report some sources of felt manipulation and harm that do not necessarily relate to manipulative designs. We support this theme with Table 1, which maps experienced harms to documented ontologies of manipulative designs and platform affordances [25, 49].

4.3.1 Emotional distress. This type of harm includes negative emotions and psychological impacts on users — e.g., annoyance, stress, and frustration. For participants, these sneaking techniques — e.g., putting elements in the basket automatically — and attention-capture designs — like notifications — impact that emotional distress (See Figure 3).

As mentioned above, a common perceived harm related to triggering social comparisons that might cause emotional distress. To address these feelings, they reported avoiding seeing this type of content and disengaging with the platform by using other attention-capture design patterns — like scrolling — to reduce the trigger of those insecurities. This increased their cognitive burden, placing the effort to avoid harm on them.

Some participants also reported emotional distress — feeling bad, anxious, comparing themselves, and being mad and frustrated — when they created and posted content. As Victor explained, *"you start to see how others get a lot of likes, and you have nothing"*. Thus, when Anna realises she does not get any likes or views, she re-posts

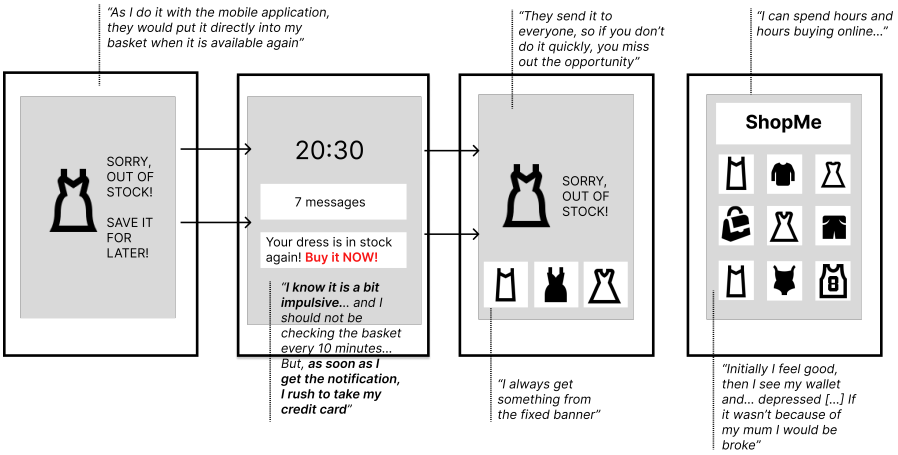


Figure 3: Diagram of Anna's experience with manipulative design practices triggering their impulsivity.

the content again because *"why did she post it for if nobody sees it?"* Some manipulative designs, like social proof and attention-capture deceptive patterns, may also negatively affect the user as a content creator and not only as a content consumer.

4.3.2 Labour and Cognitive Burden. This type of harm increases the effort — both cognitive and physical — on the user within the interaction. Participants reported seeing these techniques commonly when exposed to pop-ups, nagging techniques, and interface interference in online interfaces. For instance, Anna used to see the consent notice from TikTok often asking to access her contacts, which tired her so she *"would just accept"*. When we asked her about the visual manipulation of content with colours, she recalled extra barriers that would lead her to accept.

> Interviewer: *Here you can see something you have told me before, that you can only accept or go to settings.*
> Anna: *Exactly, that is the thing. Then, if you go to settings, I mean, I have sometimes tried to go to settings. So you go to settings, and you have another window, and another, and another, and to make it that way, you just press accept, and it's done. I mean, they make it very complicated, so you can press "accept."*

Anna's quote illustrates how she finally accepted the consent banner due to of this cognitive burden, which in turn impacts her privacy. However, privacy is not the only side effect that labour and cognitive burden can be associated with. Some participants reported how the increase in burden could have a financial impact, prompting them to buy an extra item or to feel strongly tempted to do so. Participants identified additional contexts in which they feel manipulated by techniques using cognitive burden and might have a side-effect impact: fast-food kiosks and pirated content websites. Oskar explained he would usually see interface interference techniques (including pop-ups, visual manipulation, and highlighting colours) in fast-food kiosks and sometimes find it difficult to resist the temptation, increasing his spending.

4.3.3 Privacy. Privacy harms imply that users make a data concession to the platform. During the first part of the interview, participants did not explicitly report privacy harms. When we exposed them to examples of manipulative patterns, they recognized personal experiences of privacy harms. Nagging techniques on social media made participants accept permissions. Lola and Anna describe platforms as insistent, and both acknowledged not reading these notifications nor recalling what they do in such situations. Anna would accept them to not be bothered because this nagging is common and recurrent in all applications. When exposed to screenshots of friend spam – a technique asking for an acquaintance's e-mail in exchange for a life within the videogame, all participants who had played that game reported disclosing friends' e-mails and spamming them to get more lives.

When shown interface interference elements, participants mentioned a new context prompting labour or cognitive burden: pirated content websites. Participants found pop-ups that nag them that are difficult to close. Oskar explained that he sometimes receives those pop-ups while watching a movie and 'fails' in pressing the 'X' button to close the pop-up; hence, he is forcefully redirected to ads.

4.3.4 Attentional harms. These harms push users to spend more time by directing their attention to the platform. Participants identified attention deceptive patterns in video games, for instance, the full-screen mode that makes users lose track of time (which is a type of time fog), a notification to catch the participants' attention, grinding, and infinite scroll. Some attention capture patterns (e.g., play by appointment) were not only associated with attentional harms (see in 4.2.2 how it translates into the regulation of participants' routines) but also evoked emotional distress and annoyance.

Techniques like pay-to-win were also present. Although pay-to-win and urgency/scarcity in content — like skins — were related to financial harm, these strategies are linked to attentional harms in our participants because financial investments required them to invest more time. Lola and Victor explained buying skins as an investment because it relates to how much time they spend on the videogame: they would not buy a skin for a game they do not play.

Experienced Harm	High Level Manipulative Design	Meso-level Manipulative Design
Emotional distress	Forced action Sneaking Social engineering Content/People Deception	Play by appointment* Pay to win* Confirmshaming Personalisation
Labour and cognitive burden	Forced action Interface Interference	Nagging Manipulative Visual Interference
Financial	Social engineering Forced action Content/People Deception	Urgency Scarcity Personalisation/social proof Infinite scroll*
Attention Time	Interface Interference Forced action Interface Interference Social engineering	Time fog* Grinding* Infinite scroll* Notifications Forced continuity Manipulative Visual Interference Personalisation
Privacy	Forced action	Friend Spam
Socio-political misinformation	Social engineering Forced action	Personalisation Infinite scroll*
Identity	Social engineering	Personalisation

Table 1: This table relates the harms reported by the participants to the high-level and meso-level manipulative design patterns described in Gray et al. [25]. Meso-level patterns marked with "*" correspond to attention deceptive design patterns, as gathered in Monge Roffarello et al. [49]. This table is not meant to be exhaustive but rather a supporting visual tool to map reported harms with associated manipulative designs.

In social networks, attentional harms reported by participants are associated with attention capture deceptive designs, mainly infinite scroll and personalisation. As a source of harm, both strategies were also mentioned in other contexts like e-commerce. Anna and Ineke explained how infinite scrolling through personalised clothes suggestions makes them invest much more time than they would initially want.

4.3.5 Financial harms. This refers to a financial loss for the user. Besides financial harms as a side effect of cognitive and labour burdens, participants mentioned cases of scams and deception via deceptive websites that pretend to be legitimate or dropshipping practices. These cause financial harm and emotional distress, with fear of using these platforms again. This is not a manipulative design per se but a deceptive one motivated by scammers rather than a platform. Another source of financial harm was the content influencers and video streamers promoted on platforms.

Participants reported financial harms associated with e-commerce and video games. Social engineering patterns like scarcity claims and limited content (e.g., skins for characters and pay-to-win mechanisms) seemed a prominent source of financial harm as Lola reported (See Figure 2). As seen in 4.1.2, harm involves a social component with teenagers, which may contribute to its tolerance. Although participants seemed aware of social engineering techniques, they tended to accept them as an inevitable part of the game.

4.3.6 Socio-political misinformation and Identity harms. Participants show two additional concerns not linked to the presented contexts as part of felt manipulation. On social networks, participants reported having experienced socio-political misinformation derived from personalised content and algorithms, which create echo chambers. Lola reflected on how this information targets people akin to the content. On one occasion, she found herself conflicted when she discovered the other side of a specific political phenomenon, losing herself because she did not know who to trust. Teenagers changing their behaviour because of trends on social media is another harm that participants reported as caused by personalisation and algorithmic profiles. Ineke exemplified how this could affect teenagers' identity:

> Ineke: *In some cases, [social networks] can change people's lives and make it harder or cause them problems.*
> Interviewer: *What do you mean?*

> Ineke: *In their way of being, their way of expressing themselves, seeing the world, everything. Maybe, someone who has a lot of confidence when talking starts seeing videos that say, 'no, you can't do this and that while talking' - because there are videos like that. [...] Then, the person feels identified with that stuff and stops doing them and stops being themselves because of the videos.*

5 DISCUSSION

In this section, we describe how teenagers' experiences of manipulative design depend on contextual factors such as the social ecology of manipulative designs. We describe how the environment and ecology of teenagers might contribute to — or limit — their position of vulnerability toward manipulative designs. As one of the first accounts of the experiences of teenagers with manipulative designs, the present study provides a foundation for future researchers that includes open questions and design challenges in counteracting manipulative design experiences for teenagers.

5.1 The Social Ecology of Manipulative Designs

The perception of the world of teenagers is heavily influenced by their peers and families [46]: they are the immediate surroundings that help them to understand the world and shape their experiences, including their relationships with manipulative designs.

As explained in our findings, sometimes risks from manipulative design are shared with friends and peers, incentivising teenagers to engage with manipulative designs. In this regard, in line with studies on social media use, it can be argued that manipulative designs take advantage of "network effects:" the more people engage with the platform, the more useful it is [56]. Some manipulative designs similarly rely on network effects to achieve a bigger impact; *"pay to win options,"* fake limited scarcity or social pyramids in video games do not function with only one user. This also resonates with some previous work explaining how cosmetics in videogames are not only a way of belonging and comparison with others, but also a part of the player's identity [9, 18]. Li et al. [36] explain the hedonic aspect of in-game purchases as a consideration to include in videogames design; however, as seen in our results, when combined with manipulative designs, it might catalyse harms.

Considering our results, one may question if manipulative designs prey on teenagers' identity or social needs more than utilitarian needs. For instance, teenagers' experience of scarcity in video games emerges differently than scarcity cues in e-commerce due to time and social pressures, differing from adults' experiences with scarcity that tend to focus on the product [65] and are negatively related to the hedonic dimension of user experience [66]. Addressing "network effects" and identity issues together mean that the emotional part of manipulative designs can transcend beyond a cute or sad message, like in "toying with emotions," and rather target a teenager's social needs and identity in the experience of the manipulative design. Consequently, the mechanisms of protection for teenagers might differ from those proposed in the literature to prevent scarcity cues and impulse buying from happening (e.g. [50, 61]). This social aspect of the experiences of teenagers with manipulative designs poses a new challenge for design countermeasures: how can design interventions include this social and identitarian aspect to protect teenagers?

Shared family experiences influence how teenagers perceive manipulative designs and their consequences. This can have both positive and negative effects on the user. The privacy literature confirms that teenagers are more aware of interpersonal privacy (i.e., disclosing information) than commercial privacy (i.e., sharing data with companies) [38], which is echoed in our results. However, if parents are equally unaware of how manipulative designs lead to commercial privacy risks, they might reinforce them. Our participants focused on how families advise and support teenagers, shaping their awareness about what they can, cannot, or should do to avoid risk online (e.g., disclosing their images online). However, accepting a banner that gives extra access to their data from other websites is not construed as a problem. This contrasts with documented experiences in adults, where effects of manipulative designs in cookie notices explains how participants reported concerns about how third parties collect data, profiling, or surveillance [5]. For our participants, this privacy issue was unlikely to be a concern unless their environment taught them that it should be, and could become more problematic than in adults given teenagers' preference to deprioritize privacy over time or money.

Teenagers might also seek support for those manipulative designs they perceive as out of their control. As reflected in our interviews, participants would talk about measures coming from their toolset, or their parents' support. This contrasts with other documented experiences in which participants would come up with institutional countermeasures - education, governmental intervention, or laws [42]. When teenagers sought support, parents sometimes gave advice based on negative shared experiences that ultimately might unduly impact teenagers, excluding them from the system. A family's bad experience with manipulative designs resulted in avoiding certain technologies altogether. Despite the well-intended actions of the parents, not being able to support recovery from online manipulation properly could have an impact on how teenagers develop their digital skills and a healthy relationship with the internet.

The specific trade-offs teenagers make — e.g., money, time, and privacy — will have an impact that might not be the same for other populations. Teenagers might become vulnerable to those manipulative designs that increase the cognitive burden and make a trade-off between money and privacy, or money and time, which resonates with the idea of "participatory reluctance" that Westin and Chiasson [70] pointed out: teenagers would be more likely to yield their privacy even if they do not necessarily desire it. Some direct consequences can be perceived with the new consent-or-pay model that has been implemented in Europe: if users want to use a service, consent banners offer the option of subscription to avoid the use of cookies. Given the trade-off of resources that teenagers and some other vulnerable collectives make during their online interactions, these populations may be highly impacted by such a model. Their ecologies also play a role in the effect of some manipulative designs that shape their routines, like play-by-appointment, that are specially made for them. This interplay of these trade-offs can be perceived as factors of vulnerability that do not necessarily belong to teenagers, but that seem to be present in their experiences — e.g., the lack of resources will not be only present in teenagers'

ecologies. This effect of the environment as a mediator of vulnerability seems to be in line with the theorization of DiPaola and Calo [14], and it is a starting point to discuss an empirical approach to vulnerability towards manipulative designs.

Studies in design focusing on harms are growing [40, 49, 57]. A commonly suggested counter-intervention in the domain of manipulative designs is the use of friction to increase reflection and prevent users from the effects of manipulative designs. Bongard-Blanchy et al. [4], Moser et al. [50] and Lukoff et al. [40] offer the use of friction and 'microboundaries' [40] to mitigate the effects of manipulative designs and help users to regain control in social media or e-commerce contexts. Indeed, Zac et al. [72] explored the use friction as countermeasure and proved to be effective in some contexts. However, in light of our results, it is necessary to consider whether this type of intervention can be adapted to the social ecology of manipulative designs and whether they would work in the particular trade-offs some populations make during their interactions with manipulative designs. To what extent is friction an appropriate solution when lack of awareness is not the main reason behind the impact of manipulative designs on specific populations?

5.2 Supporting Vulnerable Actors in Confronting Manipulative Designs

The effect of the social environment on manipulative designs resonates with theories of digital inequality. The effect of socio-digital inequality is well-documented [31–33] and may have an impact on experiences of manipulation. Differences in socio-economic status (SES) will impact the level of digital skills of families since higher economic resources are associated with more mental, social, and cultural resources [68], in line with the idea of socio-digital vulnerability towards manipulative designs [14]. Socio-economic conditions may, therefore, impact how teenagers deal with manipulative designs. Families with lower SES, education, quality time to give, or less tech-savvy families can misguide teenagers in their interactions with manipulative designs. Thus, the quality of the offline social network has been associated with mental health harms on teenagers when they use social media [57].

If teenagers' environments cannot supply them with the support needed to recognise or recover from the effects of manipulative designs, this can become problematic for their development, such as associations between mental health risks and the use of platforms with manipulative designs. Not being able to cope with these kinds of risks might be especially problematic for the development of teenagers' personalities. For instance, Livingstone et al. [37] documented parents being unaware of some of the risks that teenagers had experienced online. Therefore, our data hint at how digital inequalities can reinforce the vulnerability of teenagers towards manipulative designs because they attack key identity and social-related factors of their development while being dependent on others to protect themselves and recover from the impact. This dependency on the environment means that context can foster vulnerabilities towards manipulative designs for teenagers, but it also can help to prevent it. Consequently, there is room for new countermeasures to manipulation from a socio-technical point of view, both for policy implications and design interventions.

5.3 Limitations and Future Work

This work presents some limitations. Our sampling and time limitations did not allow us to go deeper into some of the themes, which could have shown more nuances with additional participant perspectives. Furthermore, limiting the technology contexts may have left out other relevant factors that may play a role in the experience of manipulative designs. For instance, different contexts embody different privacy trade-offs, cognitive load, and primary tasks; e.g., casual Internet browsing might entail different rationales than objective-oriented tasks.

Given the complexity of online platforms that mediate the experience of manipulation, we cannot fully disentangle the effect of specific manipulative designs from other technological affordances. For this reason, we suggest future researchers on manipulative designs to carefully reflect on the methodological implications of studying a phenomenon that cannot always be seen, like online manipulation, and to opt by taking harms-based approaches.

Our findings support a wide range of future work in the domain of manipulative designs, including the study of more diverse populations, especially those that can be considered vulnerable. Future work should seek to better comprehend the landscape of manipulative designs and their effects on particular populations and more fully account for ecological complexity and sociality relating to the experience of manipulative designs.

Future areas of research may include: (i) Further exploring the role of family and friends and their relationship to coping with manipulative design, including families when exploring the solution space for interventions. (ii) Addressing the relationship between digital inequalities and manipulative designs—supporting broader goals of understanding how vulnerability impacts experiences of manipulative designs. To do so, we encourage researchers and practitioners to use participatory and bottom-up approaches that investigate "why" these harms occur, rather than maintain behaviouralist approaches that look at the effect on behaviour caused by design elements. By contextualising the interactions, researchers may elicit more vulnerability-centered counter-interventions to manipulative designs.

6 CONCLUSION

In this paper, we interviewed teenagers about their daily interactions with manipulative designs. Aiming to disentangle their experiences with manipulative interfaces, we illustrated the impacts that their context has on teenagers' relationships and experiences with these designs. We, therefore, contribute to explaining their potential position of vulnerability towards manipulative designs, offering a new social space to fight manipulative designs that can inspire regulators and future research.

ACKNOWLEDGMENTS

We want to express our gratitude to the participants that participated in this study for their generosity. We also want to thank the members of "La Rueca Asociación Social y Cultural" for opening their doors to this collaboration and allowing us to learn from them. We thank the anonymous reviewers for their detailed constructive feedback, and Joshua Dawson and Sophie Doublet for their support

in proofreading the manuscript. This research is funded by the Luxembourg National Research Fund FNR grant IS/14717072 Deceptive Patterns Online (Decepticon).

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A APPENDIX

Overarching Theme	Theme	Codes
Risk is a shared experience	Seeing harm on others raises awareness	Parents experiences with scams Attentional harms on siblings invite reflection
	Relationship with others lead to risk	All my friends have this "skin," I will miss it Teasing each other to spend more
	Family helps me to cope	My parents trust I am not doing anything risky Parents warned me Asking parents for help to avoid attention harms
Personal and Social Context Influence the Risk Experience	Personal contexts influence emotions and shape one's sense of harm.	Stressing moments lead me to be more impulsive online
	Context influences the interplay of resources: never money, sometimes time, and always privacy.	Time is something you can measure; privacy is not If I had the money, I would be broke No money loss, no risk Use it in downtime and free moments Investing money in a videogame implies you will invest time
The (Un)conscious Experience of Harms	Emotional distress	Comparison Insecurities
	Labour and Cognitive Burden	Tired of being asked by websites one time and another
	Privacy	I end up accepting because it is tiring Policies and consent notices feel complicated
	Attentional harms	Loosing track of time
	Financial harms	A little discount keeps adding on the basket
	Socio-political misinformation and Identity harms	People change their behaviours because of what they see What they see might not be true; we don't know what is true

Table 2: Example of codes associated to themes.