Explainable Persuasion for Persuasive Interfaces: The Case of Online Gambling

Deniz Atalay Cemiloglu

Bournemouth University

A thesis submitted in partial fulfilment of the requirements of Bournemouth University for the degree of Doctor of Philosophy

[May] 2023

Copyright

This copy of the thesis has been supplied on condition that anyone who consults it is understood to recognise that its copyright rests with its author, and due acknowledgement must always be made of the use of any material contained in, or derived from, this thesis.

Abstract

As human attention is a scarce resource, interactive online platforms such as social networks, gaming and online gambling platforms utilise persuasive interfaces to maximise user engagement. However, ethical concerns may arise since persuasive systems influence user behaviours. While interacting with persuasive systems, users may be unaware of being persuaded or unaware of the negative consequences that may result from interacting with persuasive systems. This can hinder users' ability to evaluate the persuasion attempt and regulate their behaviour. Moreover, persuasive systems designed to maximise user engagement may, in some cases, trigger or reinforce addictive usage. There is evidence in the literature that online persuasive interfaces may influence psychological and cognitive mechanisms related to addictive behaviour. Transparency and user voluntariness are proposed to be the building blocks of ethical persuasive systems. However, to date, the concept of transparent persuasive technology mainly remained philosophical in academia. One approach to designing persuasive systems that adhere to the transparency and user voluntariness requirements could be fulfilling conditions for informed consent. When interacting with persuasive systems, users could be informed about the persuasive design techniques used by the system, and such information may help users build resilience against persuasion attempts made by the system. Such an approach aligns with the principles outlined in the software engineering code of ethics of avoiding harm and maintaining honesty and trustworthiness. This thesis aims to introduce and evaluate the concept of *explainable persuasion* in the context of designing ethical digital persuasive interfaces with an analogy to explainable artificial intelligence. A mixed methods approach was conducted to achieve this goal. The thesis focused on a distinct domain, online gambling, as gambling disorder is recognised as a mental disorder by health organisations. Accordingly, a scoping review was conducted first to identify the main persuasive design techniques utilised in online gambling platforms. Identified persuasive design techniques were analysed for their potential to facilitate gambling disorder through the addiction literature. An online survey was then conducted to examine users' awareness of persuasive design techniques used in online gambling platforms and users' attitudes towards the concept of *explainable persuasion*. Finally, an online experiment was conducted to determine the effectiveness of *explainable persuasion* as an inoculation intervention in building resilience against persuasive design techniques used in online gambling platforms. The findings of the user studies showed that *explainable persuasion* was accepted and that it could be a promising solution for designing persuasive interfaces that promote informed choice and strengthen resilience against persuasion if it is not compatible with users' personal goals. This thesis contributes to transparency and explainability literature as it is one of the first attempts to examine the role of explainability in the domain of persuasive technology which may also

have addictive potential. Identifying acceptance and rejection factors of *explainable persuasion* can help design persuasive interfaces that promote informed usage and meet ethical requirements. This implication does not only apply to persuasive technology but can also be generalised to research areas such as combatting fake news and social engineering. The findings are expected to have important implications for gambling operators and regulators in expanding the scope of responsible gambling practices to ensure explainability and transparency. The results are expected to also benefit wider application areas such as explainability in other contents and interfaces related to marketing, news and recommendations made by or facilitated by intelligent systems.

Table of Contents

List of Figures

List of Tables

Acknowledgement

1.   CHAPTER 1: INTRODUCTION

Within the digital realm, persuasive systems are defined as systems that are intended to change the user's attitudes and behaviours or both without coercion (Fogg 2003; Oinas-Kukkonen and Harjumaa 2009). Persuasive systems have been utilised in various fields, such as e-commerce, health, wellness, and energy consumption, to promote desirable attitudes and behaviours and discourage undesirables ones (Graml et al. 2011; Langrial et al. 2012; Alhammad and Gulliver 2014; Oyebode et al. 2020; Adib and Orji 2021). Persuasive systems are often matched with user interests, regardless of whether they are designed to persuade users to change their own behaviour or to promote user engagement in systems. However, because persuasive systems persuade users to interact with the system by prompting a change in their mental state (Oinas-Kukkonen 2013), ethical concerns may arise (Spahn 2012; Karppinen and Oinas-Kukkonen 2013). This thesis introduced and evaluated the concept of *explainable persuasion* in the context of designing ethical persuasive systems by taking online gambling as an example domain. This chapter provides an overview of the thesis by discussing the background and context of the research, the research problem and motivation, the research questions, the research objectives, the methodology, the thesis structure, and the publications that have arisen from this thesis.

1.1   RESEARCH BACKGROUND AND CONTEXT

It is proposed that persuasive systems persuade users to interact with the system by prompting a cognitive or emotional change in their mental state (Oinas-Kukkonen 2013). The design of any system by itself is suggested to be persuasive by definition, as the way the designer structures the digital realm defines how the user will interact with it (Redström 2006). Accordingly, persuasion by design could be accomplished through elements that make up the system, such as visual and aesthetic cues or persuasive design techniques adopted in the system (Cyr et al. 2018). Persuasive systems can be grouped

into two categories: behavioural change support systems (BCSS), in which users utilise technology to modify their behaviour or attitude to attain a self-defined goal (Oinas-Kukkonen 2013), and systems that persuade users for the persuader's gain (Spahn 2012). Typical examples of BCSS applications are those that promote positive behaviours such as physical activity, personal well-being, and energy savings (Graml et al. 2011; Langrial et al. 2012; Oyebode et al. 2020). The second category includes interactive online platforms that utilise persuasive interfaces to maximise user engagement, such as social networks, gaming, and online gambling platforms.

Whether designed for self-directed behaviour change or to enhance user involvement in systems, persuasive systems are generally aligned with user interest. However, given that persuasive systems influence users' cognitive or emotional state (Oinas-Kukkonen 2013), ethical concerns may arise (Spahn 2012; Karppinen and Oinas-Kukkonen 2013). This is more likely to be the case when persuasion is not self-directed but designed to influence for the advantage of a third party (Spahn 2012). In the last two decades, the world economy started to move from a materials economy to an attention economy, establishing a market where individual attention is a valuable resource (Goldhaber 1997). As human attention is limited, interactive online platforms started to employ immersive and persuasive interfaces to engage users and increase business profit (Hogan 2001). For example, online platforms use persuasive design techniques such as notifications, rewards, and social influence to engage users and increase revenue. In this context, ethical concerns need to be addressed. While people typically have some knowledge about traditional forms of persuasion, such as those used in advertising and marketing, their knowledge of digital persuasive design techniques could be limited, which may affect their response to persuasion attempts (de Pelsmacker and Neijens 2012). When interacting with persuasive interfaces, users may be unaware that they are being persuaded (Atkinson 2006; Smids 2012) or may be unaware that interacting with

persuasive interfaces may produce unintended consequences (Berdichevsky and Neuenschwander 1999). This can hinder the user's ability to evaluate the persuasion attempt as well as to reflect and direct their behaviour (Timmer et al. 2015). Moreover, persuasive interfaces designed to maximise user engagement may, in some cases, trigger or reinforce addictive usage. Some elements can trigger irresistible urges and increase perceived urgency and pressure (Alrobai et al. 2014; Ali et al. 2015; Kuonanoja and Oinas-Kukkonen 2018). For example, the use of rewards on digital platforms may encourage people to place more importance on the positive experience felt in the moment and make it hard to reflect on negative consequences that they may face in the future regarding excessive use (Cemiloglu et al. 2021b). Concerns regarding system persuasion may increase when the persuasion target is an emotionally or cognitively vulnerable group (Davis 2009).

In the context of online gambling, which is considered an example domain of technology with addictive potential (Alter 2017), persuasive interfaces may unintentionally trigger or expedite psychological and cognitive mechanisms related to addictive behaviour and contribute to excessive time and money spent on gambling (McCormack and Griffiths 2013; Cemiloglu et al. 2021b). Players may be unaware of persuasion having taken place and unaware of the negative consequences of interacting with persuasive gambling interfaces. As a result, monitoring and controlling gambling behaviour while interacting with persuasive interfaces may become difficult, especially for at-risk or problem gamblers.

1.2   RESEARCH PROBLEM AND MOTIVATION

This thesis aims to make a significant contribution to persuasive technology and ethics in software engineering literature by addressing ethical persuasive system design.

Most of the studies conducted in the persuasive technology domain concentrate on

BCSSs, underlining the positive impact of persuasive design techniques in promoting positive behaviours such as physical activity, personal well-being, and energy savings (Graml et al. 2011; Langrial et al. 2012; Oyebode et al. 2020). However, there is a lack of research that addresses the potential negative impact of persuasive design techniques employed to influence the users for the persuader's gain (Kuonanoja and Oinas-Kukkonen 2018; Montag et al. 2019). This is especially needed for interactive online platforms that utilise persuasive interfaces to maximise user engagement (i.e., social networks, gaming, and online gambling platforms) due to their addictive nature. This thesis is one of the first attempts to examine the relationship between persuasive technology and addictive usage. Overall, the purpose of this thesis is not to argue causation but rather to open a discussion around the potential negative effects of persuasive design techniques in certain contexts and modalities of usage.

While different approaches were taken to discuss the role of ethics in persuasive technology, transparency and user voluntariness were suggested to be important factors in building ethical persuasive interfaces (Atkinson 2006; Barral et al. 2014; Timmer et al. 2015). However, to date, the concept of transparent persuasive technology mainly remained philosophical in academia (Atkinson 2006; Smids 2012; Barral et al. 2014; Timmer et al. 2015). The design of ethical persuasive interfaces, e.g., in terms of graphical and informational content, delivery methods, personalisation, and timing, have not yet been discussed. This thesis addresses the design of ethical persuasive interfaces and proposes *explainable persuasion* as a potential solution to address issues related to system transparency, ethics, and user control, particularly within persuasive interfaces where emotions can bias decision-making, such as online gambling platforms (Hinson et al. 2006).

In the domain of consumer research, the Persuasion Knowledge Model (PKM) (Friestad

and Wright 1994) has been used extensively to examine how consumers recognise and build resilience against persuasion attempts (Fransen et al. 2015a). The model postulates that when individuals have information on both the persuader and self (i.e., the persuasion target), they can better analyse the persuasion attempt and decide whether to be persuaded. While most research has focused on the PKM within traditional modes of persuasion, such as advertising and marketing (Ham et al. 2015), persuasive technology has not been the subject of considerable research. This thesis attempts to contribute to the literature on persuasive technology by using the PKM as a reference model to assess users' knowledge about the new range of digital persuasive techniques. Such assessment is crucial because users' understanding of persuasive interfaces might influence how they respond to persuasion attempts (de Pelsmacker and Neijens 2012). User knowledge of persuasive interfaces is especially crucial in the context of technology with addictive potential, where persuasive design techniques may trigger or accelerate addictive behaviour.

Existing research on guidelines for the design, implementation, and evaluation of explainable systems (Rosenfeld and Richardson 2019; Samek et al. 2019; Chazette and Schneider 2020; Rai 2020; Sokol and Flach 2020) and information systems transparency (Hosseini et al. 2018) could provide a foundation for the design of *explainable persuasion,* but it may not be sufficient. This is because the user's primary task while interacting with persuasive interfaces is not to regulate their behaviour. On the contrary, notices and alerts are frequently viewed as distractions from the user's primary task (Iqbal and Horvitz 2010; Shepherd and Renaud 2018). Consequently, this thesis explores user acceptance and rejection factors of *explainable persuasion* to improve the design of *explainable persuasion* for a better user experience and increased user retention.

1.3   RESEARCH AIM

This thesis aims to introduce and evaluate the concept of *explainable persuasion* when building ethical persuasive interfaces. The thesis investigates whether persuasive interfaces utilised to change user behaviours within online platforms can trigger or expedite usage that is addictive in the sense of being obsessive, hasty, and associated with harm. The thesis takes online gambling as an example domain and application. Online gambling was selected as an extreme case since persuasive gambling interfaces may unintentionally trigger or expedite gambling disorder and contribute to excessive time and money spent on gambling. While no consensus exists on the addictive nature of social media or online streaming platforms, the DSM-5 (American Psychiatric Association 2013) recognised gambling as a disorder. Accordingly, the thesis explores user awareness of persuasive design techniques used in online gambling platforms and users' attitudes towards the concept of *explainable persuasion*. The thesis examines user acceptance and rejection factors of *explainable persuasion* and identifies possible *explainable persuasion* design tensions (i.e., conflicts that may occur throughout the design process due to technical constraints, user and business requirements) and solutions. This thesis also evaluates the effectiveness of *explainable persuasion* as an inoculation intervention in building resilience against persuasive design techniques used in online gambling platforms.

1.4   RESEARCH QUESTIONS

RQ1: What is *explainable persuasion* in the context of persuasive interfaces?

Taking online gambling as an example domain (i.e., the context of online gambling platforms and their players).

RQ2: What is the relationship between persuasive design techniques and gambling disorder?

RQ3: What do users know about persuasive design techniques utilised in online gambling platforms?

RQ4: What is the users' attitudes towards the concept of *explainable persuasion*?

RQ5: What are the user acceptance and rejection factors of *explainable persuasion*?

RQ6: Can *explainable persuasion* be adopted as an inoculation intervention to build resilience against persuasive design techniques used in online platforms?

1.5 RESEARCH OBJECTIVES

The following research objectives have been developed to answer the research questions posed in the thesis.

Objective 1: Define the concept of *explainable persuasion* in the context of persuasive interfaces.

The concept of *explainable persuasion* will be offered as a solution to design ethical persuasive interfaces. With an analogy to explainable artificial intelligence (XAI), the concept of *explainable persuasion* will be defined as the system's transparency about its persuasion attempts so that users can choose to be conscious of how the design may alter their behaviour and can consent to be subject to it. A literature review will be undertaken on persuasive technologies, gambling disorder, resistance to persuasion, system transparency, and system explainability in order to determine the primary boundaries and function of *explainable persuasion* in the context of persuasive interfaces. This objective will contribute to defining the scope of the thesis and the studies that will be undertaken.

Objective 2: Analyse the relationship between persuasive design techniques and gambling disorder.

The researcher will investigate whether persuasive design techniques utilised to change

user attitudes and behaviours within online gambling platforms can trigger or expedite gambling disorder. Understanding the relationship between gambling disorder and persuasive design techniques requires an investigation that goes beyond analysing gambling disorder symptoms. That is, one needs to look at the etiological factors that give rise to addictive symptoms in the first place to see whether persuasive design techniques tap into similar mechanisms. This objective will serve as the foundation for understanding the link between persuasive design and addictive behaviour and offer information and materials for the following empirical investigations.

Objective 3: Explore users' awareness of the use, intent and impact of persuasive design techniques utilised in online gambling platforms.

As the online gambling market continues to expand, an increasing number of online gambling platforms are being equipped with persuasive design techniques to attract players and increase engagement. While interacting with persuasive interfaces, players may be unaware of the persuasion attempt or that such techniques may contribute to gambling disorder. Drawing on the findings obtained from Objective 2, the researcher will conduct an online survey to examine whether users are aware of the use, intent and potential negative impact of the main persuasive design techniques utilised in online gambling platforms. The survey will also explore users' perception of susceptibility to persuasive design techniques in themselves and in others. This objective will contribute to a better understanding of user awareness of persuasive interfaces used in online gambling platforms and whether demographic or psychometric factors (i.e., problem gambling severity) contribute to it.

Objective 4: Explore users' attitudes towards the concept of *explainable persuasion*.

The first step in any innovation is user acceptance, which is users' willingness to use the

tool for the purpose it was designed for (Dillon 2001). Accordingly, the researcher will explore the concept of *explainable persuasion* from the user's perspective with the online survey mentioned in Objective 3. This objective will help determine whether *explainable* is a user requirement on demand.

Objective 5: Determine the user acceptance and rejection factors of *explainable persuasion*.

With the online survey mentioned in Objective 3, the researcher will explore user acceptance and rejection factors of *explainable persuasion*. Based on the findings, the researcher will further identify design tensions that could prohibit players from interacting with *explainable persuasion* and provide solutions to address these tensions. By identifying user acceptance and rejection factors and further exploring design tensions, this objective will help optimise *explainable persuasion* design for a better user experience and higher retention.

Objective 6: Evaluate whether *explainable persuasion* can be adopted as an inoculation intervention to build resilience against persuasive design techniques used in online gambling platforms.

The researcher will examine whether *explainable persuasion* can be used as an inoculation intervention within online gambling platforms. According to the Inoculation Theory, it is possible to inoculate people's attitudes against persuasive attacks in the same manner as the immune system can be inoculated against viral attacks (McGuire 1961). Studies on native advertisement disclosure suggest that even simple disclosures can foster resistance to persuasion by priming individuals about the commercial content (Amazeen 2020). A similar approach will be taken in the online gambling domain, where *explainable persuasion* will be utilised to inoculate users against the persuasive design technique, in-game rewards (i.e., cash bonuses and free spins). The findings of

this objective will help determine whether *explainable persuasion* could promote

system transparency and user control when interacting with persuasive interfaces.

The mapping between the thesis research questions, objectives and chapters is shown in

Table 1.

TABLE 1. MAPPING THE THESIS RESEARCH QUESTIONS, OBJECTIVES AND CHAPTERS

Research Question	Objective Outcome	Chapter
RQ1: What is explainable persuasion in the context of persuasive interfaces?	Objective 1	Chapters 2 and 4
Taking online gambling as an example domain		
RQ2: What is the relationship between persuasive design techniques and gambling disorder?	Objective 2	Chapter 5
RQ3: What do users know about persuasive design techniques utilised in online gambling platforms?	Objective 3	Chapter 6
RQ4: What is the users' attitudes towards the concept of explainable persuasion?	Objective 4	Chapter 7
RQ5: What are the user acceptance and rejection factors of explainable persuasion?	Objective 5	Chapter 8
RQ6: Can explainable persuasion be adopted as an inoculation intervention to build resilience against persuasive design techniques used in online platforms?	Objective 6	Chapter 9

1.6   METHODOLOGY OVERVIEW

This section gives an overview of the adopted research methods that were used to

achieve each objective.

Objective 1: Define the concept of *explainable persuasion* in the context of

persuasive interfaces.

A literature review was conducted on persuasive technologies, gambling disorder,

resistance to persuasion, system transparency, and system explainability.

Objective 2: Analyse the relationship between persuasive design techniques and

gambling disorder.

A literature synthesis was conducted to examine gambling disorder through addiction theories to understand etiological factors that give rise to addictive symptoms. For the purpose of the thesis, addiction theories were grouped into eight different categories: biological, predisposition, learning, decision-making, motivation, self-regulation, psycho-social, and contextual. As the second step, a scoping review was conducted to identify the main persuasive design techniques used in online gambling platforms by examining the gambling literature and by analysing online gambling platforms. The analysis was guided by criteria set by the Persuasive System Design (PSD) model (Oinas-Kukkonen and Harjumaa 2009) and also informed by Cialdini's (2001) work on principles of persuasion and McCormack and Griffiths's (2013) work on structural and situational characteristics of internet gambling. Seven websites from six different operators with the largest market share in the UK online gambling and betting market (Mintel Report 2019) were examined to identify the main persuasive design techniques used in online gambling platforms. Through the scoping review, 19 persuasive design techniques used by online gambling platforms were identified. Later, the researcher made an argument about potential associations between gambling disorder and the identified persuasive design techniques in light of etiological factors that give rise to gambling disorder. It is important to note that the researcher did not claim that this pairing depicts confirmatory evidence. The aim was to raise awareness of the possibility that persuasive interfaces may contribute to gambling disorder under certain user and contextual conditions.

Objective 3: Explore users' awareness of the use, intent and impact of persuasive design techniques utilised in online gambling platforms.

An online survey was conducted to address Objectives 3, 4 and 5. A total of 250 UK-based users of gambling platforms (age range 18 – 75, 123 male) completed the online

survey. The survey consisted of three main parts, which included both closed-ended and open-ended questions. The first part of the online survey examined whether users were aware of the use, intent and potential negative impact of the persuasive design techniques utilised in online gambling platforms. Users were also asked if they agreed with the claim that persuasive design techniques could contribute to problem gambling. Users were asked how much they thought they could be influenced by the persuasive design techniques and how much they thought the same persuasive design techniques could influence others. Descriptive analysis was utilised to provide a thorough overview and detailed insights into the survey data. Further analysis was conducted on the effects of user demographic and psychometric characteristics (i.e., problem gambling severity). Non-parametric tests were used to analyse group differences. Data from the open-ended questions was analysed using thematic analysis (Braun and Clarke 2006).

Objective 4: Explore users' attitudes towards the concept of *explainable persuasion*.

The second part of the online survey examined users' attitudes towards the concept of *explainable persuasion.* Users were asked whether they agreed that *explainable persuasion* could help players stay more in control of their gambling. Users were also asked about the delivery and presentation of *explainable persuasion,* what content they required from the explanation, and what they would think about operators that employ it. Non-parametric tests were used to analyse correlations and group differences. Data from the open-ended questions was analysed using thematic analysis (Braun and Clarke 2006).

Objective 5: Determine the user acceptance and rejection factors of *explainable persuasion*.

The third part of the online survey helped explore how *explainable persuasion* design

can be improved. With an open-ended question, participants were asked to explain why they agreed or disagreed that *explainable persuasion* may help gamblers stay in more control of their gambling. Data from the open-ended questions was analysed using thematic analysis with a deductive approach (Braun and Clarke 2006). The Unified Theory of Acceptance and Use of Technology (UTAUT2) (Venkatesh et al. 2012) was used to analyse and categorise user responses to acceptance and rejection factors. The researcher identified design tensions and possible solutions by further examining user acceptance and rejection factors. This analysis enabled the identification of bottlenecks in *explainable persuasion* communication and potential ways to tackle them.

Objective 6: Evaluate whether *explainable persuasion* can be adopted as an inoculation intervention to build resilience against persuasive design techniques used in online gambling platforms.

An online psychological inoculation study was conducted to address Objective 6. The study explored whether *explainable persuasion* can be used as an inoculation intervention to confer resistance to persuasive interfaces utilised in online gambling platforms. The study examined the inoculation effect of *explainable persuasion* on the persuasive design technique, in-game rewards (i.e., cash bonuses and free spins). A total of 240 UK-based users of gambling platforms (age range 18 – 73, 138 male) completed the study. *Explainable persuasion* was operationalised as a disclosure statement of persuasive intent during the persuasive attack (i.e., pop-up bonus offer). A 4x2 design was used in the study. Inoculation intervention (inoculation intervention + disclosure of persuasive intent during the persuasive attack, inoculation intervention alone, disclosure of persuasive intent during the persuasive attack alone, and control) and problem gambling severity (non-problem gamblers + low-risk gamblers, moderate-risk gamblers) served as the independent variables. The study consisted of three phases over

the course of two weeks. These manipulations enabled the researcher to examine the effect of *explainable persuasion* on resistance to persuasion. Analysis of Covariance (ANCOVA) was used as the main analysis to test the effect of the inoculation intervention and problem gambling severity. Spearman correlations were used to analyse the association between continuous and ordinal variables (Sheskin 2003). Data from the open-ended question was analysed using thematic analysis (Braun and Clarke 2006).

1.7 THESIS STRUCTURE

This thesis structure is illustrated in **Figure 1**. A literature review is presented in **Chapter 2**; this chapter examines significant fields of research related to the research topic. **Chapter 3** describes the research methodology adopted to attain the thesis objectives, including data collection methods and analysis techniques. In **Chapter 4**, the concept of *explainable persuasion* is introduced. **Chapter 5** discusses the relationship between persuasive design techniques and gambling disorder. **Chapters 6, 7 and 8** discuss the findings of the online survey, which explores user awareness of persuasive design techniques used in online gambling platforms and users' attitudes towards the concept of *explainable persuasion*. **Chapter 9** presents the findings of the inoculation study. **Chapter 10** concludes by summarising the conclusions of the research thesis and discussing future work.
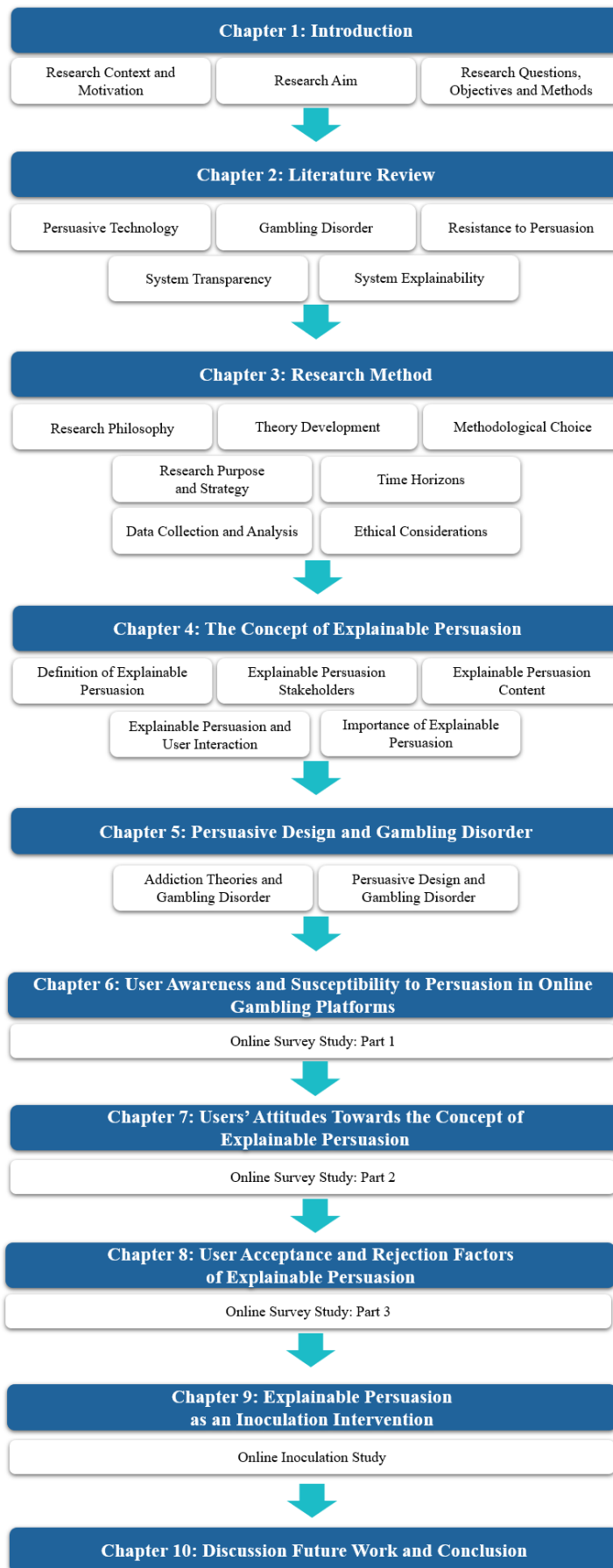
FIGURE 1. THESIS CHAPTERS AND RESEARCH ROADMAP

1. Cemiloglu, D., Gurgun, S., Arden-Close, E., Jiang, N., and Ali, R., 2023. Explainability as a Psychological Inoculation: Building Resistance to Digital Persuasion in Online Gambling through Explainable Interfaces. *International Journal of Human-Computer Interaction* **[Submitted].**

2. Cemiloglu, D., Arden-Close, E., Hodge, S. E. and Ali, R., 2023. Me versus them: exploring the perception of susceptibility to persuasion in oneself and others in online gambling. *Persuasive Technology: 18th International Conference, PERSUASIVE 2023,* Eindhoven, The Netherlands, 19-21 April. DOI: 10.1007/978-3-031-30933-5_24

3. Cemiloglu, D., Arden-Close, E., Hodge, S. E. and Ali, R., 2023. Explainable persuasion for interactive design: The case of online gambling. *Journal of Systems and Software*, 195, 111517. DOI: 10.1016/j.jss.2022.111517.

4. Cemiloglu, D., Almourad, M. B., McAlaney, J. and Ali, R., 2022. Combatting digital addiction: Current approaches and future directions. *Technology in Society*, 68, 101832. DOI: 10.1016/j.techsoc.2021.101832.

5. Cemiloglu, D., Catania, M. and Ali, R., 2021a. Explainable Persuasion in Interactive Design. *2021 IEEE 29th International Requirements Engineering Conference Workshops (REW)*. IEEE. 377-382. DOI: 10.1109/REW53955.2021.00066.

6. Cemiloglu, D., Naiseh, M., Catania, M., Oinas-Kukkonen, H. and Ali, R., 2021. The Fine Line Between Persuasion and Digital Addiction. *In Ali, R., Lugrin, B. and Charles, F. (Eds.), Persuasive Technology (pp. 289-307).* Cham: Springer

International Publishing. DOI: 10.1007/978-3-030-79460-6_23

7. Cemiloglu, D., Arden-Close, E., Hodge, S., Kostoulas, T., Ali, R. and Catania, M., 2020. Towards Ethical Requirements for Addictive Technology: The Case of Online Gambling. *2020 1st Workshop on Ethics in Requirements Engineering Research and Practice (REthics)*. IEEE. 1-10. DOI: 10.1109/REthics51204.2020.00007.

The author contributed as a co-author in related research:

1. Gurgun, S., Cemiloglu, D., Arden-Close, E., Phalp, K., Nakov, P., and Ali, R., 2023. Challenging Misinformation on Social Media: The Perceptions and Misperceptions of Negative Consequences and Injunctive Norms and their Impact on the Willingness to Challenge. *Online Social Networks and Media* **[Submitted].**

2. Ali, R., Al-Thani, D., Al-Mansoori, R. S. and Cemiloglu, D., 2021. From Digital Addiction to Digital Wellbeing: Future Digitization and its Challenges in the Arab World. *Istishraf for Future Studies*, 6 (6), 160-208. DOI: 10.31430/VXJR6265.

3. Naiseh, M., Cemiloglu, D., Thani, D. A., Jiang, N. and Ali, R., 2021. Explainable Recommendations and Calibrated Trust: Two Systematic User Errors. *Computer*, 54 (10), 28-37. DOI: 10.1109/MC.2021.3076131.

News Article

McAlaney, J., Ali, R., Cemiloglu, D., "Five ways to manage your screen time in a lockdown, according to tech experts" [online]. The Conversation. Available from: https://theconversation.com/five-ways-to-manage-your-screen-time-in-a-lockdown-

according-to-tech-experts-152715

1.9   DECLARATION OF CO-AUTHORS' CONTRIBUTION

The author of this thesis was also the first author of the publications. The contribution of the first author was as follows:

- Establishing and expanding upon the themes and research objectives for each paper.

- Determining the most applicable research approach for each publication (e.g., study design, participant recruitment, data collection and analysis).

- Designing and carrying out the empirical research provided in each paper.

- Conducting data analysis and interpretation.

- Writing up the results of the study and producing each paper in its entirety.

In addition to contributing to, validating, and confirming the research conducted for this thesis, the co-authors also reviewed each published and submitted work. Also, they provided assistance and criticism on the structure and general articulation of the argument and objectives of the publications. In addition, they provided insight into the study methodology and assessed the quality of the papers in terms of style and content.

1.10   CHAPTER SUMMARY

This chapter introduced the research context, the research problem, and the research motivation. The chapter also presented the research questions, research objectives, methodology, thesis structure, and publications that have resulted from this thesis. The next chapter provides a literature review of key research areas relevant to the research topic.

2.   CHAPTER 2: LITERATURE REVIEW

The previous chapter introduced the research context. This chapter presents a literature review on persuasive technologies, gambling disorder, resistance to persuasion, and explainable systems (i.e., system transparency and explainability) to determine the primary boundaries and function of *explainable persuasion* in the context of persuasive interfaces.

2.1   PERSUASIVE TECHNOLOGY

2.1.1   PERSUASION

Over the past half-century, persuasion research has expanded in most social sciences (e.g., communication, psychology, sociology, political science, and anthropology) and applied fields (e.g., advertising, marketing, public health, medicine, law, business, education, and environmental studies) to investigate how persuasive communication impacts decision making in different contexts (O'keefe 2015).

2.1.1.1   DEFINITION

In essence, persuasion is defined as a conscious effort to shape, reinforce, or change the responses of others (Roloff and Miller 1980; Cameron 2009). While different definitions of persuasion are proposed by different scholars, Powers (2007) reported the most common elements incorporated in definitions of persuasion within modern philosophical literature and social sciences. In a typical persuasion context, the common elements of persuasion are as follows:

1. Persuasion requires one or more persuader(s), a message, and one or more receiver(s).

2. Persuasion requires the intention of the persuader.

3. The receiver needs to have the option to accept or reject the persuasion attempt.

4. Persuasion needs to result in observable changes in attitudes or behaviour.

5. Persuasion is a psychological process that involves verbal, visual, auditory or text-based communication.

Persuasion is the use of communication to influence people's independent decisions and behaviours. The goal of persuasion is to alter a person's decisions, and behaviours without resorting to force or coercion, and ultimately, the decision to change rests with the person being persuaded (Jones and Simons 2017).

2.1.1.2   ART OF RHETORIC

Despite the developments and progress in communication technology over the centuries, the basis of persuasive communication remains rooted in *Rhetoric* defined by Aristotle (384 - 322 B.C.) (Pelclová and Lu 2018). Aristotle (384 - 322 B.C.) described *Rhetoric* as the art of persuasive communication in which the speaker successfully persuades the listener to do something they would not normally do if they were not asked (Borg 2013). Aristotle (384 - 322 B.C.) argued that the goal of every persuasive communication is to move the audience from an initial state to the desired state and referred to this change (i.e., in attitude, belief, behaviour) as persuasion (Rapp 2011; Borg 2013).

Aristotle (384 - 322 B.C.) identified three distinct persuasive appeals employed by speakers in the persuasion process: ethos, pathos, and logos (Rapp 2011; Borg 2013).

A.   ETHOS

"Ethos" refers to the speaker's character or personality. For the persuasion attempt to be successful, source credibility is crucial. That is the degree to which an audience views a speaker as trustworthy (Rapp 2011; Borg 2013).

B.   *PATHOS*

The term "pathos" refers to the audience's emotional state. According to Aristotle (384 - 322 B.C.), persuasion can be achieved by appealing to the audience's feelings and emotions (Rapp 2011; Borg 2013).

C.   *LOGOS*

Within the persuasion process, "logos" refers to the argument itself. According to Aristotle (384 - 322 B.C.), persuasion can be achieved by appealing to reason or logic, establishing clear, reasonable connections between concepts and employing facts (Rapp 2011; Borg 2013).

2.1.1.3   *YALE ATTITUDE CHANGE MODEL*

The Yale Attitude Change Model examines the circumstances in which persuasive communication may successfully change people's attitudes (Hovland and Janis 1959) and has a framework comparable to Aristotle's idea of persuasion. The model suggested that the source, message, and audience are all relevant in determining whether a person's attitude changes as a result of persuasive communication (Hovland and Janis 1959). Hovland and Janis (1959) proposed that the persuasive power of a message relies on how well it is attended to, comprehended and accepted by the audience and factors relating to source, message and audience can influence this (Figure 2).
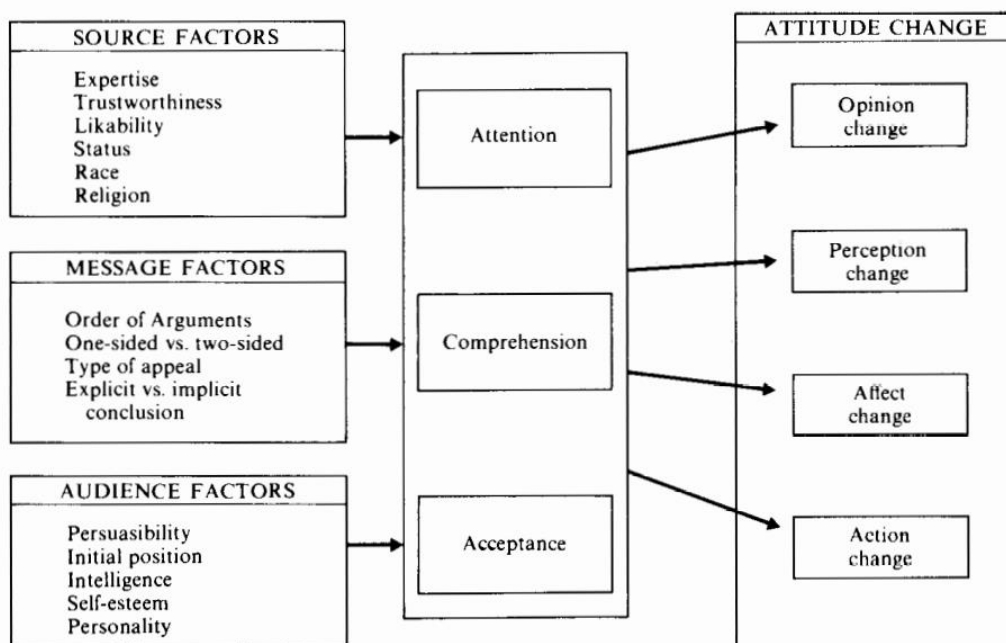
FIGURE 2. YALE ATTITUDE CHANGE MODEL (BASED ON JANIS AND HOVLAND, 1959)

McGuire (1968) later expanded Hovland and Janis's (1959) phases of message

processing (e.g., attention, understanding, and acceptance) into six stages: presentation,

attention, comprehension, agreement with the argument, retention, and conduct.

McGuire (1968) argued that for persuasive communication to influence behaviour, the

persuasive message should be presented, brought to the audience's attention,

comprehended, accepted, and recalled by the audience in future.

2.1.1.4   ROUTES TO PERSUASION

The Elaboration Likelihood Model (ELM), developed by Petty and Cacioppo (1983),

provides a thorough understanding of the ways in which persuasion can cause attitude

change. The basic principle of ELM is the existence of two pathways for persuasion: the

central and peripheral routes. According to this model, an individual's motivation and

ability affect their elaboration level, which in turn influences the route through which

persuasion takes place (Petty and Cacioppo 1983, 1986).

An individual's motivation to process a message may be influenced by many elements

such as issue involvement, the audience's level of need for cognition (NfC) (i.e., an

individual's tendency to enjoy and engage in complex thinking) (Cacioppo et al. 1983).,

source attractiveness, and whether the persuasive argument supports or opposes the

audience's prior views (Petty and Cacioppo 1983). Distractors, message repetition,

complexity, and the recipients' level of relevant expertise can impact an individual's

ability to process a message (Petty and Cacioppo 1983). Attitude and behaviour change

are common metrics for evaluating the success of persuasion. Figure 3 depicts the ELM

model.
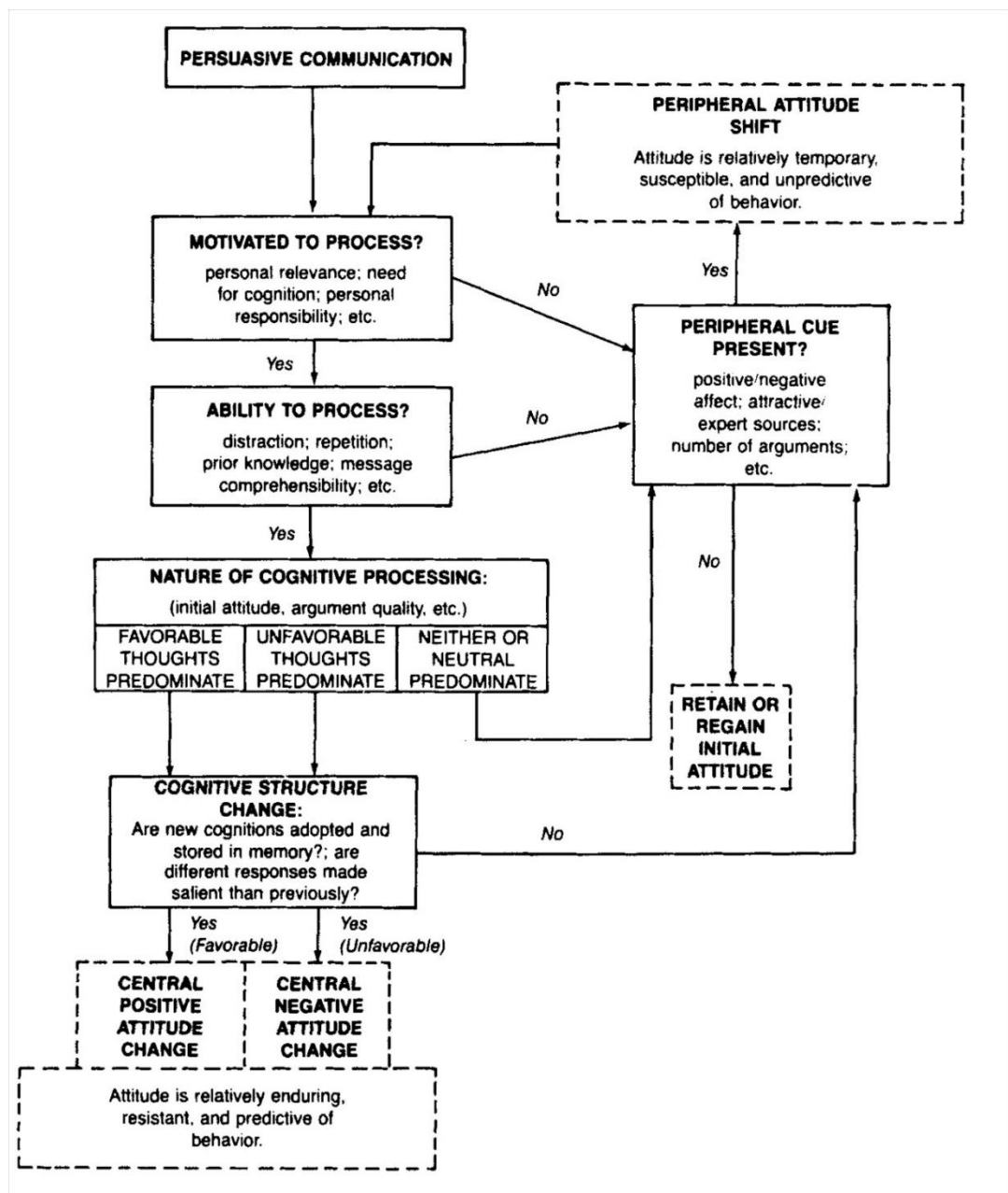
FIGURE 3. CENTRAL AND PERIPHERAL ROUTES TO PERSUASION (BASED ON PETTY AND CACIOPPO, 1986, P126)

A.   *CENTRAL ROUTE*

According to the ELM, when elaboration likelihood is high, the central route will be

used for information processing. Persuasion results from a rational and thorough

examination of the evidence in support of the argument, as the individual who receives

the message is able to generate a greater level of cognition through the central route

(Petty and Cacioppo 1983, 1986; Petty 2018). Attitudes developed through the central

route are suggested to be long-lasting, resistant, and predictive of behaviour (Petty and

Cacioppo 1983; Haugtvedt and Petty 1989).

B.   *PERIPHERAL ROUTE*

According to the ELM, when elaboration likelihood is low, the peripheral route will be

used for information processing. Persuasion results from stimulus cues (i.e., credibility,

source attractiveness, heuristics) instead of argument quality, as the individual who

receives the message, does not rely on cognitive effort (Petty and Cacioppo 1983, 1986;

Petty 2018). Being influenced by pathos or ethos is suggested to be related to persuasion

through the peripheral route (Borg 2013). It is indicated that attitudes developed through

the peripheral route are temporary and less predictive of future behaviour (Petty and

Cacioppo 1983, 1986; Petty 2018).

2.1.2   PERSUASIVE SYSTEMS

While computers were initially designed as tools with basic functions such as storing

data and performing calculations, as technology improved and became more pervasive

in many aspects of daily life, their designs evolved to make them more persuasive (Fogg

2003). Table 2 displays persuasive technology domains and applications, as outlined by

Fogg (2003). Numerous research has been conducted on persuasive technologies across

different fields, including marketing (Adib and Orji 2021), fitness and wellness

(Matthews et al. 2016), safety (Bergmans and Shahid 2013), and energy consumption

(Bang et al. 2006).

TABLE 2. PERSUASIVE TECHNOLOGY DOMAINS AND APPLICATIONS (BASED ON FOGG 2003, P3)

Domain	Example Application	Persuades Users to
Commerce	Amazon.com's recommendation system	Purchase more books and other items.
Education, learning, and training	Safety CodeWarriorU.com	Do things that will help you learn how to write code.
Safety	Drunk driving simulator	Drive sober.
Environmental preservation	Scorecard.org	Do something about companies that pollute.
Occupational effectiveness	"In My Steps" VR system	Show more compassion for people with cancer.
Preventive healthcare	Quitnet.com	Quit smoking
Fitness	Tectrix VR bike	Work out and have fun
Disease management	Bronki the brachiosaurus game	Take better care of asthma.
Personal finance	FinancialEngines.com	Make a plan for your retirement and stick to it.
Community involvement	CapitolAdvantage.com	Get regular people involved in government.
Personal relationships	Classmates.com	Get in touch with old classmates.
Personal management and self-improvement	MyGoals.com	Set goals and do what it takes to reach them.

2.1.2.1 DEFINITION

Persuasive technology is defined as "any interactive computing system designed to change people's attitudes or behaviours" (Fogg 2003, P1). In the persuasive technology literature, different terminologies, such as persuasive technology, persuasive systems, and persuasive interfaces, are used to refer to computer systems designed to alter user behaviours. Persuasive systems are suggested to persuade users through both human-computer interaction and computer-mediated communication in which persuasion occurs through other people using the system (Oinas-Kukkonen and Harjumaa 2009). Fogg (2003) made a distinction between levels of persuasion and defined systems that are designed solely to persuade users as macro persuasion systems and systems that are not built for persuasion but rather include persuasive elements as micro persuasion systems (e.g., online gaming platforms, e-commerce websites, email programs).

2.1.2.2 MODELS AND FRAMEWORKS

Several models and frameworks have been proposed to design and evaluate persuasive

technologies. In the following section, Captology (Fogg 2003), Persuasive System Design (PSD) (Oinas-Kukkonen and Harjumaa 2009), and principles of influence Cialdini's (2001) models will be summarised.

One of the most often referenced figures in the field of persuasive technology is B. J. Fogg. Fogg (2003) proposed the term "Captology" to define the intersection of computers and persuasion (Figure 4). Captology focuses on the design, study, and analysis of interactive systems intended to alter users' attitudes or actions (Fogg 2003).
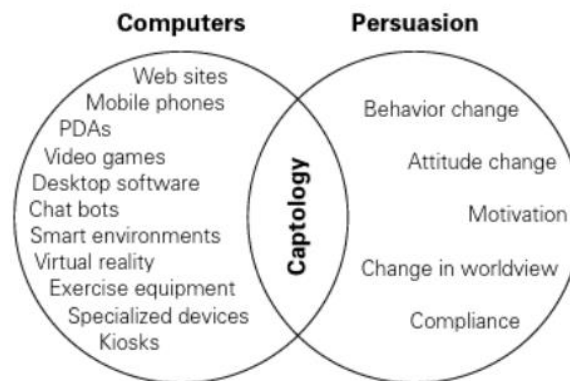
FIGURE 4. CAPTOLOGY (BASED ON FOGG 2003, P5)

According to Fogg (2003), from the users' perspective, computers play three primary roles, as tools, as sensory media and as social actors (Figure 5). As tools, computers may persuade the user by simplifying the desired action or guiding users through a procedure. As sensory media, computers may persuade users by offering simulations or by enabling people to practise behaviour. As social actors, the computer may persuade users by rewarding them, modelling a desired behaviour, or offering social support (Fogg 2003).
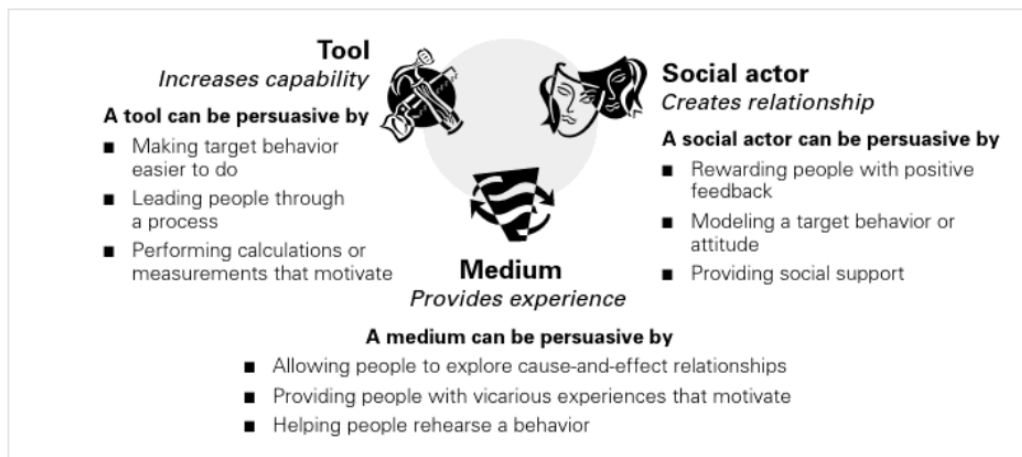
FIGURE 5. COMPUTING TECHNOLOGIES FUNCTIONAL ROLES (BASED ON FOGG 2003, P25)

B. PERSUASIVE SYSTEM DESIGN MODEL

Within the PSD model, persuasive technology is defined as "computerised software or information systems designed to reinforce, change or shape attitudes or behaviours or both without using coercion or deception" (Oinas-Kukkonen and Harjumaa 2009, P486). This definition suggests that a persuasive system has three possible outcomes, reinforcing a current behaviour, changing a current behaviour or creating a behaviour which did not exist before (Oinas-Kukkonen and Harjumaa 2009).

I. PERSUASION CONTEXT

To identify appropriate moments for persuasion, the PSD model necessitates a thorough understanding of the persuasion context (Oinas-Kukkonen 2010). The PSD model defines the persuasion context as comprising of the persuasion intent, persuasion event, and strategy in use (Torning and Oinas-Kukkonen 2009). The persuasion intent refers to who the persuader is and what the system intends as a target behaviour. The persuasion event refers to the use context (i.e., characteristics of the problem domain), user context (i.e., individual traits, interests, and goals which influence information processing), and the technology context (i.e., characteristics of the technological platform in use). The strategy refers to the message (i.e., content and delivery) and the route to persuasion. The route to persuasion can be the central route, persuasion resulting from information

processing that is slow and reflective or the peripheral route, persuasion resulting from information processing that is fast and relies on mental shortcuts (Cacioppo et al. 1986).

II. *PERSUASIVE DESIGN TECHNIQUES*

Persuasive design techniques are methods that may be used in persuasive technology to encourage behaviour change (Fogg 2003; Oinas-Kukkonen and Harjumaa 2009). By adapting and expanding on Fogg's (2003) work, Oinas-Kukkonen and Harjumaa (2009) identified four persuasive design technique categories in the PSD model for the design and development of persuasive systems. These include (i) *primary task support*, design techniques that support and ease conducting activities such as reduction and personalisation, (ii) *dialogue support*, design techniques that support the achievement of goals while using the system such as praise, rewards and reminders, (iii) *social support*, design techniques that enable motivating certain action through social influence such as social learning and competition and (iv) *system credibility support*, design techniques that make the system more trustworthy. Table 3 displays a complete list and definition of each persuasive design technique.

TABLE 3. PERSUASIVE DESIGN TECHNIQUES (BASED ON OINAS-KUKKONEN AND HARJUMAA 2009, P492 - 495)

Persuasive Design Technique	Definition
Primary Task Support	
Reduction	A system that reduces complex behaviour into simple tasks helps users perform the target behaviour, and it may increase the benefit/cost ratio of a behaviour.
Tunnelling	Using the system to guide users through a process or experience provides opportunities to persuade along the way.
Tailoring	Information provided by the system will be more persuasive if it is tailored to the potential needs, interests, personality, usage context, or other factors relevant to a user group.
Personalisation	A system that offers personalised content or services has a greater capability for persuasion.
Self-Monitoring	A system that keeps track of one's own performance or status supports the user in achieving goals.
Simulation	Systems that provide simulations can persuade by enabling users to observe the link between cause and effect immediately.
Rehearsal	A system providing means with which to rehearse a behaviour can enable people to change their attitudes or behaviour in the real world.

Dialogue Support	
Praise	By offering praise, a system can make users more open to persuasion.
Rewards	Systems that reward target behaviours may have great persuasive powers.
Reminders	If a system reminds users of their target behaviour, the users will be more likely to achieve their goals.
Suggestion	Systems offering fitting suggestions will have greater persuasive powers.
Similarity	People are more readily persuaded through systems that remind them of themselves in some meaningful way.
Liking	A system that is visually attractive for its users is likely to be more persuasive.
Social Role	If a system adopts a social role, users will more likely use it for persuasive purposes.
System Credibility Support	
Trustworthiness	A system that is viewed as trustworthy will have increased powers of persuasion.
Expertise	A system that is viewed as incorporating expertise will have increased powers of persuasion.
Surface Credibility	People make initial assessments of the system's credibility based on a firsthand inspection.
Real-World Feel	A system that highlights the people or organisation behind its content or services will have more credibility.
Authority	A system that leverages roles of authority will have enhanced powers of persuasion.
Third-Party Endorsements	Third-party endorsements, especially from well-known and respected sources, boost perceptions of system credibility.
Verifiability	Credibility perceptions will be enhanced if a system makes it easy to verify the accuracy of site content via outside sources.
Social Support	
Social Learning	A person will be more motivated to perform a target behaviour if they can use a system to observe others performing the behaviour.
Social Comparison	System users will have a greater motivation to perform the target behaviour if they can compare their performance with the performance of others.
Normative Influence	A system can leverage normative influence or peer pressure to increase the likelihood that a person will adopt a target behaviour.
Social Facilitation	System users are more likely to perform target behaviour if they discern via the system that others are performing the behaviour along with them.
Cooperation	A system can motivate users to adopt a target attitude or behaviour by leveraging human beings' natural drive to cooperate.
Competition	A system can motivate users to adopt a target attitude or behaviour by leveraging human beings' natural drive to compete.
Recognition	By offering public recognition for an individual or group, a system can increase the likelihood that a person/group will adopt a target behaviour.

Persuasive design techniques outlined in Table 3 have been implemented in various fields such as e-commerce, health, well-being, and health (Langrial et al. 2012; Alhammad and Gulliver 2014; Oyebode et al. 2020; Adib and Orji 2021). The most

commonly used persuasive design techniques in e-commerce applications were reported as dialogue support and system credibility support (Alhammad and Gulliver 2014). Within the e-commerce context, designers focus on elements that facilitate interaction, as customers may be hesitant to carry out a financial transaction if there is no positive engagement with the website. Also, because there is an element of risk involved for buyers when using e-commerce websites, the designers of these sites place a strong emphasis on establishing credibility and trust (Alhammad and Gulliver 2014). The most commonly used persuasive design techniques in the health domain were reported as primary task support and system credibility support (Oyebode et al. 2020). Within the healthcare context, it is essential to assist users in performing tasks by tailoring interventions to the individual level, as each individual is unique. Additionally, because users tend to be sceptical about whether they can trust applications in the healthcare industry, the appearance of an app's credibility is critical (Oyebode et al. 2020).

C.   PRINCIPLES OF INFLUENCE

The six fundamental principles of influence proposed by Cialdini (2001) serve as another common reference model for designing persuasive technology. Cialdini (2001) stated that the art of persuasion relies on leveraging a limited number of universal human motivations. Table 4 displays a complete list and definition of each influence principle (Cialdini 2001; Cialdini and Cialdini 2007).

TABLE 4. PRINCIPLES OF INFLUENCE (BASED ON CIALDINI 2001)

Principles of Persuasion	Definition
Liking	People may be more open to persuasion from those people they like. Liking may be due to perceived similarities with others or compliments received from others.
Reciprocity	People feel compelled to repay what they have received. People may be more open to persuasion if you give them what you want to receive.
Social Proof	People decide how to act in a situation by observing what others like them do. People may be more open to persuasion if you use peer influence.
Consistency	People may be more open to persuasion if you first get them to make a small commitment that's consistent with the final desired action.

Authority	People may be more open to persuasion if they perceive others as legitimate experts.
Scarcity	People want more of what they cannot have. People may be more open to persuasion if you highlight uniqueness and exclusiveness.

An example of the reciprocity principle could be offering special benefits to website subscribers or offering a free trial of an app to new users. An example of the consistency principle could be getting users to register to a platform for personalised offers. Some principles of persuasion listed above (e.g., liking, authority) show similarity to persuasive design techniques outlined in the PSD model (Oinas-Kukkonen and Harjumaa 2009). Cialdini (2008) later proposed a seventh principle, unity, which suggests that individuals are more likely to be convinced by those with whom they have a feeling of shared identity.

2.1.2.3   USER EXPERIENCE WITH PERSUASIVE SYSTEMS

User experience design plays a significant role when building persuasive systems because persuasion requires effective communication between the system and the user. The usability of the interactive system is a defining factor determining the quality of the communication between the user and the system (Cockton and Gram 1996). While definitions of usability vary (Lewis 2014), in ISO 9241-11 (2018), it refers to "the extent to which a system, product or service can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use". In other words, for a system to provide a viable medium for persuasion, it needs to be usable. Consequently, the PSD model identified two postulates that need to be fulfilled when designing persuasive systems with user experience in mind (Oinas-Kukkonen and Harjumaa 2009). According to the model, persuasive systems should seek to be unobtrusive; the system needs to refrain from interfering with users while they are focused on their primary tasks. Thus, the timing of the persuasive design techniques is crucial. The second postulate states that persuasive systems should be easy

to use and pleasant to interact with. Hence, persuasive systems should adhere to general software qualities such as responsiveness, ease of access, error prevention, convenience, and high information quality and attractiveness (Oinas-Kukkonen and Harjumaa 2009). From a broader perspective, usability and persuasion reciprocally influence each other. For persuasion to occur, it is necessary to create grounds for an effective user experience. At the same time, effective user experience can be supported by persuasive design techniques such as attractiveness, personalisation, and reciprocity.

2.1.3   ETHICAL PERSUASIVE DESIGN

The neutrality of information technology is questioned as, in some manner, it affects people's attitudes and behaviour (Oinas-Kukkonen and Harjumaa 2009; Karppinen and Oinas-Kukkonen 2013). Persuasive technology persuades users to interact with the system by prompting a cognitive or emotional change in their mental state (Oinas-Kukkonen 2013), and such an intervention may raise ethical concerns (Spahn 2012; Karppinen and Oinas-Kukkonen 2013). Therefore, developers and designers have a responsibility to be conscious of the impact that the technology may have on the people who use it (Berdichevsky and Neuenschwander 1999). Different variables may impact whether a certain persuasive technology is regarded as ethical. These include the user, the intent, the persuasion method employed, the outcome, and the persuasive technology being utilised (Fogg 2003; Page and Kray 2010).

2.1.3.1   *ISSUES OF CONCERN*

A.   *NOT IN THE USERS' INTEREST*

Compared to BCSSs, systems that persuade users for the persuader's gain may raise ethical concerns as their goal is not always aligned with the users' best interest (Spahn 2012). In order to increase user engagement, many interactive online platforms such as social networks, gaming, and online gambling platforms create and deploy persuasive

interfaces. Persuasion may be used, for instance, to induce people to engage with different game features or to encourage them to purchase products.

B. *LACK OF AWARENESS OF PERSUASION*

When interacting with persuasive technology, users may be unaware of being persuaded (Smids 2012). Instead, they may regard the persuasive interface as a means of generating a favourable user experience (Branch et al. 2021). Lack of awareness of persuasion may hinder a user's ability to recognise and evaluate the persuasion attempt and reflect on their behaviour (Timmer et al. 2015). Software users do not always realise when they are being persuaded (Branch et al. 2021).

C. *UNINTENDED CONSEQUENCES*

Persuasive technology designed to change users' attitudes and behaviour in a certain way may result in unforeseen repercussions that were not anticipated by the designer (Berdichevsky and Neuenschwander 1999; Atkinson 2006). Since persuasive systems are designed to prompt behavioural, cognitive, psycho-social, and other psychological mechanisms to change a user's attitudes and behaviour, they may also trigger or expedite mechanisms related to addictive behaviour (Kuonanoja and Oinas-Kukkonen 2018; Cemiloglu et al. 2021b). Persuasive interfaces designed to maximise user engagement may, in some cases, trigger or reinforce usage that is addictive in the sense of being obsessive, hasty, and associated with harm. It is possible that some design elements might heighten a sense of urgency and pressure, causing an uncontrollable desire for the addictive activity (Alrobai et al. 2014; Ali et al. 2015; Kuonanoja and Oinas-Kukkonen 2018). Users may be unaware of the negative consequences of interacting with persuasive interfaces. As a result, monitoring and controlling behaviour while interacting with persuasive interfaces may become difficult (Timmer et al. 2015). Benner et al. (2021) stressed the importance of notifying the user about possible undesirable outcomes related to persuasive technology as a minimum design

requirement.

The concern for persuasion heightens when the persuasion target belongs to an emotionally or cognitively vulnerable group, such as a child or the elderly (Davis 2009). In the case of online gambling, persuasive interfaces may unintentionally trigger or expedite psychological and cognitive mechanisms related to addictive behaviour and contribute to excessive time and money spent on gambling (McCormack and Griffiths 2013; Cemiloglu et al. 2021b). Therefore, problem or at-risk gamblers may find it difficult to regulate their gaming behaviour.

E.   PERSUASION PROFILING

Persuasion profiling, adapting persuasive systems to user differences for effective persuasion, also raises ethical concerns (Kaptein and Eckles 2010). According to Kaptein and Eckles (2010), persuasion profiling may present distinct ethical concerns due to the risk of employing systems trained in one domain for another and the lack of transparency regarding how the persuasive system adapts to the unique characteristics of individual users.

2.1.3.2   ETHICAL DESIGN APPROACHES

Different scholars have studied and identified possible approaches to address ethical concerns in the field of persuasive technology. For example, Karppinen and Oinas-Kukkonen (2013) suggested a conceptual ethical framework that includes the following three categories: guideline-based methods, stakeholder analysis, and user participation (Table 5).

TABLE 5. FRAMEWORK OF ETHICAL APPROACHES IN PERSUASIVE TECHNOLOGY DESIGN (BASED ON KARPPINEN AND OINAS-KUKKONEN 2013, P93)

Approach	Publication	Primary Ethical Contribution for Designers
Guideline	(Berdichevsky and Neuenschwander 1999)	There are eight principles for designing persuasive technology, but the golden rule is the most significant one: The people who create persuasive technologies should never try to convince someone to do something that they themselves wouldn't agree to do.

	(Gram-Hansen 2009)	Reflections on ethics are intuitive and personal by nature. Designers need to design a product that has an effect on the user in a way that they think is morally right.
	(Smids 2012)	The individual's free will to alter their behaviour is the most pressing moral concern when it comes to persuasive technology. Avoid using any kind of pressure, manipulation, or covert influence.
	(Spahn 2012)	Three principles for persuasion: 1) every persuasion should begin with informed consent; 2) all persuasion should have a clear and conclusive goal; 3) all persuasion should provide the user with as much control as possible.
Stakeholder Analysis	Fogg (2003)	An analysis of stakeholders, in seven steps: 1) make a list of all stakeholders; 2) write down what each stakeholder stands to gain 3) what each stakeholder stands to lose; 4) figure out who stands to gain the most 5) and who stands to lose the most; 6) figure out what is moral by looking at gains and losses in terms of values; 7) be aware of the personal values you bring to the analysis.
	(Friedman et al. 2006)	Stakeholders' values are found through an analysis with three different levels: conceptual, empirical, and technical.
User Involvement	(Davis 2009)	Participation in design. Utilising participatory design to include prospective users as full participants in the design process and using value-sensitive design to assess the values of the direct and indirect stakeholders.
	(Yetim 2011)	There are a total of 21 important questions that serve as reflective guides for the three different kinds of discourses: pragmatic (e.g., goal-value, action-goal, action-value), ethical (e.g., identifying, checking), and moral (e.g., identifying, checking).

Benner et al. (2021) conducted a systematic literature review to outline ethical considerations for persuasive system design (Table 6).

TABLE 6. ETHICAL CONSIDERATIONS DERIVED FROM LITERATURE (BASED ON BENNER 2021, P6)

Consideration for Ethical Persuasion	Source	Description
Consciousness of Intent	(Pilaj 2017)	It is necessary to design persuasive systems with an ethical objective in mind. As long as there is no malicious intent, persuasive systems may be used.
The Extent of Ethics and PSD Implementation	(Sunstein 2016; Pilaj 2017)	In order to create a balance that assures autonomy, transparency, and effectiveness, designers should assess the degree to which persuasive and ethical qualities are considered.
Opt-in Design, Anonymisation	(Renaud and Zimmermann 2018; Humlung and Haddara 2019)	An opt-in design is advocated so as not to force the user into an ethically unpleasant scenario.
Ethical Outcomes	(Sunstein 2016; Renaud and Zimmermann 2018; Hassan and Hamari 2020)	When persuading a user toward a given (third-party) outcome, persuasive systems must also keep the user's intended outcomes in mind.
Fairness and Exploitation	(Kim and Werbach 2016; Winkel et al. 2016)	It should be ensured that persuasive systems do not misuse their persuasive powers to exploit users (e.g., financially or emotionally).
Negative Morals	(Kim and Werbach 2016; Lopez-Gonzalez and Griffiths 2018; Macey and Hamari 2020)	Due to the nature of persuasive systems, a poorly conceived implementation might lead to moral decay (e.g., encouraging gambling culture in crypto trading).

| Asymmetrical Power Dynamics | (Winkel et al. 2016; Hassan and Hamari 2020) | Designers of persuasive systems must be aware of their ability to influence the decision-making process of users and the implicit paternalism inherent in their designs. |

Overall, both the framework and the systematic review emphasised the importance of voluntariness and transparency in designing ethical persuasive technology (Karppinen and Oinas-Kukkonen 2013; Benner et al. 2021).

A.   *IMPORTANCE OF VOLUNTARINESS*

According to Smids (2012), the most significant ethical dilemma involving persuasive technology is the user's willingness to change. Smids (2012) makes a distinction between persuasion, coercion, and manipulation and states that if persuasion is not based on voluntary change, it should not be labelled as an outcome of a persuasive system. In terms of BCSS, it is argued that the user uses persuasive technology to achieve their self-defined goals, and therefore it is morally less problematic (Spahn 2012). However, when technology is designed with the goal of influencing users in a direction the user has not consciously chosen, ethical concerns may arise (Karppinen and Oinas-Kukkonen 2013). In their effort to change or modify user attitudes and behaviours, persuasive interfaces provide cues for the users and request users act in line with these cues. Although these requests cannot be classified as coercion, it is possible that they violate the concept of voluntariness (Karppinen and Oinas-Kukkonen 2013). According to Karppinen and Oinas-Kukkonen (2013), the route to persuasion also has implications for the voluntariness principle. In instances where persuasive technologies employ the peripheral route to persuasion, such as using subliminal cues, the users may be unaware that they are being persuaded. Such unawareness violates the voluntariness condition, as users need to understand what they are consenting to act voluntarily (Spahn 2012). According to Spahn (2012), user consent should precede persuasion. Therefore, in the design of ethical persuasive technology, respecting the autonomous choice of the individual is stated to be a key condition (Smids 2012; Karppinen and

Oinas-Kukkonen 2013).

B.   THE ISSUE OF TRANSPARENCY

Scholars argue that for persuasion to be ethically acceptable, the intent of the persuader must be disclosed (Atkinson 2006; Davis 2009; Benner et al. 2021). According to the PSD model, "persuasion through persuasive systems should always be open" (Oinas-Kukkonen and Harjumaa 2009, P487). It is suggested that informing the user of the persuaders' intent enhances the persuasiveness of the system, decreases the possibility of misleading the users (Oinas-Kukkonen and Harjumaa 2009) and avoids appearing manipulative (Leth Jespersen et al. 2007). Transparency is suggested to encourage voluntariness since it will allow users to decide for themselves if the persuasion is ethical and whether they want to act accordingly (Karppinen and Oinas-Kukkonen 2013). However, it should be noted that excessive disclosure can reduce the effectiveness of persuasive systems (Berdichevsky and Neuenschwander 1999; Benner et al. 2021) and possibly lead to unfavourable sentiments regarding products and services (Van Reijmersdal et al. 2010). Therefore, the right balance of transparency and performance is needed in the design of ethical persuasive systems (Benner et al. 2021).

2.2   GAMBLING DISORDER

2.2.1   CONTEXT OF GAMBLING

The global gambling market is on an accelerated rise, with the expectation that its size will increase by 231.63 billion U.S. dollars between 2020-2024 (Technavio 2020). According to Gambling Commission (2019), 47% of adults in the United Kingdom reported having engaged in at least one kind of gambling activity in the preceding four weeks. Players participate in different forms of gambling, such as lottery, bingo, horse racing, sports betting, and casino games either online or at land-based venues. While the majority of individuals seem to gamble responsibly for entertainment (Shaffer and Hall 2001), certain players demonstrate problematic gambling activity (Calado and Griffiths

2016).

2.2.2   GAMBLING DISORDER

2.2.2.1   DEFINITION

Gambling disorder is defined as a repetitive problem gambling behaviour that causes severe distress and harm to one's life (American Psychiatric Association 2013). People who experience problem gambling struggle to control the amount of time and money they spend on gambling (Neal et al. 2005). Studies show that 0.12 to 5.8% of adults worldwide (Calado and Griffiths 2016) and 0.2 to 12.3% of adolescents in Europe meet the criteria for gambling disorder (Calado et al. 2017). The repercussions for individuals who have an addictive relationship with gambling are far-reaching, impacting their well-being, social ties, and financial status (Raylu and Oei 2002).

2.2.2.2   DIAGNOSTIC CRITERIA

In the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association 2013), pathological gambling was labelled as gambling disorder and moved from the "impulse control disorder" section to "substance-related and addictive disorders", becoming the first recognised behavioural addiction. This re-grouping highlighted the parallels between gambling disorder and substance use disorders (Rash et al. 2016).

According to the DSM-5, an individual must show four or more of the nine symptoms over the course of a year to fulfil the criteria for gambling disorder. In DSM-5, the diagnostic criterion for gambling disorder was decreased from five of ten criteria to four of nine criteria in an effort to enhance classification accuracy and decrease the occurrence of false negatives (Yau and Potenza 2015). On the basis of the number of observable symptoms, gambling disorder can be categorised as mild, moderate, or severe and as episodic or chronic (American Psychiatric Association 2013; Rash et al.

2016). The diagnostic criteria of DSM-5 (American Psychiatric Association 2013) for gambling disorder is shown in Table 7.

TABLE 7. DIAGNOSTIC CRITERIA OF GAMBLING DISORDER (DSM-5, P585)

Diagnostic Criteria
A. Persistent and recurrent problematic gambling behaviour leading to clinically significant impairment or distress, as indicated by the individual exhibiting four (or more) of the following in a 12-month period:
1. Needs to gamble with increasing amounts of money in order to achieve the desired excitement.
2. Is restless or irritable when attempting to cut down or stop gambling.
3. Has made repeated unsuccessful efforts to control, cut back, or stop gambling.
4. Is often preoccupied with gambling (e.g., having persistent thoughts of reliving past gambling experiences, handicapping or planning the next venture, thinking of ways to get money with which to gamble).
5. Often gambles when feeling distressed (e.g., helpless, guilty, anxious, depressed).
6. After losing money gambling, often returns another day to get even ("chasing" one's losses).
7. Lies to conceal the extent of involvement with gambling.
8. Has jeopardized or lost a significant relationship, job, or educational or career opportunity because of gambling.
9. Relies on others to provide money to relieve desperate financial situations caused by gambling.
B. The gambling behaviour is not better explained by a manic episode.

2.2.2.3   CONSEQUENCES OF GAMBLING DISORDER

Gambling disorder may have negative effects on a person's mental health, physical health, relationships, finances, and career (McCormack and Griffiths 2011; Langham et al. 2015; Li et al. 2017).

A.   PSYCHOLOGICAL CONSEQUENCES

Studies show that gambling disorder is associated with feelings of extreme distress, feeling ashamed, anger and guilt due to significant losses (Parke et al. 2007; McCormack and Griffiths 2011) or not being able to control gambling (Salonen et al. 2018). Multiple studies have shown that gambling disorder is associated with depression, anxiety, stress (Ste-Marie et al. 2006; McCormack and Griffiths 2011) and

life dissatisfaction (Porter et al. 2004a). Roberts et al. (2017) showed that poorer mental health is a risk factor for suicidality within gambling disorder populations.

B.   PHYSICAL-HEALTH CONSEQUENCES

Sleeplessness, high blood pressure, headaches, reduced physical activity and general neglect of self-care were reported as the common physical health problems related to gambling disorder (McCormack and Griffiths 2011; Langham et al. 2015; Salonen et al. 2018).

C.   SOCIAL CONSEQUENCES

People with gambling disorder reported that they neglect their relationship responsibilities, spend less time with significant others, and feel excluded from their social circles (i.e., social isolation) (Langham et al. 2015; Li et al. 2017; Salonen et al. 2018). Holdsworth et al. (2013) proposed that the financial (i.e., extra expenses, debts), emotional (i.e., loss of trust, feelings of betrayal), psychological (i.e., stress, anxiety) and physical impacts (i.e., high blood pressure, sleeplessness) of gambling disorder on partners may increase conflicts within relationships. According to Goodwin et al. (2017), the average problem gambler has an impact on six other people.

D.   FINANCIAL CONSEQUENCES

Financial consequences arising from gambling disorder include the erosion of savings, less money available for recreational activities, late bill payments and debt problems (Langham et al. 2015; Li et al. 2017; Salonen et al. 2018). Studies showed an association between gambling disorder and income-generating offences in which the motivation to acquire money was related to the drive to gamble or to recuperate losses (Adolphe et al. 2019).

E.   ACADEMIC OR OCCUPATIONAL CONSEQUENCES

People with gambling disorder reported low productivity at work or study due to tiredness or distraction (Langham et al. 2015; Li et al. 2017; Salonen et al. 2018). Toce-

Gerstein et al. (2003) indicated that people with severe gambling disorder are more likely to have risked losing their job compared to those with mild symptoms.

2.2.2.4   ONLINE GAMBLING AND GAMBLING DISORDER

Online gambling currently accounts for around 40% of the gaming market in the United Kingdom (Gambling Commission 2021). According to studies, the prevalence of gambling disorder among internet gamblers is substantially greater than among land-based gamblers (Kairouz et al. 2012; Hing et al. 2022). Compared to traditional gambling, online platforms may increase the scale of gambling disorder because of ease of access (i.e., through desktop and mobile devices), privacy and anonymity, marketing and advertising efforts, and structural characteristics (e.g., game mechanics, persuasive interfaces) used in these platforms (Gainsbury et al. 2015; Drosatos et al. 2020). Moreover, the use of gambling data for targeted advertising may further increase the risk, tempting more gambling than what a player can afford (Hing et al. 2014a).

2.2.3   RESPONSIBLE GAMBLING

Gambling was recognised as a social and public health issue when the gambling market began to expand significantly due to relaxed government regulations and advances in new technologies (Korn and Shaffer 1999). In response, governments and gambling providers have been challenged to show their dedication to Corporate Social Responsibility (CSR) (Blaszczynski et al. 2004; Hing 2010). To address corporate social responsibility demands, governments and gambling providers globally introduced policies and practices to prevent and mitigate the adverse effects of gambling disorder on players and the community (Blaszczynski et al. 2011).

2.2.3.1   CORPORATE SOCIAL RESPONSIBILITY

CSR is defined as "the attempt to solve social problems caused wholly or in part by the corporation" (Fitch 1976, P38) and entails actions regarding the corporation's perceived

responsibilities (Brown and Dacin 1997). Carroll (1991) identified four categories of responsibilities in defining CSR, which are economic responsibilities (i.e., being profitable), legal responsibilities (i.e., obeying the laws), ethical responsibilities (i.e., doing what is right and fair) and philanthropic responsibilities (i.e., contributing to the quality of life) and stated that these responsibilities reflect stakeholders' and society's demands. It is argued that CSR practices may provide a range of potential benefits to corporations, including guaranteeing the long-term sustainability of the company, fending off government regulation with self-disciplined standards, allowing for the implementation of proactive measures, which may be more effective than reactive measures, and enabling businesses to use resources to address social problems that others have failed to address and guarantee public support (Carroll and Shabana 2010). In their systematic review of responsible gambling practices involving land-based or online gambling, Ladouceur et al. (2017) found that gambling providers commonly recognise and execute five primary responsible gambling strategies:

1. Self-exclusion: allowing gamblers the option to ban themselves from gambling venues.

2. The development of behaviour-based algorithms: tracking, detecting and intervening with problem gambling behaviour.

3. Limit setting: letting gamblers set money and time limits to help them spend only what they can afford to lose.

4. Responsible gambling specific game features: structural characteristics of games that promote responsible gambling (e.g., warning messages: clock, displaying monetary and time limits that the player set prior to gambling).

5. Training gambling venue employees about responsible gambling.

In the United Kingdom, social responsibility became a licensing condition for gambling operators with the Gambling Act 2005. A review on CSR in the UK gambling industry conducted by consulting sources from gambling companies as well as a variety of government departments, institutions, and NGOs involved in gambling regulation showed that most CSR commitments were directed toward responsible gambling initiatives (Jones et al. 2009). Most gambling operators stated they promote responsible gambling and minimise problem gambling by safeguarding minors and vulnerable players and by supporting organisations that provide guidance to those who experience problem gambling. Other reported CSR commitments were related to employee satisfaction, promoting community safety and providing contributions to a range of charities. Jones et al. (2009) argued that an ideal way to address the conflict between social responsibility and gambling industry profit could be through "responsible growth."

2.2.3.2   THE RENO MODEL

The foundational basis of responsible gambling practices mainly rests upon the science-based framework Reno Model I–V (Blaszczynski et al. 2004; Blaszczynski et al. 2008a; Blaszczynski et al. 2011; Collins et al. 2015; Shaffer et al. 2016). The model was initially developed in the city of Reno through roundtable meetings and was sponsored by both government and commercial gambling entities (Blaszczynski et al. 2004). Overall, the model's main aim is to guide stakeholders (e.g., operators, consumers, governments, and healthcare services) in producing responsible gambling measures that can empirically be tested (Blaszczynski et al. 2004). In defining responsible gambling policies, the model stresses the importance of autonomy and informed choice (Blaszczynski et al. 2004).

According to the Reno Model, both the player and the gambling industry share responsibility for adhering to responsible gambling within the bounds of governmental regulations (Blaszczynski et al. 2008a).

Blaszczynski et al. (2008a, P106) identified three main principles to establish informed choice within the gambling context.

1. *Individuals are personally responsible for their level of participation in gambling.*

2. *Informed choice is a pivotal requirement for responsible gambling.*

3. *Science, in part, can contribute to determining which information is necessary to promote informed choice in gambling.*

The main responsibility of the gambling industry is to offer adequate and useful information that will facilitate informed player choices. The gambling industry is obligated to disclose and inform players about games' features and how they work, along with the potential harm and consequences related to interacting with such games. This information should be relevant, accurate, accessible, understandable and provided on a timely basis (Blaszczynski et al. 2008a).

The main responsibility of the player is to understand and use the information provided by the operators when deciding to gamble. Players must make sure that they are well informed about the consequences of their behaviour and make decisions in line with their economic and personal circumstances (Blaszczynski et al. 2008a).

In the Reno Model, it states that problem gambling is the product of poor judgment or misguided decision-making rather than an underlying lack of self-control and that such

decisions are partly attributable to limited information availability (Blaszczynski et al. 2008a). Blaszczynski et al. (2008a) argued that aligned with a public health approach; the aim should be to deliver relevant, accessible, comprehensible, and timely information to the general public rather than focusing just on those who are at risk for or are experiencing problem gambling. This is because relevant information regarding gambling harms is essential in both prevention and intervention regarding gambling disorder. While no clear guidelines were provided to determine what information is necessary or sufficient to satisfy gambling-related informed choices, current research focuses on informative messaging about erroneous beliefs related to gambling, such as perceived skill, biased recall, superstition and incorrect perceptions of randomness (Dixon 2000; Ladouceur and Sevigny 2003; Monaghan and Blaszczynski 2010; Wohl et al. 2017).

2.2.3.3   SITUATIONAL AND STRUCTURAL RISK FACTORS

Most of the responsible gambling measures adopted by gambling providers target problem gamblers and act as reactive measures to decrease current harm (Ladouceur et al. 2017). While reactive measures such as self-exclusion schemes and limit setting attempt to minimise harm, they put the burden of responsibility mostly on the individual through self-regulation tools focused on gameplay (Livingstone and Rintoul 2020; Reynolds et al. 2020). Though the individual must take responsibility for their actions, for responsible gambling to happen, the platform itself must ensure that it provides a secure environment for responsible gambling to take place through site structure, gambling formats and business practices (Schüll 2012).

Previous research acknowledged that gambling behaviour was influenced not only by individual factors but also by situational factors (i.e., features relating to the environment such as availability and accessibility) and structural factors (i.e., the game features that reinforce gambling activity through appeal and arousal) (Griffiths 1993;

Schüll 2012; McCormack and Griffiths 2013). For example, Leino et al. (2015) showed that reward characteristics could explain 27 % of the variance in the number of bets made. Consequently, the role of structural characteristics in the acquisition, development and maintenance of gambling disorder needs to be considered when developing responsible gambling initiatives. In terms of structural characteristics, a distinction has been made between characteristics related to the technology of the game (i.e., pay-out ratio, auto-play, stake size) and secondary characteristics (i.e., artwork, sounds, animation) (Leino et al. 2015). For a more comprehensive review on structural characteristics see (Griffiths 1993; McCormack and Griffiths 2013). To date, most of the research on structural characteristics of gambling primarily focused on game mechanics. As the online gambling market grows, the gambling platform and game interface become important components of the structural characteristics of gambling. Today online gambling platforms are equipped with persuasive design techniques to increase player engagement. For example, online gambling platforms reward players with casino bonuses, offer rehearsal options with demo games and ease gambling with auto-spin functions. Nonetheless, it is possible that such persuasive design techniques might trigger gambling disorder (Cemiloglu et al. 2021b). In the discussion of responsible gambling policy and practices and gambling operators' responsibility to fulfil conditions for informed choice, player awareness of persuasive design techniques and their potential negative impact on behaviour is an important topic that needs to be investigated. According to the Reno Model, gambling operators need to provide all relevant and essential information that will help players assess the implications of interacting with the gambling platforms so that they can make informed choices (Blaszczynski et al. 2008a). If informed choice is one of the central tenets of the responsible gambling policy framework, then raising awareness of persuasive design techniques and their potential negative impact could be an important step in developing

new responsible gambling initiatives.

2.3 RESISTANCE TO PERSUASION

Studies show that when faced with a persuasion attempt, individuals often show resistance and exhibit coping behaviours (Zuwerink Jacks and Cameron 2003; Fransen et al. 2015b). It is suggested that resistance to persuasion is not a result of a single-minded resistance to influence but is instead associated with self-control and personal goals (Friestad and Wright 1994).

2.3.1 PERSUASION KNOWLEDGE MODEL

It is stated that throughout their life, people develop personal knowledge about persuasion and utilise this knowledge to respond to persuasion attempts directed by others (Friestad and Wright 1994). Persuasion knowledge was first proposed by Friestad and Wright (1994) as a component of a more comprehensive model known as the Persuasion Knowledge Model (PKM) (Figure 6). According to the PKM model, persuasion consists of an agent (i.e., the person attempting to persuade) and a target (i.e., the person targeted with the persuasion attempt). Persuasion attempt is defined as the target's perception of an agent's strategic conduct during the persuasion process, while persuasion episode refers to the observable aspect of the persuasion attempt from the consumer's perspective (Friestad and Wright 1994). According to the model, when the target becomes aware of the persuasion attempt, they try to cope with it, either accepting or resisting the persuasion attempt based on their personal goals. Friestad and Wright (1994) stated that the success or failure of a persuasive attempt is determined by the interplay of four knowledge structures. These are agent knowledge (i.e., knowledge about the persuasion agent's qualities, competencies, and objectives), target knowledge (i.e., knowledge about the persuasion target's qualities, competencies, and objectives), topic knowledge (i.e., knowledge about the persuasion topic) and persuasion knowledge

(i.e., knowledge about the agent's intentions and tactics).
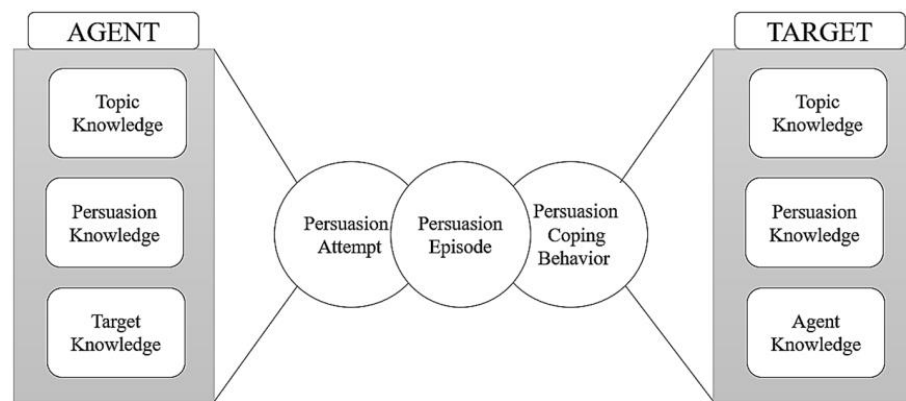
FIGURE 6. THE PERSUASION KNOWLEDGE MODEL (BASED ON FRIESTAD AND WRIGHT 1994, P2)

According to the PKM, persuasion knowledge enables people to recognise how persuasion agents attempt to persuade them (Friestad and Wright 1994). When a persuasive incentive is observed, persuasion knowledge is activated, and this helps people analyse information critically, hence reducing their susceptibility to persuasion (Livingstone and Helsper 2006; Panic et al. 2013). Persuasion knowledge is suggested to consist of information relating to both the persuasion agent and the persuasion target. Information relating to the persuasion agent consists of i) information about the persuasion agent's intention, ii) information about the persuasion agent's tactics, iii) information about psychological mediators that the persuasion agent uses (i.e., why the tactic is persuasive, what influences the person mentally), and iv) belief about the effectiveness and appropriateness of the persuasion agent's tactics. Information relating to the persuasion target consists of information about i) the persuasion target's coping goals and ii) the persuasion target's coping tactics. The model postulates that when individuals have information on both the persuasion agent and self (i.e., the persuasion target), they can better analyse the persuasion attempt and decide whether to be persuaded (Friestad and Wright 1994).

2.3.2 MOTIVATIONS AND STRATEGIES FOR RESISTING PERSUASION

2.3.2.1 RESISTANCE TO PERSUASION MOTIVES

In their integrative framework, Fransen et al. (2015a) highlighted three different motivations for resisting persuasion: threat to freedom, reluctance to change, and concerns of deception. According to the Reactance Theory, humans have an inbuilt demand for autonomy and freedom. When they feel their freedom is endangered, they are motivated to defend their threatened position (Brehm 1966). If people believe that the risks associated with change outweigh the benefits, they may be reluctant to change and favour the status quo (Samuelson and Zeckhauser 1988). Finally, people's fears of being deceived may lead them to actively resist persuasion (Fransen et al. 2015a).

2.3.2.1 RESISTANCE TO PERSUASION STRATEGIES

Individuals who recognise persuasion attempts can use a variety of strategies to resist and limit the influence that persuasion has on their decision-making and behaviours (Zuwerink Jacks and Cameron 2003; Fransen et al. 2015a; Fransen et al. 2015b). Table 8 presents different strategies people use to resist persuasion, as outlined by Fransen et al. (2015a). Fransen et al. (2015a) proposed that people's motivations for resisting persuasion influence the techniques they employ to resist persuasion. They proposed that avoidance strategies may be activated by any of the motivations while contesting strategies are typically associated with deception concerns and that empowerment and biased processing strategies are most frequently used when individuals are resistant to change.

TABLE 8. STRATEGIES TO RESIST PERSUASION (BASED ON FRANSEN 2015)

Resistance Strategy	Description	Example
Avoidance Strategies	Involve simply avoiding persuasion attempts.	Looking away from online banner ads while surfing the internet.
Contesting Strategies	Involve actively counterarguing against the message, the source, or the employed persuasion technique.	Mentioning a negative stereotype about the persuasion source.

Biased-Processing Strategies	Involve comprehending the information in a manner that supports their existing views or behaviour.	Underestimating the impact of smoking on one's own health due to good genetic background.
Empowerment Strategies	Involve declaring their current views rather than opposing the persuasive argument.	Proclaiming the justifications for no vaccination rather than refuting the justifications for vaccination.

Counterarguing, which is an instance of contesting strategy, is one of the most often employed strategies for resisting persuasion (Zuwerink Jacks and Cameron 2003; Fransen et al. 2015a). According to this strategy, when people encounter a persuasive argument, they evaluate it in light of previously held beliefs, and if discrepancies are found, the argument is refuted by generating counterarguments (Wright 1975). Revealing the persuasive argument's intent explicitly might increase the likelihood of counterarguing (Compton and Ivanov 2012; Amazeen and Wojdynski 2019; Amazeen 2020).

2.3.3 INOCULATION THEORY

According to the Inoculation Theory, it is possible to inoculate people's attitudes against persuasive attacks in the same manner as the immune system can be inoculated against viral attacks (McGuire 1961, 1964). McGuire (1964) suggested that exposing someone to a weakened version of a persuasive attack can help them protect their established attitudes against stronger persuasive attacks that may happen in the future. Inoculation intervention is suggested to trigger resistance to persuasion through two main components: threat and refutational pre-emption (McGuire 1961, 1964). The threat component works on a more affective basis and warns individuals about their vulnerability to future persuasive attacks. This motivates them to adopt a protective stance. The refutational pre-emption component works on a more cognitive basis. This component first raises arguments that may be used in persuasive attacks and then refutes them to help individuals protect their attitudes. This two-sided approach triggers greater resistance than a one-sided message as through being introduced to the opposing

viewpoint, the individual has been offered a basis for disregarding the opposite view (Lumsdaine and Janis 1953). Resistance arises from the threat component motivating the individual to protect established attitudes and the refutational pre-emption component providing content for counterarguments (McGuire 1961, 1964; Pfau et al. 1997). It has been suggested that for inoculation interventions to be effective, there needs to be a delay between the inoculation intervention and the actual persuasive attack, as it takes time to counterargue and generate arguments for defence (McGuire 1964). While much early research views inoculation as a prophylactic approach (i.e., preventing attacks on established attitudes) (McGuire 1964; Pfau et al. 2004), it has been argued that inoculation interventions can also provide a "therapeutic" effect (Compton 2020; Van der Linden and Roozenbeek 2020). That is, inoculation has the potential to create resistance to persuasion in individuals with desired attitudes as well as in individuals with neutral or opposite attitudes (Compton and Ivanov 2013). Furthermore, studies argue that inoculation interventions are not only effective on argument-specific resistance but also have the potential to inoculate individuals against the very tactics used in persuasion attacks (Roozenbeek and van der Linden 2019a, 2019b). Inoculation interventions have been conducted in various contexts, such as advertising, political campaigns, social issues and health (Banas and Rains 2010). Studies successfully conferred resistance to deceptive food advertising (Mason and Miller 2013), native advertisements (Amazeen 2020), fake news (Roozenbeek and Van Der Linden 2019b), legalisation of the use of handguns and marijuana (Pfau et al. 2009), and to pressures to smoke cigarettes (Pfau et al. 1992) and consume alcohol (Godbold and Pfau 2000). Inoculation success has been evaluated with print (Parker et al. 2012) video (Godbold and Pfau 2000) and game-based interventions (Roozenbeek and Van Der Linden 2019b; Van der Linden and Roozenbeek 2020).

2.3.3.1   INOCULATION THROUGH PERIPHERAL CUES

Studies show that just as persuasion can result from peripheral cues, so can resistance to persuasion (Knowles and Linn 2004). It has been suggested that inoculation can also work heuristically through peripheral cues requiring minimal cognitive effort (Banas and Miller 2013). Studies conducted in the advertising domain support this notion and argue that native advertising disclosures act as a forewarning which helps the individual recognise the commercial content (Amazeen and Wojdynski 2019; Amazeen 2020). Once individuals recognise the persuasive intent, they use their persuasion knowledge (Friestad and Wright 1994) to decide how to interpret this content and use counterarguments as a defence mechanism to resist persuasion if the persuasion is not aligned with their personal goals (McGuire 1964; Friestad and Wright 1994). As a result, resistance to persuasion can be conferred in the absence of refutational pre-emption. These findings are aligned with research that suggests threat on its own can confer resistance (Kiesler and Kiesler 1964; Petty and Cacioppo 1979). However, McGuire and Papageorgis (1962) argue that the threat itself is not as impactful as the threat paired with refutational pre-emption.

2.3.3.2   INOCULATION AND ISSUE INVOLVEMENT

Research on inoculation intervention shows that issue involvement, defined as the significance of an attitudinal object for an individual (Zaichkowsky 1985), is an important variable that influences the resistance process. Issue involvement is suggested to be both a precondition for resistance (Pfau 1992) and a product of inoculation intervention (Pfau et al. 2004). It has been argued that an individual will be motivated to process information when the subject is important to them (Petty and Cacioppo 1986). If involvement levels are extremely low or high, inoculation intervention will fail to generate a threat since individuals might not worry about their attitudes being attacked or would already have entrenched attitudes (Pfau et al. 1997; Compton and Pfau 2009).

Studies suggest that issue involvement can contribute to counterarguing either directly (Pfau et al. 1997) or indirectly, such that elicited threat increases issue involvement levels, contributing to counterarguing (Pfau et al. 2004).

2.4 EXPLAINABLE SYSTEMS

2.4.1 SYSTEM TRANSPARENCY

The increasing integration of software systems in everyday life has elevated the importance of system transparency as a crucial non-functional requirement (Chazette and Schneider 2020). There is an increasing need to provide users with clear explanations of how systems make decisions regarding system behaviour, predictions, and recommendations (Chen et al. 2014; Springer and Whittaker 2019; Chazette and Schneider 2020). Nevertheless, system transparency is not limited to explaining how a system operates. According to Alonso and De La Puente (2018), transparency is a means through which both the user and the system attain a shared understanding of a shared objective and the current situation, and it relates to any decisions given by the system or the user using the system. It is suggested that transparency is crucial in any system design, but especially in persuasive system design, which seeks to alter users' attitude and behaviour (Benner et al. 2021; Wang et al. 2022).

2.4.1.1 *DEFINITION*

System transparency is defined as "the understandability and predictability of the system" (Endsley et al. 2003, P146). The act of disclosing a system's intent, behaviour, or reasoning to the user supports user's choices and actions (Turilli and Floridi 2009; Chen et al. 2014).

2.4.1.2 *REFERENCE MODELS FOR TRANSPARENCY REQUIREMENTS*

Hosseini et al. (2018) proposed four reference models to help requirement engineers address the transparency demands in information systems more effectively. These

reference models cover transparency stakeholders, transparency meaningfulness, transparency usefulness, and information quality in transparency.

With the Transparency Actors Wheel reference model, Hosseini et al. (2018) defined the relevant actors in information exchange and broke down the information circulation into four components:

- **Information Provider (IP):** The entity that provides and presents information about another entity or oneself.

- **Information Receiver (IR):** The entity that receives information about another entity or about oneself.

- **Information Entity (IE):** The entity whose information is being sent. Depending on the circumstances, this may contain the IP or the IR.

- **Information Medium (IM):** The medium or channel via which the information is being delivered.

It is suggested that identifying relevant stakeholders in an information exchange would help understand the transparency needs of each actor, as well as help detect and resolve any conflicts among the stakeholders involved (Hosseini et al. 2015, 2018).

B.   *TRANSPARENCY MEANINGFULNESS*

With the Transparency Depth Pyramid reference model, Hosseini et al. (2018) explained the level of transparency meaningfulness based on the depth of disclosed information. These levels provide answers to three primary questions:

- **Data Transparency:** questions relating to what information is needed and who the stakeholders are in the context of transparency.

- **Process Transparency:** questions relating to how something is performed.

- **Policy Transparency:** questions relating to why an action is performed.

Hosseini et al. (2018) stated that moving from data transparency to policy transparency gives depth to transparency. Amiribesheli et al. (2016) postulated that a greater degree of transparency might raise the level of trust among stakeholders, as with deeper transparency, the disclosed information becomes more meaningful to the stakeholders.

C.   TRANSPARENCY USEFULNESS

For system transparency to be useful in supporting user decisions, it must extend beyond information availability and lead to information actionability (Turilli and Floridi 2009; Schauer 2011; Hosseini et al. 2018). According to Hosseini et al. (2018), useful transparency is achieved when quality information is made accessible to the audience in a meaningful and useful manner and when the available information allows users to make decisions. With the Transparency Achievement Spectrum reference model, Hosseini et al. (2018) defined certain steps that needed to be taken between information availability to information actionability to achieve useful transparency. These steps are listed in Table 9.

TABLE 9. STEPS TO BE TAKEN FOR USEFUL TRANSPARENCY (BASED ON HOSSEINI ET AL. 2018)

1. Information Availability	Systems must give relevant information while maintaining the attributes of correctness, completeness, and timeliness.
2. Information Interpretation	Systems must present information in a specific way so that users can interpret it.
3. Information Accessibility	The information must be visible and easily accessible.
4. Information Perception	In order to achieve usable transparency, there must be congruence between users' and information providers' perceptions of what constitutes transparency.
5. Information Understandability	All users must be able to comprehend the information provided, which can only be accomplished through controlling for potential language, cultural, and cognitive challenges.
6. Information Acceptance	The user has to be prepared to process the information, which might either confirm their ideas or challenge them.
7. Information Actionability	It is necessary for information to prompt appropriate user action.

With Information Quality in Transparency reference model, Hosseini et al. (2018) categorised 16 different information quality dimensions borrowed from the work of Kahn et al. (2002). Hosseini et al. (2018) stated that since information is fundamental to transparency, information that communicates transparency must have specific quality features to lessen the likelihood of misinformation. The four categories of information quality dimensions are listed in Table 10.

TABLE 10. INFORMATION QUALITY DIMENSIONS (BASED ON HOSSEINI ET AL. 2018, P262)

Sound information:	Represents the quality of the information supplied by the information provider.
Free of Error	The extent to which information is accurate and dependable.
Completeness	The extent to which information is not missing and is of sufficient breadth and depth for the task at hand.
Concise Representation	The extent to which information is compactly represented.
Consistent Representation	the extent to which information is presented in the same layout.
Dependable information:	Represents the quality of the service in providing information by the information provider.
Timeliness	The extent to which information is sufficiently up-to-date for the task at hand.
Security	The extent to which access to information is restricted appropriately to maintain its security.
Useful information:	Represents the meeting/exceeding of the information receiver's expectations in the supplied information quality.
Appropriate Amount	The extent to which the volume of information is suitable for the task at hand.
Relevancy	The extent to which information is applicable and helpful for the task at hand.
Understandability	The extent to which information is easily comprehended.
Interpretability	The extent to which information is in appropriate languages, symbols, and units, and the definitions are clear.
Objectivity	The extent to which information is unbiased, unprejudiced, and impartial.
Usable information:	Represents the meeting/exceeding of the information receiver's expectations in information provision service.
Believability	The extent to which information is considered true and credible.
Accessibility	The extent to which information is available or easily and quickly retrievable.
Ease of Manipulation	The extent to which information is easy to manipulate and apply to different tasks.
Reputation	The extent to which information is highly regarded in terms of its source or content.
Value-Added	The extent to which information is beneficial and provides advantages from its use.

2.4.2   EXPLAINABILITY

One potential way to achieve transparency and increase the understandability of a system is to provide users with explanations of how the system operates (Doran et al. 2017; Chazette and Schneider 2020).

The concept of explainability has been extensively studied and implemented in the field of artificial intelligence (AI). Today many software systems use machine learning to make autonomous choices or support user decisions, and expert systems, knowledge-based systems, decision support systems, and recommender systems are a few examples (Nunes and Jannach 2017). Users' trust in such systems' decisions is crucial for the success and widespread adoption of these systems and providing explanations has been seen as a means to increase user confidence in and acceptance of software decisions and recommendations (Naiseh et al. 2021). Thus, in the context of AI, explainable artificial intelligence (XAI) is defined as providing users explanations to help them understand why and how an intelligent system acted in a certain manner or made a particular recommendation (Naiseh et al. 2020a).

2.4.2.1   USE OF EXPLANATIONS

Users may demand explanations from systems for a variety of reasons, including decision-making, understanding the system's mechanics, or system confidence. In their systematic literature review, Nunes and Jannach (2017) identified different purposes for explanations. The list is shown in Table 11.

TABLE 11. PURPOSES FOR THE USE OF EXPLANATIONS (BASED ON NUNES AND JANNACH 2017, P411)

Transparency	Describe how the system operates.
Effectiveness	Help users make informed decisions.
Trust	Enhance users' confidence in the system.
Persuasiveness	Persuade users to try or purchase something.
Satisfaction	Enhance usability or enjoyment.
Education	Allow users to learn from the system.
Scrutability	Allow users to correct the system's errors.
Efficiency	Help users make decisions more quickly.
Debugging	Allows users to identify flaws in the system.

It has been argued that it is essential to have a clear understanding of the explanation's intent since this will determine the design of the explanation, including what information to include and how to present it (Tintarev and Masthoff 2007).

2.4.2.2 DELIVERY OF EXPLANATIONS

A. EXPLANATION DELIVERY METHODS

Delivery methods relate to how explanations are provided to the users. Delivery methods are not mutually exclusive, and a system can use different delivery methods depending on the use, user and technology context (Naiseh et al. 2020a). Naiseh et al. (2020a) identified four explanation delivery methods. See Table 12.

TABLE 12. EXPLANATION DELIVERY METHODS (BASED ON NAISEH ET AL. 2020A)

Persistent-Specific	The user is given explanations along with the recommendation in a way that is clear and easy to understand.
Ad-Hoc	The explanation is given to the end-users when it is required.
On-demand	Users can request the explanation, which is embedded in a separate view.
Exploration	Users can explore the nature of the explanation and how the agent works, which helps them understand why the recommendation was made.
Persistent-Generic	The explanation is saved as a report so that it can be investigated later, and it is persistent without a time limit.

B. EXPLANATORY MEDIUM

Explanations can be delivered through textualisation, visualisation or a combination of the two, as demonstrated within the XAI field (Sokol and Flach 2020). Textualisation can be in the form of a dialogue system, and visualisation can be in the form of plots or graphical representations. In some instances, a combination of textualisation and visualisation may be required because not every medium can transmit the same quantity or type of information (Eiband et al. 2018; Sokol and Flach 2020).

2.4.2.3 USABILITY REQUIREMENTS

Sokol and Flach (2020) identified 11 usability requirements from a user-centric perspective in their explainability fact sheet template, which was created to help the design and evaluation of explainable systems. Usability requirements were introduced to ensure that algorithmic explanations are easily understood by explainees, independent of their prior knowledge and past experience with explainable systems in general. The

list of 11 usability requirements is shown in Table 13.

TABLE 13. USABILITY REQUIREMENTS OF EXPLAINABLE SYSTEMS (BASED ON SOKOL AND FLACH 2020)

Soundness	This characteristic assesses an explanation's truthfulness in relation to the underlying prediction model.
Completeness	To be trusted, an explanation must also generalise well beyond the specific context in which it was produced.
Contextfullness	To assist understanding how an explanation might be generalised, it can be put in a context, enabling the user to judge its soundness and completeness.
Interactiveness	To enhance the overall user experience, the explanation process should be controllable by the user.
Actionability	Users appreciate explanations that they may use as guidelines for the intended result.
Chronology	Users favour explanations that attribute their cause to more recent events.
Coherence	Any explainable system should be consistent with the explainee's prior knowledge, which can only be accomplished if the explainee's mental model is included in the explainability system.
Novelty	It is best to avoid giving users basic or expected explanations.
Complexity	Given the diversity of explainees' abilities and prior knowledge, the complexity of explanations should be tailored to the receiver.
Personalisation	An explainability system must "know" what the user knows and decide the explanation's content.
Parsimony	Explanations should be selective and brief enough so that the explainee is not overloaded with unnecessary information.

2.4.2.4 USER EXPERIENCE WITH SYSTEM EXPLANATIONS

To create transparent and explainable systems, it is crucial to comprehend users' views of explanations and what they anticipate from them. To investigate the user experience of system explanations and examine how explanations relate to transparency, Chazette and Schneider (2020) explored the relationship between explanations and system attributes related to transparency from the user perspective. Chazette and Schneider (2020) reported correlations between explainability and quality characteristics related to transparency and stated that a positive impact of explanations on interrelated quality characteristics could result in a positive impact on transparency and vice versa. The positive and negative impact of explanations on transparency is shown in Tables 14 and 15, respectively.

Informativeness and Understandability
Facilitates the understanding of a system by conveying information.
Reduces obscurity or clarifies doubts by providing clear information.
Supports user decision-making.
Usability
Facilitates the use of a system.
Guides the use of the system.
Helps the user to become proficient in the operation of the system.
Supports time efficiency, assisting the user in making faster decisions.
Explanations may be a way to prevent users from making mistakes.
Relationship
Positive impression: improve the experience of using a system and avoid frustrations.
Establishes a relationship of trust with the user.
Explanations put the user in control.
Auditability
Data transparency: provides better understanding of the technical aspects of the system has created of the user.
Explanations help find out more about the internal model of the system.

TABLE 15. PERCEIVED NEGATIVE IMPACT OF EXPLANATIONS ON TRANSPARENCY (BASED ON CHAZETTE AND SCHNEIDER 2020, P499 - 501)

Informativeness and Understandability
Hinders understanding if explanations are not provided in a language appropriate to the user or are poorly elaborated.
Unnecessary information: explanations may be seen as too lengthy, repetitive, irrelevant or useless.
Fails to reduce obscurity or even add more.
Usability
Impairs the use of a system: user interface becomes polluted with the excess of explanations.
Results in the use of computational resources when incorporating explanations into a system, consuming storage space, memory and CPU resources, or data volume.
Time-consuming, as users may have to invest time to consume explanations.
Relationship
Negative impression: explanations being annoying, inconvenient, tiring or boring.
May result in loss of control: if users do not have the option to control the delivery and depth of explanations.

With their systematic review, Naiseh et al. (2020a) also identified potential risks of explanations on user experience. It was stated that explanations may foster over-trust owing to user biases (e.g., overconfidence bias leading the user to believe that the system must always be right) or under-trust when the user believes that the explanation does not suit their context. It was suggested that the users might regard the motive of the

explanation as suspicious (i.e., as a way to manipulate the users) and that they may refuse to devote cognitive effort to interacting with the explanations as they are immersed in their primary task (Naiseh et al. 2020a).

Overall, it was suggested that providing explanations can have a double-edged sword effect (Chazette and Schneider 2020; Naiseh et al. 2020a). That is, offering explanations may either facilitate or impede the fulfilment of system attributes associated with software quality. Effective explanation design necessitates assessing the relationship between explainability and software quality characteristics of the system during requirement analysis, as this would allow identifying potential conflicts and trade-offs (Chazette and Schneider 2020). It is also important to consider the domain in such an analysis, as user requirements will likely differ (Chung and Nixon 1995). Explainability may be a mandatory feature in certain domains but a desirable feature in others (Chazette and Schneider 2020).

2.5   CHAPTER SUMMARY

This chapter presented a review of the relevant literature regarding *explainable persuasion* in the context of online gambling by covering research on persuasive technology, gambling disorder, resistance to persuasion, and explainable systems. The next chapter examines the thesis's methodological approach.

3. CHAPTER 3: RESEARCH METHODOLOGY

This chapter discusses the thesis's methodological strategy by examining research methodologies and presenting justifications for the selected methods. In this thesis, the research methodology is designed according to the Research Onion Framework (Saunders et al. 2019). See Figure 7. This chapter first gives an overview of the layers of the Research Onion Framework. The rationales for the selected philosophy, approach, strategies, choice, time horizon and techniques and procedures are then provided.
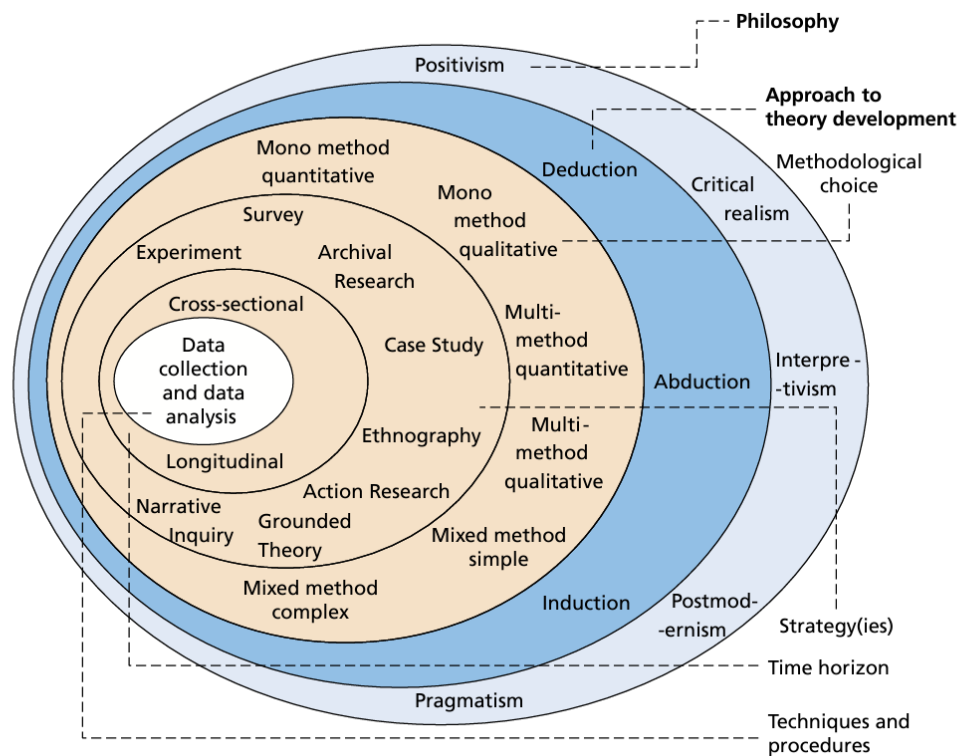
FIGURE 7. THE RESEARCH ONION FRAMEWORK (BASED ON SAUNDERS ET AL. 2019, P130)

3.1 RESEARCH PHILOSOPHIES

Research philosophy refers to a set of ideas and assumptions that guide the creation of knowledge (Saunders et al. 2019). Researchers make a variety of assumptions during each step of the research process (Burrell and Morgan 2017). Ontological, epistemological and axiological assumptions are defined as fundamental assumptions that guide the research process; however, it should be emphasised that the list is not

exhaustive. **Ontological Assumptions** refer to assumptions about the nature of reality. **Epistemological Assumptions** refer to assumptions about knowledge, including what is acceptable, valid and accurate knowledge. **Axiological Assumptions** refer to assumptions about how much and how the researcher's personal values influence the study process. These assumptions determine the research questions, methodologies, and interpretation of the results (Crotty 1998). Table 16 reviews and provides a comparison between the five major philosophies in research discussed by Saunders et al. (2019).

TABLE 16. FIVE MAJOR PHILOSOPHIES IN RESEARCH (BASED ON SAUNDERS ET AL. 2019, P144 - 145)

Research Philosophical Positions	Ontology (nature of reality or being)	Epistemology (what is acceptable knowledge)	Axiology (role of values)	Research Methods
Positivism Relates to the philosophical stance of the natural scientist and entails working with an observable social reality to produce law-like generalisations.	Real, external, independent, one true reality.	Scientific method, observable and measurable facts, law-like generalisations.	Researcher is detached, neutral and independent of what is researched.	Typically deductive, highly structured, large samples, measurement, typically quantitative methods of analysis.
Critical Realism Makes a distinction between the "real" and "observable" worlds. The "real" is unobservable and cannot be grasped by the human senses.	Layered reality: the empirical (events that are observed), the actual (events and non-events generated by the real, observed or not), and the real (casual structures with enduring properties), external, independent.	Epistemological relativism, knowledge historically situated and transient.	Researcher acknowledges bias by world views, cultural experience and upbringing.	In-depth historically situated analysis of pre-existing structures and emerging agency.
Interpretivism Emphasises that humans are different from physical phenomena as different people, cultures, and eras create different meanings. It is critical to discover definite, universal "laws".	Socially constructed through culture and language, multiple meanings, interpretations, and realities.	Focus on narratives, stories, perceptions, and interpretations.	Researcher interpretations are a part of what is researched.	Typically, inductive. Small samples, in-depth investigations, qualitative methods of analysis.
Postmodernism Claims that there is no "true" way to explain the social world beyond what language offers, and language is dominated by power dynamics and dominant ideologies.	Socially constructed through power relations, some meanings, interpretations, realities are dominated and silenced by others.	What counts as "truth" and "knowledge" is decided by dominant ideologies.	Researcher and research embedded in power relations.	Typically, deconstructive – reading texts and realities for in-depth investigations of anomalies, silences and absences, typically qualitative methods of analysis.

Pragmatism				
Recognise that there are various ways to perceive the world and that no one perspective can provide the whole picture. Pragmatics holds that concepts are only meaningful when they enable action and may integrate different perspectives within a single study according to the research question.	Complex, rich, external "reality" is the practical consequences of ideas.	"True" theories and knowledge are those that enable successful action.	Research is initiated and sustained by the researcher's doubts and beliefs.	Following research problem and research question, range of methods: mixed, multiple, qualitative, quantitative, action research.

3.1.1 RATIONALE FOR SELECTING PRAGMATISM

This thesis adopts pragmatism as its research philosophy. The thesis introduces a novel concept termed *explainable persuasion* and explores users' attitudes towards it. A more comprehensive understanding of this new concept could be attained by combining quantitative and qualitative methodologies, as well as adopting both a positivist and an interpretivist point of view. Moreover, according to pragmatism, meaning is derived not from fixed rules but rather from human experiences. Adopting pragmatism as a research philosophy thereby permits investigating user acceptance and rejection factors, as well as the primary design tensions and solutions associated with *explainable persuasion* as experienced by users. In addition, the thesis proposes *explainable persuasion* as a solution to addictive digital use; hence, the findings of the thesis can contribute to practical solutions.

3.2 APPROACH TO THEORY DEVELOPMENT

The approach that is used for theory development is critical as it helps researchers make judgements about the study design and research methods, and it also assists researchers in selecting their research design so that it can accommodate research restrictions (Smith et al. 2008). The three main approaches to theory development are deduction, induction, and abduction.

In **deductive reasoning**, the conclusion derives logically from theory-based assumptions (Ketokivi and Mantere 2010). Research based on deductive reasoning

starts with a hypothesis or theory, and the researchers check to see whether the collected evidence supports or rejects that hypothesis (Saunders et al. 2019).

In contrast, in **inductive reasoning,** the conclusion is derived from a body of observations (Ketokivi and Mantere 2010). Research based on inductive reasoning starts with collecting data to identify a pattern from which a generalisation may be made (Saunders et al. 2019).

With **abductive reasoning**, one starts with a limited set of observations and then moves on to the most plausible explanation for those observations (Reichertz 2007; Kennedy 2018). Research based on abductive reasoning starts with selecting or inventing a hypothesis to explain an empirical instance, followed by evaluating this hypothesis with more data collection (Saunders et al. 2019). Table 17 shows the characteristics of the three theory development approaches.

TABLE 17. THEORY DEVELOPMENT APPROACHES (BASED ON SAUNDERS ET AL. 2019, P153)

Reasoning	Logic	Generalisability	Use of Data	Theory
Deduction	In deductive inference, when the premises are true, the conclusion must also be true.	Generalising from the general to the specific.	Data collection is used to evaluate propositions or hypotheses related to an existing theory.	Theory falsification or verification.
Induction	In inductive inference, known premises are used to generate untested conclusions.	Generalising from the specific to the general.	Data collection is used to explore a phenomenon, identify themes and patterns, and create a conceptual framework.	Theory generation and building.
Abduction	In an abductive inference, known premises are used to generate testable conclusions.	Generalising from the interactions between the specific and the general.	Data collection is used to explore a phenomenon, identify themes and patterns, locate these in a conceptual framework and test this through subsequent data collection and so forth.	Theory generation or modification; incorporating existing theory where appropriate, to build new theory or modify existing theory.

3.2.1 RATIONALE FOR SELECTING ABDUCTION

This thesis adopts abduction as its approach to theory development. Because

explainable persuasion is a new research topic, it is important to understand what users think about *explainable* persuasion and why. This requires combining deduction and induction within the same research. Also, due to a lack of prior knowledge related to the research topic, the researcher is not in a position to frame hypotheses about *explainable persuasion.* Therefore, an abductive approach is used to modify existing theories to explore *explainable persuasion* and to test its effectiveness as an inoculation intervention.

3.3 METHODOLOGICAL CHOICE

The first decision to be made in terms of methodology is whether to conduct the research using a quantitative, qualitative, or mixed-method research design (Saunders et al. 2019).

Quantitative research designs are often linked with positivism, particularly when paired with rigorously defined data collection methods. Quantitative research is often tied with a deductive approach in which data are gathered and studied to evaluate hypotheses. Nevertheless, it may also include an inductive approach, such as when a researcher analyses quantitative data to establish hypotheses to test in a follow-up study. Quantitative research investigates the associations that exist between variables via the use of numerical measurements. Results arise from analysing the data using a range of statistical techniques (Saunders et al. 2019).

Qualitative research is generally related to interpretivism. This is because researchers should comprehend the subjective and socially created meanings stated by participants in the study. With qualitative research design, researchers develop conceptual frameworks by examining participants' interpretations and the interrelation between them. Qualitative research is often tied with an inductive approach in which data are gathered and studied to construct a theory or to enrich an existing theoretical viewpoint.

A substantial amount of qualitative research also employs an abductive approach, in which inductive conclusions are drawn, and deductive assumptions are tested with a follow-up study. In qualitative research, meanings are inferred from text and images rather than from numerical data and statistical analysis (Saunders et al. 2019).

Mixed-methods research combines quantitative and qualitative data collection and analysis methodologies within a single research project. Pragmatism and critical realism are the two philosophical approaches that are generally related to mixed methods designs. In a mixed methods research design, deductive, inductive, or abductive approaches could be adopted. Quantitative research and qualitative research may be used equally or unequally in mixed methods research depending on the research goal (Creswell and Clark 2017). Quantitative and qualitative research may be given different weights in a study, with one approach dominating and the other supporting (Saunders et al. 2019).

3.3.1   RATIONALE FOR SELECTING MIXED-METHOD

This thesis utilises a mixed-method approach for its methodology. This choice was made as the thesis adopts an abductive approach to theory development. The thesis adopts an **embedded mixed-methods research** design (Creswell and Clark 2017). While quantitative research design is the primary approach for data collection, qualitative research is incorporated into the research design via the use of qualitative questions in the online survey and the online experiment. In this thesis, the quantitative approach leads the exploration of novel insights, whereas the qualitative approach helps explain the relationships between variables discovered by quantitative research. Meanings and results are clarified, validated, and strengthened by the use of qualitative methodology.

3.4 RESEARCH PURPOSE AND STRATEGY

3.4.1 RESEARCH PURPOSE

Research may be designed to serve a variety of purposes, including exploratory, descriptive, explanatory, evaluative purposes, or a mix of these and the purpose of the research determines the research question (Saunders et al. 2019).

Exploratory research employs open-ended questions to explore and gather insights on a subject of interest that have not been examined in detail before. Data is collected to answer questions about what and how. Initial results obtained through exploratory research can serve as a foundation for further research.

Descriptive research aims to provide a comprehensive picture of events, people, or circumstances. Data is collected to answer questions about what, where, when, and how.

Explanatory studies explore why something happens and identify causal links between variables. Data is collected to answer questions about why and how.

Evaluative research aims to assess how effectively something functions. The process of evaluating something often involves comparing groups, events, or time frames. Data is collected to answer questions about to what extent and how.

A research study may **combine purposes** by utilising a variety of methods within the research design.

3.4.2 RESEARCH STRATEGY

Research strategy is the methodological connection between research philosophy and data collection and analysis techniques that outline how a researcher intends to address the research question (Denzin and Lincoln 2011). Table 18 reviews the strategies defined by Saunders et al. (2019).

TABLE 18. RESEARCH STRATEGIES (BASED ON SAUNDERS ET AL. 2019)

Experiment	– The goal of the experiment strategy is to discover how likely it is that a change in one variable (i.e., independent variable) will cause a change in another variable (i.e., dependent variable). – Experiments utilise hypotheses instead of research questions.
Survey	– Used to determine prevalent characteristics or patterns among a population. – Methods include questionnaires, interviews, and observations.
Archival and Documentary Research	– Using archival and documentary materials (e.g., newspapers, blogs, government documents, visual or audio documents) to generate a detailed description of major events, their background, players' roles, external factors like economic or commercial forces etc. – The documents the researcher uses should not be originally created for the research purpose.
Case Study	– A case study is an in-depth assessment of a topic or event in its real context, which helps examine what is happening and why and the impacts of the context. – The "case" may refer to an individual, group, organisation, event, etc.
Ethnography	– Examining people in groups in their natural setting to understand how they connect and interact in observable ways.
Action Research	– An iterative process of investigation aimed to provide answers to actual organisational challenges via a collaborative and participatory approach. – Has effects on both the participants and the organisation outside the scope of the research project.
Grounded Theory	– As a strategy, grounded theory refers to generating theory from collected data. – There is no pre-defined theory; the theory is grounded in the viewpoints of the participants.
Narrative Inquiry	– The narrative inquiry focuses on the events' chronological order as reported by the narrator (i.e., participant) to deepen comprehension and support analysis. – Links events, activities, and their outcomes through time to form a meaningful whole.

3.4.3   RATIONALE FOR THE SELECTIONS

This thesis combines different **research purposes** within its design. The thesis is exploratory in nature because it investigates whether and how persuasive design techniques may trigger addictive digital usage and what users think about the concept of *explainable persuasion.* The research is descriptive because it examines a specific user group, online gamblers, to provide a comprehensive picture of their lived experiences with persuasive design techniques and their attitudes towards *explainable persuasion* in the context of online gambling. The research is explanatory because it aims to understand the reasons for user acceptance and rejection factors of *explainable*

persuasion. And lastly, the research is evaluative as it aims to assess the effectiveness of *explainable persuasion* as an inoculation intervention (McGuire 1961; McGuire and Papageorgis 1962).

This thesis utilises a **case study** as its research strategy. In the field of psychology, the case study strategy is commonly employed to conduct a thorough investigation of a specific individual or a small group of individuals (Jhangiani et al. 2019). However, for the purpose of this thesis, the case study definition provided by Saunders et al. (2019) is utilised. According to Saunders et al. (2019), case studies provide an in-depth investigation into a topic within its actual context. Within this approach, a case encompasses various entities, including individuals, groups, organisations, events, and other relevant phenomena. A distinct domain for persuasive technology, online gambling, was selected as a case study for the research. Online gambling was selected as an example of an extreme case to highlight the potential risks of persuasion since gambling can be addictive. While no consensus exists on the addictive nature of social media or online streaming platforms, the DSM-5 (American Psychiatric Association 2013) recognised gambling as a disorder. The use of a case study helped identify how users perceive the research topic and their reasons, and the potential effect of the context on user perception and experience. Adopting a case study approach enabled the gathering of both qualitative and quantitative data for a comprehensive understanding of the case's features. This thesis used a scoping review, an online survey and an online experiment to obtain data for the case study.

3.5   TIME HORIZONS

Cross-sectional research examines a topic at a certain point in time, while **longitudinal research** examines a topic over a period of time. Longitudinal research enables investigating change over time and provides some control over certain variables

within the study (Saunders et al. 2019).

3.5.1 RATIONALE FOR SELECTIONS

A cross-sectional research design was selected for the **scoping review** and the **online survey.** This is because the purpose of these studies was to identify persuasive design techniques used in online gambling platforms, understand user awareness of the use, intent and impact of persuasive design techniques and explore user attitudes towards *explainable persuasion.* Accordingly, it was suitable to perform a single study at a specific moment in time to achieve this objective.

A longitudinal research design was selected for the **online experiment.** Literature on inoculation studies suggests that there needs to be a delay between the inoculation intervention and the persuasive attack for people to generate arguments to defend their prior attitudes (McGuire 1964). Such a design also allowed evaluating the impact of the inoculation on attitudes immediately after the intervention and one week later to determine whether the inoculation effect decreases with time. Moreover, using a longitudinal research design meant baseline attitudes towards online casino bonuses could be controlled for during statistical analysis.

3.6 DATA COLLECTION AND ANALYSIS

Data collection and data analysis methods are at the centre of the Research Onion Framework (Saunders et al. 2019). The sections that follow describe the data collecting and analysis methods used in this thesis.

3.6.1 DATA COLLECTION

This thesis employs an abductive approach. A mixed-methods research design has been employed to meet the thesis's objectives outlined in Chapter 1. This section provides an overview of the data collection techniques. A comprehensive account of how the chosen

methods were utilised is provided in the following chapters. Table 19 outlines the data collection methods utilised in this thesis and their respective chapters.

TABLE 19. DATA COLLECTION METHODS USED IN THIS THESIS

Data Collection Method	Type	Location
Scoping Review	Preliminary exploration to identify persuasive design techniques utilised in online gambling platforms	Chapter 5
Online Survey	Embedded mixed methods research: Quantitative: dominating role, Qualitative: supporting role	Chapters 6, 7, 8
Online Experiment	Embedded mixed methods research: Quantitative: dominating role, Qualitative: supporting role	Chapter 9

3.6.1.1   SCOPING REVIEW

Scoping reviews are conducted to offer an overview of the available evidence in a field, as opposed to systematic reviews, which are conducted to answer a specific research question by summarising existing research (Munn et al. 2018). Scoping reviews help discover relevant evidence, clarify concepts and terminology in the field, and fill knowledge gaps (Munn et al. 2018). Scoping reviews are often used as an effective method to quickly examine evidence in new domains or areas that have not been thoroughly studied before (Mays et al. 2004).

This thesis utilised a **scoping review** to identify persuasive design techniques utilised in online gambling platforms (Chapter 5). Due to the limited knowledge base regarding the use of persuasive design techniques in online gambling platforms, the scoping review approach was found appropriate for the analysis. The findings of the scoping review enabled the researcher to identify persuasive design techniques used in online gambling platforms and argue for an association between gambling disorder and persuasive interfaces using the available literature.

3.6.1.2   SURVEY

Survey research is the practice of systematically collecting data from a population sample (Hammond and Wellington 2020). This kind of research is often used for exploratory as well as descriptive purposes. The goal of any survey is to gather information about the population as a whole; for example, how many people agree or disagree with specific ideas, how often they do certain things, and how informed they are of certain topics or events. A questionnaire is a common survey research technique as it permits comparatively faster and easier collection of standardised data from a large participant pool (Saunders et al. 2019). While questionnaires mostly focus on numerical data, many also include open-ended questions (Hammond and Wellington 2020).

This thesis utilised an **online survey** for the study described in Chapters 6,7 and 8. The online questionnaire enabled examining users' awareness of persuasive design techniques used in online gambling platforms, users' perception of susceptibility to persuasive design techniques in themselves and in others, and users' attitudes towards the concept of *explainable persuasion*. In addition, the open-ended questions in the online questionnaire assisted in exploring user acceptance and rejection factors of *explainable persuasion*, *explainable persuasion* design tensions and possible solutions provided by the users. Table 20 shows the advantages and disadvantages of using online questionnaires as a data collection technique (Wright 2005; Patten 2016).

TABLE 20. ADVANTAGES AND DISADVANTAGES OF USING ONLINE QUESTIONNAIRES

Advantages	Disadvantages
Easy access to a significantly larger and geographically diverse participant base.	Questionnaires may provide only a snapshot.
Questionnaires provide an efficient way to collect (reach thousands of people with common characteristics in a short time).	Self-selection and special interest in the research topic may impact the results.
Questionnaires are useful for collecting information on sensitive matters when administered anonymously.	Much of the situation cannot be controlled in online questionnaires; the possibility of mindless clicks on answers without reading.
Questionnaire research is economical.	Questionnaires elicit socially desirable responses (i.e., answers perceived to be socially desirable.

The goal of the experiment strategy is to explore how likely it is that a change in an independent variable will cause a change in a dependent variable (Saunders et al. 2019). An experimental study is based on measurable data, and the results report statistical relationships between variables, effect size and mean group comparisons (Hammond and Wellington 2020). Experimental designs comprise of classical experiments, quasi-experiments, and within-subject designs.

In a **classical experiment**, participants are placed in either an experimental or control group at random. While the experimental group gets a specific intervention, the control group receives no intervention. The findings compare the studied variables between the two groups to explore the intervention effect (Saunders et al. 2019).

A **quasi-experiment** also utilises experimental and control groups; however, participants are not allocated to each group at random. Using matched pairs is a potential strategy for reducing the impact of individual differences between study groups. In matched pair analysis, participants in the experimental and control groups are paired according to predetermined criteria, such as age, gender, and employment. This helps lessen the impact of confounding factors on the results of the experiment (Saunders et al. 2019).

In a **within-subjects design**, there is a single group rather than an experimental and a control group. In this experimental design, participants take part in all the interventions. The findings compare the impact of different interventions on the studied variables within the same group (Saunders et al. 2019).

This thesis utilised an **online experiment** for the study described in Chapter 9. The online experiment enabled evaluating the effectiveness of *explainable persuasion* as an inoculation intervention in building resilience against persuasive design techniques used

in online gambling platforms. Table 21 shows the advantages and disadvantages of using online experiments as a data collection technique (Reips 2000).

TABLE 21. ADVANTAGES AND DISADVANTAGES OF USING ONLINE EXPERIMENTS

Advantages	Disadvantages
Online experimenting reduces costs (i.e., saving lab space, experimenters, equipment etc.).	Possible multiple submissions.
Easy access to a significantly larger and geographically diverse participant base.	Certain things cannot be controlled in online experiments, such as, mindless clicks on answers without reading the questions.
Tackles the artificial atmosphere of lab experiments, as participants remain in a familiar environment (i.e., at home on their computer).	Self-selection and special interest in the research topic may impact the results.
24/7 access is available to online experiments.	Comparatively high dropout rates.
Online users are more likely than lab participants to exercise their freedom to withdraw from the study.	Little or no contact with participants may make it hard for participants to ask questions about the experiment.
Less opportunity for undetectable experimenter effects, as in most online experiments, there is limited interaction between experimenters and participants.	Technical problems related to software, hardware, and internet connection.

A. STUDY DESIGN

A 4x2 design was used in the study. Inoculation intervention was administered through an animated video. Inoculation intervention (inoculation intervention + disclosure of persuasive intent during persuasive attack, inoculation intervention alone, disclosure of persuasive intent during persuasive attack alone, and control) and problem gambling severity (non-problem and low-risk gamblers, moderate-risk gamblers) served as the independent variables. Baseline attitude toward online casino bonuses was used as a covariate. The study design enabled comparing the influence of inoculation intervention and problem gambling severity on resistance to persuasion. The dependent variables were elicited threat, issue involvement with responsible gambling, attitudes towards online casino bonuses, intention to claim online casino bonuses, attitudes towards the persuasive attack and number of counterarguments.

Each dependent variable was analysed independently. The minimum sample size for the study was determined using Statistical Power Analysis (G*Power 3.1.9.2). G*Power is one of the most often used sample size calculation methods in the behavioural sciences

(Faul et al. 2007). The G-power software predicts the sample size needed for a study based on the statistical significance level, effect size, statistical power, and a number of predictors (Faul et al. 2007). As shown in Figure 8, the study used a 0.05 value of significance level, 0.25 effect size, 80% statistical power, and two predictors: inoculation intervention (4) and problem gambling severity (2) and one covariate. By convention, 80% is suggested to be an acceptable level of power (Cohen, 2013). A 4x2 design required comparing eight groups. For the interaction effect, the numerator *df* was calculated as (4-1) * (2-1) = 3. Accordingly, the total needed sample size by the software was estimated to be 179. This equalled to approximately 23 participants in each condition. The final sample size satisfied the requirements for adequate statistical power. There was a total of 240 participants, with 30 people participating in each of the eight conditions.
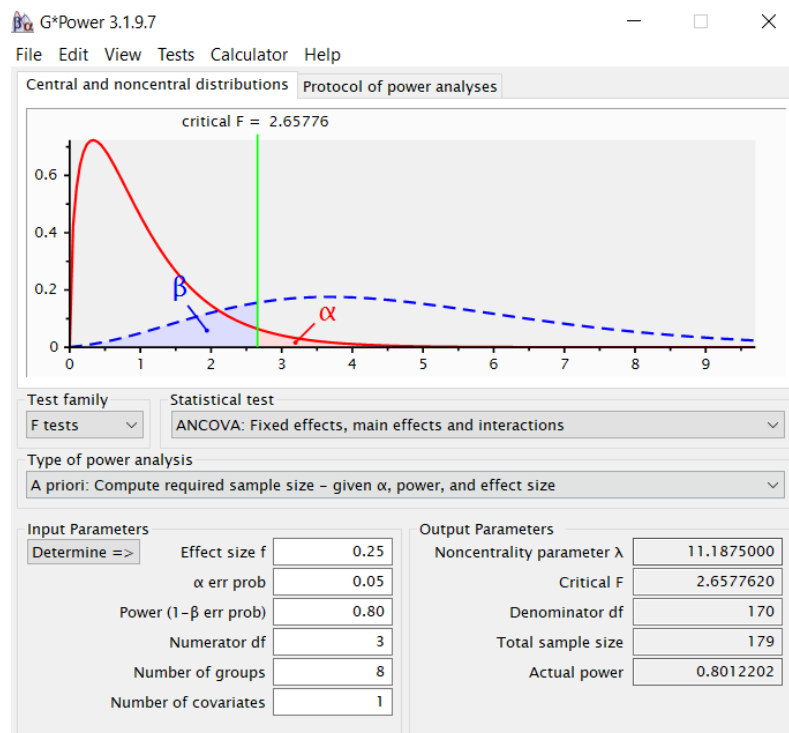
FIGURE 8. SAMPLE SIZE DETERMINED BY G POWER SOFTWARE

3.6.2   DATA ANALYSIS

This thesis follows a mixed methods data collection approach to answer the research questions. The following section discusses quantitative and qualitative data analysis methods.

3.6.2.1   STATISTICS ANALYSIS (QUANTITATIVE)

Descriptive and inferential statistical analysis was utilised in Chapters 6, 7, 8 and 9 to explore the relationship between study variables. The descriptive statistical analysis assisted in describing the sample used in the online survey and online experiment study. Inferential statistical analysis assisted in comparing groups, observing the connection between study variables, and testing hypotheses. All quantitative data analysis was conducted using SPSS version 19. Examining the relationship between study variables enabled discovering new relationships and generating new insights.

3.6.2.2   THEMATIC ANALYSIS (QUALITATIVE)

Thematic analysis is a common approach to analysing qualitative data, and it is defined as "a method for identifying, analysing and reporting patterns (i.e., themes) within data"(Braun and Clarke 2006, P79). It offers a systematic examination of qualitative data as it is carried out in a structured and logical manner (Braun and Clarke 2006). Thematic analysis may be used to examine both small and large qualitative data sets, offering a detailed description of the data and a concise summary of its most salient aspects (Saunders et al. 2019). Thematic analysis is flexible since it is not connected to a specific research philosophy and may be used with either a deductive, inductive or abductive approach (Braun and Clarke 2006). Braun and Clarke (2006) identified six phases in conducting thematic analysis. Table 22 explains each phase of thematic analysis in detail.

TABLE 22. PHASES OF THEMATIC ANALYSIS (BASED ON BRAUN AND CLARKE 2006, P87)

Phases	Content of Explanation
1. Familiarising Yourself with Your Data	Transcribing data (if necessary), reading and re-reading the data, and noting down initial ideas.
2. Generating Initial Codes	Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.
3. Searching for Themes	Collating codes into potential themes, gathering all data relevant to each potential theme.
4. Reviewing Themes	Checking if the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic "map" of the analysis.

5. Defining and Naming Themes	Ongoing analysis to refine the specifics of each theme and the overall story the analysis tells, generating clear definitions and names for each theme.
6. Producing the Report	The final opportunity for analysis. Selection of vivid, compelling extract examples, the final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.

This thesis utilised **thematic analysis** for the studies described in Chapters 6, 7, 8 and 9. The open-ended questions used in the online survey and the online experiment were analysed using thematic analysis to explore user acceptance and rejection factors of *explainable persuasion* and *explainable persuasion* design tensions and possible solutions provided by the users. NVivo software is used for the analysis of unstructured qualitative data collected via interviews, focus groups, surveys, and scientific journals (QSR International Pty Ltd 2018). NVivo was used in this thesis to code the answers given to the open-ended questions into themes. Examining the relationship between participant attributes and themes enabled discovering new relationships and generating new insights.

3.7 ETHICAL CONSIDERATIONS

Bournemouth University Research Ethics Committee approved the online survey on the 8th of November 2021. The ethics ID is 35847. Data collection took place in the first two weeks of December 2021. Participants were recruited through Prolific™ (www.prolific.co). Participants were invited to participate in an online survey that explored the impact of persuasive design techniques used in online gambling platforms on player engagement. The 9-item Problem Gambling Severity Index (PGSI) was used to assess problem gambling severity (Ferris and Wynne 2001a, 2001b). The questionnaire was used to assess user awareness of persuasive design techniques and did not include content that may stimulate gambling. Therefore, problem gamblers were not screened out based on their gambling behaviour.

Bournemouth University Research Ethics Committee approved the online experiment

study on the 11th of May 2022. The ethics ID is 39653. Data collection began on the 5th of September 2022 and closed on the 9th of December 2022. Participants were recruited through Prolific^{TM} (www.prolific.co). The PGSI was used to assess problem gambling severity (Ferris and Wynne 2001a, 2001b). Participants who were undergoing treatment or who were experiencing any negative consequences as a result of their gambling were excluded from the study as the experiment involved intervention that may trigger gambling behaviour (i.e., online casino bonus stimuli).

In accordance with the ethical code document, the two studies conducted for this thesis were below minimal risk. Before starting the online survey and experiment, the participants were asked to read the participant information sheet and consent to participate (see Appendix B and C). The participant information sheets for the studies included details about the purpose of the research, a reminder of inclusion criteria, the duration of the study, the choice of ending the participation at any time and compensation that will be given once the participant completes the study. Two screening questions were placed at the beginning of the studies to ensure that participants included in the study were 18 or older and regularly bet online on slot or roulette games. Participants were informed that they were free to stop at any time. All collected data was anonymised. Samples of the documents are available in Appendix B and C.

3.8   CHAPTER SUMMARY

This chapter summarised the layers of the Research Onion Framework and provided rationales for the selected philosophy, approach, strategies, choice, time horizon, and techniques and procedures. Further details of the studies' procedures and results are presented in Chapters 6, 7, 8 and 9. The next chapter introduces the concept of *explainable persuasion* in the context of persuasive interfaces.

4.   CHAPTER 4: THE CONCEPT OF EXPLAINABLE PERSUASION

4.1   INTRODUCTION

The previous chapter reviewed the methodological approach of the thesis by reviewing research methodologies and providing reasons for the chosen methods. In this chapter, the researcher makes a significant contribution to persuasive technology and ethics in software engineering literature by introducing the concept of *explainable persuasion* and arguing why it may be necessary for designing ethical persuasive interfaces.

Within explainable artificial intelligence (XAI) literature, explainability refers to helping users understand why and how an intelligent system has behaved in a certain way or made a recommendation (Naiseh et al. 2020a). Studies of human-agent systems showed that providing explanations on algorithmic decisions, outputs or their properties, e.g., confidence level, sample size, and training period, helps users better understand the workings of the system, which in turn facilitates informed user decisions (Eslami et al. 2018; Chazette and Schneider 2020). Also, explaining persuasion may be similar to XAI, as AI and persuasion share similarities, e.g., in personalising recommendations and tailoring steps for users based on data reflecting their personal, physical, or social context (Naiseh et al. 2020b). However, persuasive interfaces are based on other elements that primarily come from disciplines other than AI, including linguistics, games, and interaction design. For example, utilising the concept of tunnelling (i.e., guiding the user through a predetermined course of action in a step-by-step format) by exploiting humans' desire to complete tasks may lead to loss of control in online spaces and entering into the flow state (i.e., causing full immersion with the activity) (Chou and Ting 2003). Thus, suggesting that the design of *explainable persuasion* needs to also include information regarding interactive design.

The researcher introduced and defined the concept of *explainable persuasion* first in the

Conference Proceeding of the 29th International Requirements Engineering Conference (Cemiloglu et al. 2021a).

4.2   DEFINITION

Explainable persuasion aims to disclose information about the use of persuasive design techniques to help establish necessary conditions for informed consent when interacting with persuasive interfaces. Persuasive interfaces are created by integrating persuasion techniques such as rhetoric, graphics, and psychological strategies into the user interface design (Fogg 2003). From a business and usability perspective, explainable persuasive interfaces should preserve the legitimate purpose of persuasion. This poses challenges to the design of both persuasive interfaces and their explanatory counterparts. The concept of *explainable persuasion* is defined as:

The system's transparency about its persuasion attempts so that users become conscious of how the design may alter their attention or behaviour towards certain content or actions and can consent to be subject to it (Cemiloglu et al. 2021a, P378).

It is important to underline why transparency of system persuasion is needed. By *explainable persuasion,* the main goal is to encourage user consent and choice, allowing users who choose to regulate their digital usage to do so. This objective is similar to the useful transparency objective defined within the Information Systems Transparency reference model (Turilli and Floridi 2009; Schauer 2011; Hosseini et al. 2018).

4.3   EXPLAINABLE PERSUASION STAKEHOLDERS

Using the Transparency Actors Wheel reference model (Hosseini et al. 2018), the relevant actors in an information exchange within the context of *explainable persuasion* may be defined as the following:

- **Information Provider (IP):** The information provider could be operators using

persuasive interfaces (i.e., social media, gaming, gambling platforms themselves), regulators or non-profit organisations dedicated to protecting consumers and minimising harm.

- **Information Receiver (IR):** The user of the persuasive interface.

- **Information Entity (IE):** Information about the persuasive design techniques used within the persuasive interface or information about how the user interacts with the persuasive features and the consequences.

- **Information Medium (IM):** The information could be delivered through primary channels, secondary channels and public channels (Schaub et al. 2015).

  o Primary Channel: The explanation can be provided in the form of a pop-up message or disclosure footnote when the user is interacting with the persuasive interface.

  o Secondary Channel: The explanation can be provided outside the use context through emails or may be made consistently accessible on a platform-specific webpage.

  o Public Channel: The explanation can be provided in public spaces, such as a marketing campaign.

4.4   EXPLAINABLE PERSUASION CONTENT

Using the Transparency Depth Pyramid reference model (Hosseini et al. 2018), the relevant information conveyed through *explainable persuasion* in the context of persuasive interfaces could be related to answering the following questions:

- **What** persuasive design techniques exist within the interface?

- **How** do the utilised persuasive design techniques motivate certain user behaviours?

- **Why** is the interface utilising persuasive design techniques?

In determining the content of *explainable persuasion*, these questions could be addressed by the Informed Consent Theory defined in bioethics literature (Faden and Beauchamp 1986) and the Persuasion Knowledge Model (PKM) defined in the consumer research literature (Friestad and Wright 1994).

In the bioethics literature, informed consent is defined as a process in which a patient accepts to receive a medical intervention following a thorough explanation by the doctor of the intervention, its intent, benefits and associated risks, along with alternative interventions and their possible effects (Jonsen et al. 1982). Informed consent is regarded as an ethical requirement since it protects the patient's right to make autonomous choices about their life (Faden and Beauchamp 1986). Accordingly, in the context of persuasive interfaces, the content of *explainable persuasion* could inform users about the persuasive design techniques used by the system, the persuasion intentions of the system and the potential consequences of interacting with such persuasion techniques so that the users can consent to be subject to it. The example given in Table 23 demonstrates the potential content of *explainable persuasion* in the context of online gambling with reference to the Informed Consent Theory. Here the persuasive design technique to be explained is the gambling feature of an auto-spin function at an online slot game. Auto-spin is a feature that enables repetitive play by spinning the reels consecutively and automatically without requiring the player to press any buttons. A variant of that can also be the option for an auto-refresh of social media pages and the auto-play feature on sites like YouTube and Netflix.

Components of Explanation	Content of Explanation
Persuasion technique used by the system	The content will explain that the game uses the persuasive design technique of reduction (i.e., reducing user effort to act) through the auto-spin function.
Persuasion intention of the system	The content will explain that the intent of using the auto-spin function is to ease play for the user.
The consequence of interacting with persuasion techniques used by the system	The content will explain that auto-spin may impair a person's ability to control their urges and make it difficult to stop playing when they want to.

Another reference model for determining the content of *explainable persuasion* could be the PKM (Friestad and Wright 1994). According to the PKM, when faced with a persuasion attempt, people utilise their persuasion knowledge (Friestad and Wright 1994). Persuasion knowledge is suggested to consist of information relating to both the persuasion agent and target. Table 24 defines the persuasion knowledge components. The model postulates that individuals can assess the persuasion attempt better when they have information on both the persuasion agent and the target. While people typically have some knowledge about traditional forms of persuasion, such as those used in advertising and marketing, their knowledge of digital persuasive design techniques could be limited, which may affect their response to the persuasion (de Pelsmacker and Neijens 2012). In the context of persuasive interfaces, information relating to persuasion knowledge could be used as a guide to establishing the necessary conditions for informed consent. The example in Table 24 demonstrates potential *explainable persuasion* content in the context of online gambling with reference to the PKM.

TABLE 24. EXPLAINABLE PERSUASION BASED ON PERSUASION KNOWLEDGE MODEL: AUTO-SPIN ONLINE GAMBLING FEATURE EXAMPLE

Components of Explanation	Content of Explanation
Persuasion agent's intention	The content will explain that the intent of using the auto-spin function is to ease play for the user.
Persuasion agent's tactic	The content will explain that the auto-spin function persuades users to have continuous interaction with the game by reducing the effort

	to gamble, as players are not required to press any buttons when they play in auto-spin mode.
Psychological mediator that the persuasion agent uses	The content will explain that the auto-spin function is persuasive because it makes people act on impulses and make quick decisions regarding play.
Persuasion's target coping goal	The content on the target coping goal will be on having more control over the gambling time and amount.
Persuasion's target coping tactics	The content will explain that users can disable the auto-spin function or limit the time they play with it.

4.5 EXPLAINABLE PERSUASION AND USER INTERACTION

It is stated that system transparency serves its purpose when high-quality information is made accessible to users in a manner that enables them to make informed choices (Turilli and Floridi 2009; Schauer 2011; Hosseini et al. 2018). This necessitates addressing information quality dimensions (i.e., sound, dependable, useful, usable information) and usability requirements throughout the design of *explainable persuasion.*

While designing the content and delivery method of *explainable persuasion*, the designer needs to understand the context of use, task, user profile and user emotions to optimise interaction. Regarding content design, the depth to which information should be provided may be a significant factor that can influence usability. According to the usability principle of aesthetic and minimalist design, interactive interfaces should avoid the use of redundant information (Nielsen 2005). Consequently, the content depth of *explainable persuasion* may be required to vary according to the type of persuasive interface, user cognitive ability, and user motivation. For example, providing information about a persuasion target's coping goals and tactics might be more relevant within persuasive interfaces that may trigger addictive usage. However, such information may be seen as redundant within self-directed BCCSs, e.g., systems promoting a healthy lifestyle through setting limits and goals and tracking them. The level of content depth can also be related to user profiles, such as their level of need for

cognition (NfC) (Cacioppo and Petty 1982) or whether they are motivated to engage with explanations (Petty and Cacioppo 1986) and, possibly, their personality traits, such as conscientiousness and agreeableness (Chen et al. 2008).

With analogy to XAI (Rosenfeld and Richardson 2019; Naiseh et al. 2020a), *explainable persuasion* can be delivered to users in multiple ways: at initial exposure to the persuasive interface, along with the persuasive interface at all times, on demand when the user wants to access explanations or through context-aware systems. These explanations can be delivered through textualisation, visualisation, or a mixture of the two, as demonstrated within the XAI field (Sokol and Flach 2020). The format of the explanation can be related to whether the explanation would target an intuitive or rational route of information processing (Evans 2008).

In terms of presenting and delivering *explainable persuasion*, the usability heuristic adaptability (Van Welie et al. 1999) may be of value in designing usable explainable persuasive interfaces. The delivery of *explainable persuasion* may need to adapt to the needs and preferences of users in order to respect user autonomy. Hence, users could be allowed to customise the explainable persuasive interface by selecting which persuasive techniques they wish to receive explanations for, choosing the depth of information they would like to receive, and choosing when they would like to receive explanations. Providing user control over *explainable persuasion* interfaces can help users who would like to use such explanations as preventive measures when interacting with immersive technology. Similar to gaming, adapting interfaces to user emotions could further foster user engagement (Hudlicka 2008; Anolli et al. 2010). In the case of *explainable persuasion*, the content and delivery method of an explanation could be adapted to fit user emotions. The delivery of *explainable persuasion* may also need to adapt to the context of use to increase explanation effectiveness and decrease harm to user

experience. Kairos, which is defined as the right moment of intervention (Kinneavy 1986), may impact the effectiveness of the explanation. Building on the example in Table 23, explaining the persuasive nature of the auto-spin when the user exceeds a certain playtime or amount of money using this feature may make the user see this information as relevant and acceptable. The information can be presented in real-time, i.e., during the behaviour. It can also be presented after the behaviour to help the user reflect more on the link between their behaviour and the persuasive element. Also, interruption caused by *explainable persuasion* in certain situations may harm user experience and even put the user in danger; thus, context sensitivity may be needed. For example, when someone is driving and being persuaded to slow down through a persuasive system, this may not be the right moment to disclose information relating to the persuasion attempt, as studies show that cognitive involvement during driving causes distraction and influences vehicle control (Cades et al. 2017).

4.6 THE IMPORTANCE OF EXPLAINABLE PERSUASION

In this section, the need for *explainable persuasion* is discussed through both ethical and business lenses.

From an ethical perspective, *explainable persuasion* can facilitate designers in taking responsibility for protecting users' rights to know that they are being exposed to persuasion, especially when such persuasion is tailored to the user based on their profile and behaviour data. The rise of hidden persuasion techniques in the digital world has brought back interest in the conditions under which users can recognise persuasion attempts (Taylor 2017). It has been suggested that hidden persuasive techniques block users' persuasion knowledge and that salient disclosures of persuasive intent help activate users' persuasion knowledge which in turn allows the user to decide whether to be persuaded (Van Reijmersdal et al. 2016; Taylor 2017). Accordingly, the guidelines

proposed by the United States Federal Trade Commission state that native advertisements on online platforms should be labelled as sponsored content to inform users that they are interacting with adverts (Federal Trade Commission 2015). Such an approach is congruent with the European Union's General Data Protection Regulations (GDPR) (European Parliament and Council 2016), which argued for the right to an explanation of algorithmic decisions made about the user (Goodman and Flaxman 2017).

From a business perspective, *explainable persuasion* may contribute to businesses in two ways. First, system explainability studies showed that explainability is an important factor in building trust between the user and the system and increasing user satisfaction (Eslami et al. 2018; Chazette and Schneider 2020). Providing information about the use of persuasive design techniques can increase user perception of fairness with respect to persuasive systems, lessen the feeling of being "tricked" by the system and give the user a sense of control. Narayanan et al. (2020) suggested that when users realise they are being manipulated into behaviours with negative outcomes, their trust in the system inevitably declines. Second, employing *explainable persuasion*, especially within technology that has the potential to be highly immersive, can work as a proactive strategy by helping users reflect on their behaviour while interacting with persuasive interfaces. For example, *explainable persuasion* could inform the user which persuasive design technique makes the greatest contribution to their excessive usage. This could, in turn, help business sustainability, as users would not need to take extreme measures such as self-exclusion from websites (Cemiloglu et al. 2020). This thesis proposes that all operators who utilise persuasive interfaces need to provide *explainable persuasion*, which must be compelled by law in the same way that GDPR or native ad disclaimers are. However, research at this level must initially show that *explainable persuasion* is a user requirement on demand and is effective in helping users regulate their digital

usage.

Utilising *explainable persuasion* within persuasive interfaces aligns with the software engineering code of ethics, which advocates for avoiding harm and maintaining honesty and trustworthiness (Anderson 1992; Aydemir and Dalpiaz 2018). *Explainable persuasion* may also help fulfil specific professional responsibilities, such as providing thorough evaluations of computer systems and their impacts, as well as enhancing the public's understanding of computing and its consequences (Anderson 1992).

4.7 CHAPTER SUMMARY

This chapter defined the concept of *explainable persuasion* and argued why it might be necessary for designing ethical persuasive interfaces. The next chapter examines the potential impact of persuasive design techniques used in online gambling platforms on problem gambling.

5. CHAPTER 5: PERSUASIVE DESIGN AND GAMBLING DISORDER

5.1 INTRODUCTION

The previous chapter introduced the concept of *explainable persuasion*. This chapter explores the relationship between persuasive design techniques and gambling disorder. As addiction is an interwoven connection developed with an entity, the nature of the entity also has an influence on addictive behaviour. This is especially true for addictive behaviour manifested within digital platforms, as the interactive, intelligent, and personalised nature of digital media makes it more possible to attract attention and trigger and reinforce a problematic relationship with it (Ali et al. 2015). Hence, software design shall also be studied when studying addictive behaviour within digital platforms.

The findings of this study are published in the Conference Proceeding of Persuasive Technology 2021 (Cemiloglu et al. 2021b).

5.2 RATIONALE

In the last two decades, the world economy started to move from a materials economy to an attention economy, establishing a market where individual attention is a valuable resource (Goldhaber 1997). As human attention is limited, interactive online platforms started to employ immersive and persuasive design techniques to engage users and increase business profit (Hogan 2001). The use of persuasive design techniques in such platforms raises ethical concerns arguing whether software-mediated persuasion without users' informed consent is ethical (Atkinson 2006). Moreover, it is argued that persuasive design techniques intended to increase user engagement or ease task completion for users may also be responsible for excessive usage and, in some instances, lead to addiction (Alrobai et al. 2014; Ali et al. 2015; Kuonanoja and Oinas-Kukkonen 2018). Understanding the relationship between addictive usage and persuasive design techniques requires an investigation that goes beyond analysing

addiction symptoms. That is, one needs to look at the etiological factors that give rise to addictive symptoms in the first place to see whether persuasive design techniques tap into similar mechanisms. Persuasive design techniques are designed to prompt behavioural, cognitive, psycho-social, and other psychological mechanisms to change a person's attitudes and behaviour, and while doing so, they may trigger or expedite mechanisms related to addictive behaviour.

By taking gambling disorder as a case study, this chapter provides a concise review of gambling disorder through theories of addiction (Section 5.3) and examines whether persuasive design techniques utilised in online gambling platforms can trigger or expedite gambling disorder adding to the underlying causes and symptoms of it.

5.3 ADDICTION THEORIES AND GAMBLING DISORDER

Many theoretical approaches and models have been proposed to explain addiction development, maintenance, and relapse. For a collection of reviews, see the work of (Elster and Skog 1999; West 2001; Kovac 2013; West 2013). Each approach highlights different underlying mechanisms in explaining addiction, and there is no single explanation dominating the field (West 2013). Moreover, the proposed theories and models are not mutually exclusive, such that the underlying mechanisms highlighted in one theory or model can be interrelated with another (Kovac 2013). This view then suggests that the appearance and maintenance of addiction is a consequence of many integrated mechanisms in which biological, personal, social, and environmental factors work together (West 2001).

5.3.1 METHOD

A comprehensive literature review on addiction theories was conducted to gain an understanding of the etiological factors related to gambling disorder. This review was undertaken by an in-depth analysis of notable review papers on addiction theories

authored by Elster and Skog (1999), West (2001), Kovac (2013), and West (2013) as well as significant papers specifically addressing gambling disorder. Such an analysis allowed the identification and categorisation of relevant theories. Accordingly, addiction theories that contribute to understanding gambling disorder were grouped into eight categories: biological, predisposition, learning, decision-making, motivation, self-regulation, psycho-social, and contextual. In the following section, a summary is provided for each theory group.

5.3.2   ADDICTION THEORIES

5.3.2.1   *BIOLOGICAL THEORIES*

These theories postulate that addiction is mainly a "brain disease" resulting from a disorder in the dopamine reward system and other neural systems involved with conditioning, motivation, and executive functions (Volkow et al. 2011). In time as addiction develops, the structure and function of brain regions may change, causing further excessive behaviour (Goodman 2008).

A.   REWARD SYSTEM

The human brain has evolved in a way to respond to rewards as this motivates one to follow goals with positive survival value (Kelley and Berridge 2002). When an individual receives or expects to receive a reward, dopamine and other neurotransmitters' release increases in the neural system contributing to feelings of pleasure, reinforcing the goal-seeking behaviour (Schultz et al. 1997). While such activation is related to natural rewards, it has been shown that drug ingestion activates similar reward circuits in the brain (Cooper et al. 2017). The rapid increase in neurotransmitters caused by drug intake compared to natural rewards may impair reward sensitivity to natural rewards and cause dependence (Volkow et al. 2002).

The reward system not only explains substance addiction but gambling disorder as well.

For example, Sescousse et al. (2013) suggest that people with gambling disorder have an imbalanced reward sensitivity such that they show elevated sensitivity to monetary rewards and reduced sensitivity to non-monetary rewards. Other studies indicate that people with gambling disorder may have heightened mesolimbic reactivity to gambling-related stimuli (Joutsa et al. 2012; van Holst et al. 2012). Case studies demonstrate that using dopamine agonists (i.e., agents that stimulate dopamine receptors) to treat Parkinson's disease may increase urges to gamble in patients (Gallagher et al. 2007), providing support for the role of the reward system in gambling disorder.

B.   MULTIPLE CIRCUIT

Studies suggest that addiction is caused not only by the activity in the reward system but also by other neural circuits. While activation in the reward system helps explain initial drug-taking, activation in neural circuits related to motivation, memory, and executive functions help explain compulsion (Volkow and Fowler 2000). It has been suggested that improper regulation of dopamine and other neurotransmitters in the neural system reinforces learned associations, enhances the rewarding and motivational value of the substance, and reduces inhibitory control, leading to compulsivity and impulsivity (Volkow et al. 2011). This hypothesis has been supported by neuroimaging studies, which show that addicted individuals show poor impulse control on tasks that involve response inhibition (Goldstein and Volkow 2002).

Reward sensitivity, deficits in inhibition, working memory, planning and cognitive flexibility were suggested to be associated with gambling disorder (Tanabe et al. 2007; van Holst et al. 2010). Reid et al. (2012) utilise the Brief-A measure (i.e., a self-report measure that analyses executive functioning) and report that compared to controls, people with gambling disorder have significantly greater levels of deficits in executive functioning, particularly in inhibit, plan, shift, emotion control, self-monitor, and initiate aspects. Leeman and Potenza (2012) propose that serotonin dysregulation may play a

role in gambling disorder by influencing behavioural inhibition and impulsivity in players.

C.   BRAIN ADAPTATION

Prolonged substance use may cause changes in the structure and function of related brain regions, such as a reduction in neurotransmitter receptors, receptors becoming less responsive in time, or the creation of new neural pathways, which may be responsible for the maintenance of addiction (Goodman 2008). For example, the Incentive-Sensitisation Theory proposes that repeated use may cause neuroadaptation in the brain, making it hypersensitive to drugs and drug cues and, as a result, can turn ordinary wanting into cravings (Robinson and Berridge 1993). Accordingly, in time addictive activity may be less related to the expected pleasure that is "liking" and more related to "wanting" (Robinson and Berridge 1993). Even though the individual develops a negative attitude towards the addictive behaviour over time, they continue to engage in the behaviour due to the implicit "wanting" urges.

It has been suggested that the urge to gamble may be a significant factor in explaining gambling disorder and relapse (Wulfert et al. 2009). Davey and Cummins (2018) suggest that the Incentive-Sensitisation Theory may apply to gambling disorder as participants with gambling disorder were found to show greater wanting than liking, with wanting scores being higher than those of controls. The results also indicate that wanting predicted gambling behaviour for participants with gambling disorder whereas liking did not.

5.3.2.2   PREDISPOSITION THEORIES

Individuals may hold certain dispositions, which may increase their probability of developing addiction (Munafo et al. 2007). For example, some people may show genetic vulnerability to addiction as they have a low number of dopamine receptors or

inadequate neurotransmitters within their neural system, making it difficult to experience pleasure from naturally rewarding activities (Blum et al. 1996). Genetic vulnerability could also arise from comorbid addictive disorders and psychiatric disorders (Goodman 2008), suggesting common causation such that the risk factors that give rise to each disorder may be related (Kendler et al. 2003). Certain personality traits such as approach-related traits that are associated with sociability, sensation seeking, and impulsivity or avoidance-related traits related to neuroticism (Munafo et al. 2007), stressful life experience (Keyes et al. 2011), low life satisfaction (Zullig et al. 2001) and socio-demographic characteristics such as education level, occupation, income level (Pennanen et al. 2014) may all increase the likelihood of developing addictive behaviour.

A. *GENETIC VULNERABILITY*

According to twin studies, genetic factors may pose a profound risk for developing gambling disorder (Winters and Rich 1998; Shah et al. 2005; Slutske et al. 2010). Through twin studies, Lobo and Kennedy (2009) propose that gambling disorder has a heritability of 50-60%, and Winters and Rich (1998) suggest that monozygotic twins' gambling frequency is more comparable than that of dizygotic twins. Studies on gambling disorder heritability also indicate that individuals who have relatives with gambling problems are more likely to have gambling disorder than controls (Black et al. 2006).

Gambling disorder was suggested to be comorbid with other psychiatric disorders and addictive disorders. Studies show that people with gambling disorder also have high rates of substance use disorder, mood disorder, anxiety disorder, and personality disorder (Petry et al. 2005; Kessler et al. 2008; Grant and Chamberlain 2020; Rogier et al. 2020). The relationship between gambling disorder and other psychiatric disorders and addictive disorders is suggested to be bidirectional such that previous psychiatric

disorders can be a risk factor for gambling disorder, or gambling disorder may cause the development of new psychiatric or addictive disorders (Kessler et al. 2008).

B.   *PERSONALITY DISPOSITIONS*

Personality traits such as neuroticism, openness, impulsivity, the need for stimulus intensity (Myrseth et al. 2009), competitiveness (Parke et al. 2004) and risk-taking (Mishra et al. 2010) were suggested to be associated with gambling disorder. It has been argued that certain traits may interact with and influence the development of gambling disorder. For example, Auger et al. (2010) show that the risk of developing a gambling disorder is higher for those with high impulsivity and low socioeconomic backgrounds. Participants with high impulsivity and from high socioeconomic backgrounds, however, are not exposed to this risk as much.

C.   *NEGATIVE LIFE EXPERIENCES*

Studies indicate that adverse life experiences encountered during childhood, such as traumatic relationships with parents, physical abuse, emotional abuse, and sexual abuse, correlate with gambling disorder (Storr et al. 2012; Hagen et al. 2013; Sharma and Sacco 2015). Such experiences may impact executive functioning and emotion regulation during childhood and persist into adulthood (De Bellis and Zisk 2014). Granero et al. (2020) showed that stressful life events also contribute to gambling behaviour in older age, demonstrating that exposure to domestic violence and severe financial problems are associated with gambling disorder. It is suggested that gambling may serve as an avoidance-focused coping mechanism in response to psychosocial stressors (Bergevin et al. 2006; Hagen et al. 2013).

D.   *SOCIOECONOMIC AND DEMOGRAPHIC FACTORS*

Socio-economic status based on occupation, education, income, and wealth may be related to addiction as it influences life stressors, social roles, accessibility to addictive behaviour, and resources to cope with addiction (West 2001). Studies show that people

with gambling disorder are significantly more likely to be male, separated or divorced (Loo et al. 2019) and from a low socioeconomic status (Van der Maas 2016). In terms of poverty, unemployment, housing instability, homelessness, low income, and neighbourhood disadvantage were the main factors associated with problem gambling (Hahmann et al. 2020).

5.3.2.3   LEARNING THEORIES

Addiction may arise as a learned behaviour through associations made between cues (Pavlov 1902), reinforcements and responses (Skinner 1965), or observing others (Bandura 2001).

A.   CLASSICAL CONDITIONING

Classical conditioning explains addiction as a learned response produced when two stimuli are associated (Pavlov 1902). Addiction develops when the positive-reinforcing value of substance stimuli is implicitly associated with environmental stimuli, which predicts drug ingestion. Once this association occurs, the environmental stimuli (i.e., unconditioned stimuli) become a cue for drug uptake (i.e., conditioned stimuli), which can now produce strong cravings (i.e., conditioned response). Accordingly, classical conditioning explains not only addiction development but also addiction maintenance due to relapse triggers (Carter and Tiffany 1999).

According to classical conditioning, both appetitive classical conditioning (i.e., when a neutral stimulus gains positive value by being associated with a reward) and aversive classical conditioning (i.e., when a neutral stimulus gains negative value by being associated with pain) may contribute to gambling disorder (Brunborg et al. 2012; Ramnerö et al. 2019). Once internal cues (e.g., boredom, frustration) and external cues (e.g., visual, auditory elements in gambling games) are associated with physiological and psychological arousal experienced during gambling, these cues can cause arousal

and trigger gambling behaviour (Brown 1987; Ramnerö et al. 2019). This association

process is demonstrated in Figure 9.
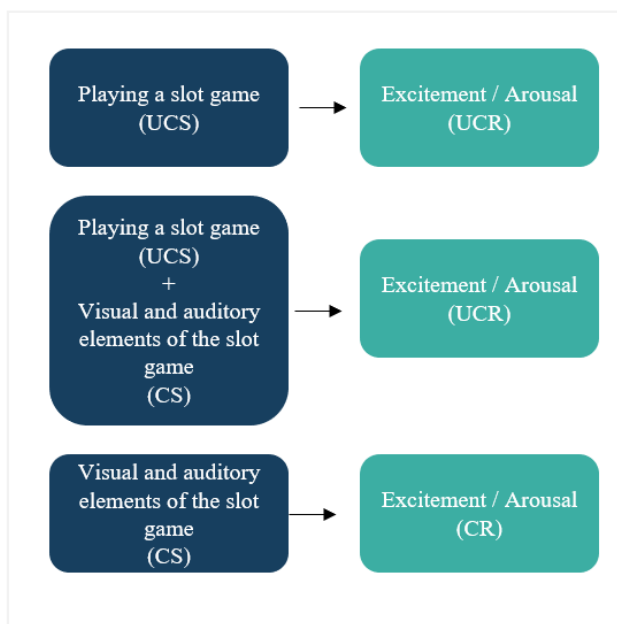
FIGURE 9. CLASSIC CONDITIONING: GAMBLING BEHAVIOUR

UCS: Unconditioned Stimuli, UCR: Unconditioned Response, CS: Conditioned Stimuli, CR: Conditioned Response

Losing is an integral part of gambling activity, and losing money is perceived as an

unpleasant experience that people try to avoid. Studies suggest that people with

gambling disorder have difficulty building associations between unpleasant experiences

and stimuli that signal these experiences (Brunborg et al. 2010; Brunborg et al. 2012).

Thus, due to impaired aversive conditioning, people may fail to avoid such stimuli and

experience problem gambling.

B. OPERANT CONDITIONING

Operant conditioning explains addiction as a learned response produced when an

association is made between a behaviour and its outcome (Skinner 1965). Individuals

actively understand the relationship between behaviours and their outcomes, and

addiction develops through associations between drug intake and attaining rewarding

experiences. In time, the continuous pairing of addictive behaviour and the positive

outcome may cause the act to become automatic; hence a behaviour that was once goal-

directed may turn into a habit, an unconscious response which is no longer linked to the value of the outcome (Wood and Rünger 2016). It is possible that classical conditioning and operant conditioning could work together. A conditioned stimulus could cue addictive behaviour, while positive reinforcement could further increase the value of performing it (Berthon et al. 2019).

The reinforcing power of rewards increases if delivered on a variable ratio schedule which has been effectively employed in the gambling industry (Griffiths 1993). It has been suggested that the anticipation of reward is sufficient to cause dopaminergic responses (Joutsa et al. 2012) and that reward uncertainty has reinforcing value in itself (Fiorillo et al. 2003). Gambling behaviour can also be reinforced in the absence of actual rewards. Barton et al. (2017) observe that when players experience near misses (i.e., the perception that the player almost won), they overestimate the frequency of winning, show increased arousal through skin conductance levels, and are motivated to continue playing. Barton et al. (2017) report that losses disguised as wins (i.e., winning less money than the actual bet) also leads to overestimating wins and produces increased enjoyment. Accordingly, the positive affect arising from near misses and losses disguised as wins can reinforce gambling.

C.   SOCIAL LEARNING THEORY

According to Social Learning Theory, addiction is a learned response produced through observing others (Bandura 2001). Individuals interact with different people in their social environment and, through this interaction, are exposed to behavioural models and norms. Addiction develops when a person associates with peers that show addictive behaviour, holds positive attitudes towards the addictive behaviour, anticipates positive outcomes (i.e., physiological effects and reactions from others) and holds a positive definition of addictive behaviour as these parameters increase their likelihood of performing the behaviour (Akers and Cochran 1985; Akers et al. 1995).

Studies show that gambling behaviour is positively correlated with that of parents and close friends (Gupta and Derevensky 1997; Hira and Monson 2000; Reith and Dobbie 2011), and individuals whose parents gamble have a higher chance of developing gambling problems (Black et al. 2006; Dowling et al. 2016). While the positive association between parent and individual problem gambling may indicate a genetic aetiology (Lobo and Kennedy 2009), gambling behaviour may also be initiated through observation and learning (Reith and Dobbie 2011). Reith and Dobbie (2011) indicate that in a social setting where gambling is perceived as fun and entertaining, individuals may learn to attribute a positive meaning to gambling and engage with it. Dowling et al. (2016) indicate that parents' gambling expectancies (i.e., positive expectancies: enjoyment, self-enhancement, money, negative expectancies: over-involvement, emotional impact) and their gambling motives (e.g., enhancement, coping, social) may influence children's expectancies and motives and, in turn, impact their gambling behaviour.

5.3.2.4 DECISION-MAKING THEORIES

Theories on decision-making suggest that individuals decide to engage in addictive behaviour based on cognitive processes (West 2013). According to the Dual-Process Theory (Evans 2008), two different types of systems underlie decision-making: intuitive, which is fast processing based on heuristics (i.e., mental shortcuts) and rational, which is slow processing based on reflective and deductive reasoning. Decision-making involves an interactive combination of intuitive and reflective processing in which one may dominate the other (Evans 2008). Thus, the development and maintenance of addictive behaviour might arise from intuitive or rational processing or the dynamic between the two.

A. INTUITIVE DECISION-MAKING

It is stated that individuals have a disposition to use intuitive processing as it saves time

and effort, and in fast-response situations this could be crucial (Evans 2008). Intuitive

processing is usually effective in decision-making; however, its heavy reliance on

heuristics and its unconscious nature makes it susceptible to biases. According to

Stanovich (2011), intuitive biases could be grouped under four categories, biases that

are hard-wired due to the evolutionary past, biases that are controlled by emotions,

biases that developed due to explicit overlearning and biases that are developed through

implicit learning through mechanisms of conditioning. From this perspective, addiction

might arise from information-processing biases that favour addictive behaviour

(McCusker 2001). For example, Field et al. (2004) showed that participants with high

levels of cannabis craving are prone to attentional bias; they showed increased attention

to cannabis cues compared with the control group. It is stated that contextual conditions

may also increase the risk of such biases. Intrinsic conditions such as fatigue, sleep

deprivation and cognitive overload, and extrinsic conditions such as high

communication load, load noise, and performance pressure may make individuals more

prone to biases (Croskerry 2012).

It has been argued that intuitive biases may contribute to the onset and maintenance of

gambling disorder. Goodie and Fortune (2013) indicate that these biases mainly reflect

the availability (i.e., use of information that is easily remembered) and

representativeness biases (i.e., the tendency to make a judgement based on an event or

object similarity) defined by Tversky and Kahneman (1974). Gambling disorder has

been linked to attentional bias (i.e., selective attention towards gambling-related stimuli

over other stimuli) (Hønsi et al. 2013), selective memory (i.e., remembering wins more

than losses) (Toneatto 1999; Joukhador et al. 2003), the illusion of control (i.e.,

believing that one has control over gambling outcomes) (Langer 1975; Cantinotti et al.

2004) and gambler's fallacy (i.e., inability to acknowledge that past losses do not

promise future wins) (Blaszczynski et al. 2008b). Walker (1992) argues that individuals

who gamble on slot machines are more prone to irrational thinking and biases compared to those who play other games. Moreover, the short time gap between betting and the outcome of such games may lead to less self-aware betting (Monaghan 2009).

B. RATIONAL DECISION-MAKING

Rational decision-making differs from intuitive decision-making. It is based on analytical processes where decision-makers come to a decision by calculating the cost and benefits of possible options and choosing the one in their best interest (Scott 2000). One should note that the term rational here does not suggest the rationality of the decision but the higher-order cognitive processes involved in coming to that decision (West 2013).

I. TEMPORAL DISCOUNTING

Rational Addiction Theory suggests that individuals may decide to engage in addictive activities as a result of cost-benefit analysis (Becker and Murphy 1988). According to this theory, individuals, whilst being fully aware of the consequences of the addictive activity, deliberately assign a greater value to events nearer in time and a lower value to events in the future (Becker and Murphy 1988). While such a tendency is not seen as irrational or problematic, problems may arise when the discounting curves get sharper as individuals drastically overvalue the present and undervalue the long-term consequences (Becker and Murphy 1988; Bickel and Marsch 2001).

Studies showed that people with gambling disorder prefer earlier smaller rewards to delayed bigger rewards and that their time-delayed discounting curves are sharper than control groups (Petry 2001; Alessi and Petry 2003; Dixon et al. 2003). This difference is demonstrated in Figure 10. Furthermore, a recent meta-analysis indicated that individuals with gambling disorder are also more likely to have a shallow probability discounting (i.e., assigning more value to low-probability rewards and less value to high-probability losses) (Kyonka and Schutte 2018).
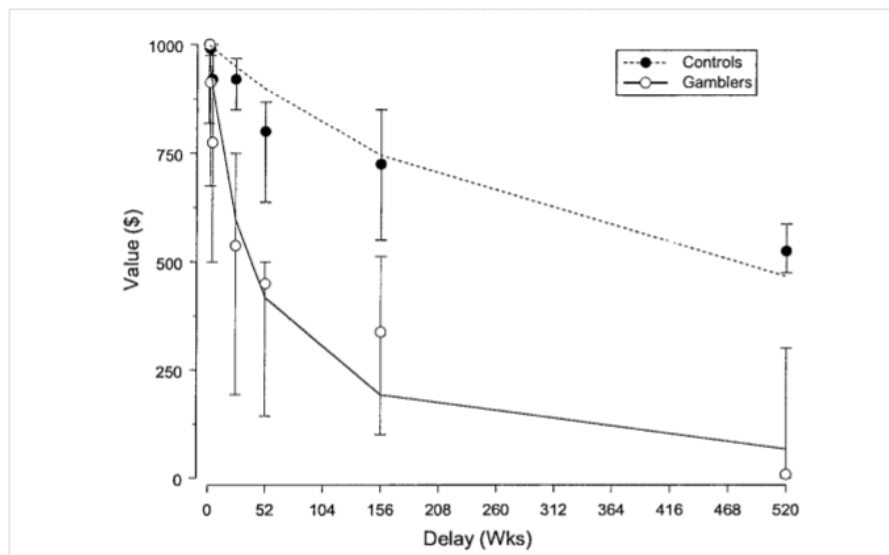
FIGURE 10. DELAY DISCOUNTING BY INDIVIDUALS WITH GAMBLING DISORDER AND INDIVIDUALS WITHOUT GAMBLING DISORDER (BASED ON DIXON ET AL. 2003, P455)

II.   MISSING INFORMATION AND INCORRECT INFORMATION

It is suggested that individuals may not be fully aware of all possible consequences when making a cost-benefit analysis regarding addictive behaviour (Furby and Beyth-Marom 1992). Addiction may arise due to not having all relevant information or basing cost-benefit analysis on incorrect information.

For example, the Protection Motivation Theory states that whether a person will adopt addictive behaviour or not depends on their perception of the threat and their confidence in their ability to cope with it (Maddux and Rogers 1983). The threat appraisal consists of the perceived severity of the threat, the perceived probability of the threat harming the individual, and the perceived reward linked to the addictive behaviour (i.e., extrinsic or intrinsic). The constructs of the threat appraisal help the individual evaluate addictive behaviour. The coping appraisal consists of response efficacy, the belief that counter behaviour will reduce addiction; self-efficacy, the belief that one will be successful in performing the counter behaviour; and the response costs, the costs assigned to counter behaviour. The constructs of the coping appraisal help the individual evaluate one's ability to avoid addiction. Accordingly, addiction may arise from incorrect beliefs about the dangers associated with addictive behaviour or from people taking a calculated risk,

underestimating the probability it will happen to them even when they know about the related dangers (Orphanides and Zervos 1995). Figure 11 demonstrates gambling behaviour in terms of the Protection Motivation Theory.
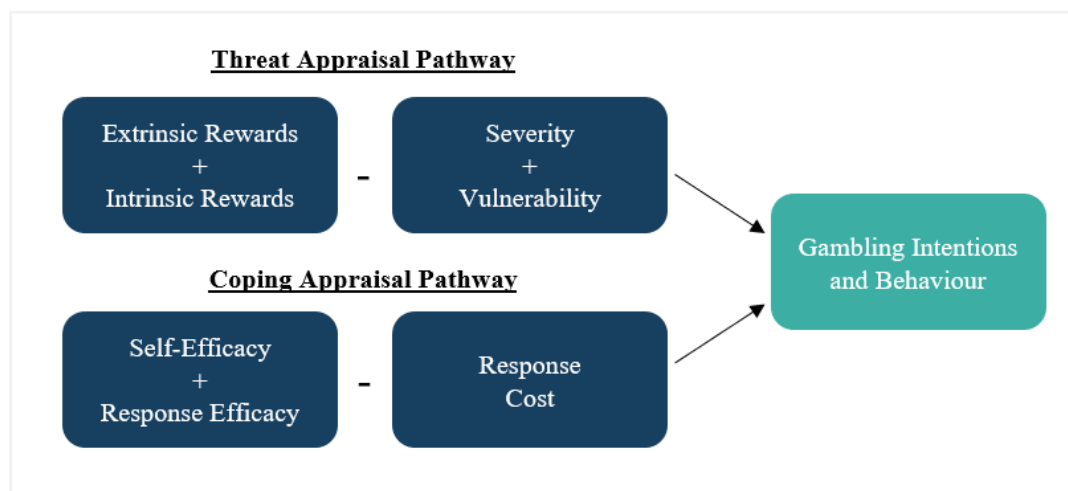
FIGURE 11. PROTECTION MOTIVATION THEORY: GAMBLING BEHAVIOUR

Studies on gambling disorder prevention focus on correcting gamblers' erroneous beliefs (i.e., belief in skill, the illusion of control) as a way to reduce problem gambling behaviour (Floyd et al. 2006; Harris and Griffiths 2017). For example, Munoz et al. (2010) showed that fear appeals in warning labels could encourage responsible gambling as they improve information processing, which has a positive effect on attitude change.

III.   COGNITIVE DISSONANCE

Another way rational decision-making theories can explain addiction is through Cognitive Dissonance Theory. According to the Cognitive Dissonance Theory, when individuals hold contradicting beliefs and actions, they feel psychological stress which in turn motivates them to resolve the conflict. Individuals may try to resolve the conflict by changing their beliefs, actions, or action perception (Festinger 1957). Figure 12 illustrates this process.
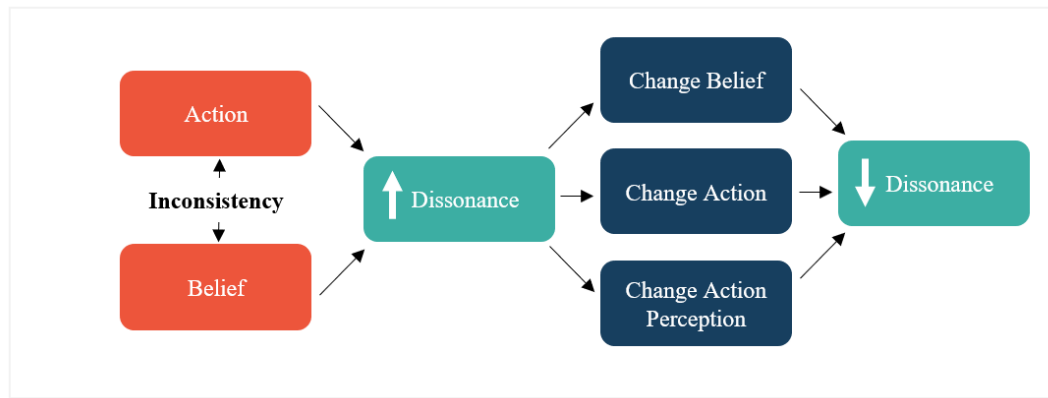
FIGURE 12. COGNITIVE DISSONANCE THEORY

Instead of changing their addictive behaviour, people may choose to justify their erroneous beliefs either by modifying their beliefs or adding extra information to make sense of the situation or overlooking information that conflicts with their current beliefs (Mantler 2013). For example, Fotuhi et al. (2013) showed that smokers who are aware of the negative consequences of smoking but who still continue usage resolved their cognitive dissonance by rationalising their behaviour by functional beliefs (i.e., stating smoking makes them calm or helps them concentrate) or by risk minimising beliefs (i.e., denying the credibility of medical evidence on smoking harms or stating smoking is no more harmful than other risky activities). Such rationalisations may prevent the individual from the responsibility of correcting behaviours and hence contribute to the maintenance of addiction (Blume and Schmaling 1996). Cognitive dissonance may also reinforce addictive behaviour when individuals try to rationalise their decisions based on intuitive judgements (Wason and Evans 1974). Because those with a gambling problem have committed significant amounts of time and money to gamble, they may be more inclined to try to rationalise their gambling despite negative consequences rather than changing their behaviour to address the dissonance (Hahmann and Monson 2021).

5.3.2.5   MOTIVATION THEORIES

Motivation theories state that addiction may arise due to addictive activity serving as a

method to fulfil different motives. Three different motives dominate the literature, addictive activity as a means of achieving pleasure (Everitt and Robbins 2005), as a means of escaping distress (Baker et al. 2004) and as a means of fulfilling diverse needs such as social identity (Walters 1996).

A.   ATTAINING POSITIVE REWARDS

Substance dependence results from the pursuit of reaching a satisfying drug "high" such that addicts might be taking drugs to experience a rapid and intense feeling of pleasure compared to natural rewards (Volkow et al. 2002; Everitt and Robbins 2005).

It has been suggested that people with gambling disorder have a low tolerance for boredom and that they gamble to increase arousal (Blaszczynski et al. 1990; Mercer and Eastwood 2010). According to the Arousal Theory, financial risk and uncertainty associated with gambling make the activity more arousing, and people continue gambling because of this gratifying impact despite losses (Zuckerman 1994; Breen and Zuckerman 1999).

B.   AVOIDING OR ESCAPING DISCOMFORT

Substance dependence results from the pursuit of avoiding or coping with distress and feeling "low". That is, addicts might be abusing drugs as a means of self-medication, consuming drugs to relieve distress or to meet pre-existing psychological needs and achieve a stable internal state (Khantzian 1997). For example, addiction might arise from defective emotion regulation, where the individual relies on drug intake to escape or lessen negative emotions (Cooper et al. 1995). While such a coping mechanism might provide a quick fix, over time, it may increase the strength of addiction as addictive behaviours might amplify the negative emotions that are felt in the first place leading to a vicious cycle (Hirschman 1992). Another example of self-medication could be related to attachment needs. When an individual has an unsuccessful attachment with their primary caregivers, their ability to derive satisfaction from interpersonal

relationships later in life diminishes. As a result, the individual may develop a maladaptive attachment to addictive substances to substitute for what is missing (Flores 2004).

According to studies, those with a gambling disorder have a high incidence of mood disorders, such as anxiety or depression (Blaszczynski and Nower 2002; Lorains et al. 2011). Problem gamblers who show depressive symptoms were reported to prefer gambling games that were repetitive or monotonous in an effort to control their depression (McCormick 1994; Blaszczynski and Nower 2002). The motivation for gambling might shift over time from being mostly reward-based in the beginning to being centred on avoiding negative experiences or relieving anxiety later on (Hodgins et al. 2011; Grant et al. 2016).

C.   FULFILLING HETEROGENEOUS MOTIVES

Substance dependence results from the pursuit of fulfilling social needs, such as fitting in with a social group or constructing a social identity (Walters 1996; Köpetz et al. 2013). For example, Lesieur and Blume (1991) defined a sub-category of gamblers called "action seekers" who bet big for the thrill of excitement and to satisfy their need for social recognition by impressing others. More discussion will be presented on this topic in the psycho-social theories of addiction.

5.3.2.6   SELF-REGULATION THEORIES

Self-regulation theories state that actions are goal-directed and feedback-controlled such that individuals exert self-control to override impulses and manage their behaviours (Carver and Scheier 2001). In this light, it is suggested that addiction arises from a deficiency in self-control where sub-functions of self-control such as goal setting, self-monitoring and action planning are individually or collectively impaired (Webb et al. 2010; De Ridder et al. 2012).

A. GOAL SETTING

Individuals self-regulate towards goals such that once a goal is set, it becomes a reference point for behaviour (Carver and Scheier 2001). It is suggested that one might be less likely to self-regulate against addiction if they hold goals in favour of addiction, for example, for social acceptance, if they hold conflicting goals (e.g., I do not want to be an addict versus I want to enjoy another drink) and favours gratification goals over self-relevant goals (Webb et al. 2010), if they hold inconsistent goals that change priority depending on time and context, or if they have unclear goals to reduce consumption (Alquist and Baumeister 2012). For example, Lister et al. (2016) showed that gamblers who have a greater achievement-oriented gambling goal were more likely to show chasing behaviour (i.e., gambling to make up for a loss) in reaction to either losses or winnings.

B. MONITORING

In regulating behaviour, it is important for the individual to have an adequate understanding of themselves and of the situation they are in, as this helps them see how their behaviour impacts them, their environment and others. Monitoring relates to the individual's awareness of where they stand in relation to their goal, and tracking the discrepancies between the two can motivate the individual towards attaining their goal (Alquist and Baumeister 2012). Accordingly, one might be less likely to self-regulate against addiction if they cannot monitor their progress or if they have low self and situational awareness due to internal distraction (e.g., preoccupation with addiction-related goals and intense emotions) or external distractions (e.g., triggering social settings) (Baumeister and Vonasch 2015). Keeping track of gambling behaviour (i.e., monitoring time and money spent in gambling sessions) is reported to help self-regulation and responsible gambling behaviour (Moore et al. 2012; Byrne and Russell 2020).

C.   ACTION PLANNING

When an individual observes a discrepancy between their goal and actual behaviour, they make specific action plans about how to act to attain their goal. Consequently, addiction may also result from an individual's inability to translate their intentions into action (Gollwitzer 1999). Webb et al. (2009) showed that when adolescent smokers stated implementation intentions (i.e., procedural if-then statements) rather than general goal intention, they were more likely to reduce their smoking. Similarly, Webb et al. (2012) found that forming implementation intentions that centred attention on the probability of winning increased risk awareness during a gambling task.

D.   SELF-EFFICACY

Another important factor in translating intention to action is the concept of self-efficacy. Self-efficacy is the individual's belief that they have the capability to exercise control over their behaviour in performing a task or achieving a goal (Bandura et al. 1999). In explaining addiction, Oei and Baldwin (1994) suggested that drinking refusal self-efficacy, the belief that one is able to resist drinking, is an important predictor of drinking behaviour. According to research, those who engage in more gambling may have a lower degree of gambling refusal self-efficacy (May et al. 2003), and perception of control and self-efficacy was reported to increase following treatment (Ladouceur et al. 2003; McAlaney and McMahon 2007). Also, it was suggested that each relapse would further erode the individual's sense of self-efficacy, which in turn might lead to a rise in addictive behaviour (Zhang et al. 2020).

5.3.2.7   PSYCHO-SOCIAL THEORIES

Psycho-social theories stress the importance of social interactions in the formation of behaviours and attitudes and state that addiction may arise as a result of social connection and influence between people (Kobus 2003).

As humans are social entities with a need for connection, the influence of other people has a significant role in shaping behaviours. That is, people try to behave in line with others and conform to social norms in order to adapt to their environment, secure social gains (e.g., acceptance, respect, popularity), and avoid social losses (e.g., social rejection) (Asch 1956). Two types of social norms can influence behaviour, descriptive norms, the perception of how frequently the behaviour is conducted by others and injunctive norms, the perception of approval or disapproval of the defined behaviour by others (Cialdini and Trost 1998). Descriptive norms are believed to signal the correctness of conducting the behaviour, and social comparison may be a mediating factor in such perception as people base their self-evaluation on comparisons with others (Festinger 1954). Injunctive norms, on the other hand, act as building blocks of social relationships and signal what ought to be done to be a part of the group. In this light, addiction may arise from the perception of a high frequency of addictive activities conducted by others and perceived approval of addictive activities within social settings (Borsari and Carey 2003). In support of the relationship between addiction and descriptive norms, evidence suggests the perception of descriptive drinking norms may facilitate social comparison in which one compares their drinking frequency and quantity with the perceived peer norm, which can, in turn, lead to increased consumption (McAlaney and McMahon 2007; Litt et al. 2012). In support of injunctive norms, studies show that a sense of belonging and acceptance may be a factor in substance usage (Dingle et al. 2015). While descriptive norms and injunctive norms act as indirect forms of influence, there might also be a direct influence in the form of peer pressure which can increase the probability of adopting addictive behaviours (Hoffman et al. 2007; Van Ryzin et al. 2012). In the gambling context, perceptions of gambling prevalence and the approval of significant others were linked to higher gambling

frequency, spending, and adverse outcomes (Larimer and Neighbors 2003).

B. SOCIAL IDENTITY

The concept of identity could be a facilitator of addiction as it assists the initiation, escalation and maintenance and relapse of addictive behaviours (Walters 1996). Individuals with unmet identity needs may try to construct a sense of self by identifying with addictive activities due to their promise of belonging and respect (Walters 1996). For example, addiction may initiate due to the individual establishing a self-construct by identifying with a group of addicts (Newcomb and Bentler 1989). The identity construct is not only related to initiation but also to escalation and maintenance. Increased usage serving to meet identity needs may, in time, facilitate the individual to identify with the addict role. Labelling oneself as a "drinker" may further escalate usage as consumption itself becomes a form of identity (Dingle et al. 2015). Foster et al. (2014) suggested that social identity moderates the relationship between perceived gambling norms and gambling behaviour.

Moreover, the identity construct is also suggested to be related to relapse. According to the Abstinence Violation Effect (AVE) proposed by Curry et al. (1987), individuals who break their commitment to abstain from use may view such behaviour as a manifestation of a weak identity which cannot be tamed and believe that abstaining is inevitable after a slip.

5.3.2.8 CONTEXTUAL FACTORS THEORIES

Theories on contextual factors state that vulnerability to addiction can be amplified by broader social and environmental factors (Smedley and Syme 2001). These factors could be grouped under three categories: micro-system and community factors, media and advertising factors and policy and legislation factors. Each factor's influence on the development of addiction may be direct or indirect and is mainly mediated by the

individual's characteristics (Chaloupka 2003). Moreover, contextual factors may work on their own or reinforce each other. For example, gambling advertisements could reinforce the social norms of gambling.

A. MICRO-SYSTEM AND COMMUNITY

The aforementioned psycho-social processes might be in play in the development or maintenance of addiction when individuals interact with their families, peers and communities. Studies show that addictive behaviours among family members and peers and social norms favouring addictive activities may increase the likelihood of the individual developing an addiction (Sudhinaraset et al. 2016). For example, in terms of communities, it has been shown that the perception of ease of getting alcohol, seeing peers drink and seeing drug-selling activity in the neighbourhood was associated with increased alcohol use (Chung et al. 2014). Studies have identified cultural experience (Dhillon et al. 2011), education level and income level (Wong and So 2003), and family gambling experiences as factors associated with gambling (McComb and Sabiston 2010).

B. MEDIA AND ADVERTISING

Media and marketing activities may reinforce vulnerability to addiction as the addictive activity may be portrayed in a favourable way through advertisements and product placements. This influence may come about in two ways; first, advertisements can further reinforce popular culture norms and second, advertisements can act as cues for addictive activity (Sulkunen 2007; Martin et al. 2013). It is suggested that gambling advertisements foster positive attitudes, normalise gambling behaviour and have an impact on how often people gamble (Parrado-González and León-Jariego 2020).

C. POLICY AND LEGISLATION

The regulation perspective is also an important factor that may be related to addiction. Regulations on accessibility, availability, advertisement and use conditions defined by

public policy may have an influence on substance consumption (West 2001). For example, studies showed that an increase in cigarette taxes and prices reduced youth smoking; that is, lower initiation rates and higher cessation rates were observed (Liang et al. 2003). Similarly, smoke-free policies are suggested to reduce consumption and smoking initiation rates (Voorhees et al. 2011). Chóliz (2016) suggested that there was a noticeable increase in the number of young compulsive gamblers two years after internet gambling became legal in Spain.

5.4 PERSUASIVE DESIGN AND GAMBLING DISORDER

In light of the theories of addiction mentioned in the preceding section, this section reports on the associations between persuasive design techniques and gambling disorder. The persuasive design techniques were analysed for their potential to facilitate gambling disorder, whether directly or indirectly, through addiction literature.

5.4.1 METHOD

A scoping review was conducted to identify persuasive design techniques used in online gambling platforms (See Appendix A). The scoping review was conducted by examining the gambling literature and analysing online gambling platforms. Persuasive design techniques defined in the PSD model (Oinas-Kukkonen 2013) served as the framework for the analysis since the PSD model has been extensively used in persuasive system design (Langrial et al. 2012; Alhammad and Gulliver 2014; Adib and Orji 2021). The analysis was also informed by Cialdini's (2001) work on principles of persuasion and McCormack and Griffiths's (2013) work on structural and situational characteristics of internet gambling. Seven websites from six different operators with the largest market share in the UK online gambling and betting market (Mintel Report 2019) were examined to identify the main persuasive design techniques used in online gambling platforms. Publicly available content located on the website's homepage,

casino page, slot page, roulette page, game information sections and promotion page were analysed. Due to membership restrictions, the gaming interface of just one of the seven online gambling sites was examined. Being a registered client enabled examination of persuasive design techniques utilised in the game interface and deposit page and also helped explore personalisation features (e.g., promotion emails, in-game customised bonus offers). Ultimately, these gambling operators utilise the same provider, Playtech, which is the leading provider of online gaming and sports betting software. Through the scoping review, 19 persuasive design techniques used by online gambling platforms were identified (Table 25).

5.4.2 FINDINGS

The researcher argued for an association between gambling disorder and persuasive design techniques when they found literature to support it. As many aspects of online gambling platforms are comparable to social networking, gaming, and streaming platforms, where deemed appropriate, research on digital addiction was also included in the analysis. The researcher does not claim that the pairing is comprehensive or that the association depicted is confirmatory evidence. The purpose is to shed light on the potential of persuasive design techniques to facilitate problem gambling in certain conditions related to users and their context. In reporting the relationship between persuasive design techniques and gambling disorder, the researcher differentiated between persuasive design techniques that can be seen as triggers for gambling disorder, on the one hand, and persuasive design techniques that can act as facilitators through triggering other behaviours leading to gambling disorder. In addition, the researcher considered both addictive actions (i.e., impulsive and hasty actions) and addictive behaviour (i.e., attitudes and habits). The findings are summarised in Table 25.

TABLE 25. PERSUASIVE DESIGN TECHNIQUES AND GAMBLING DISORDER RELATIONSHIP

BT: Biological Theories. **LT:** Learning Theories. **DMT:** Decision-making Theories. **MT:** Motivation Theories. **SRT:** Self-regulation Theories. **PST:** Psycho-social Theories. **CFT:** Contextual Factor Theories.

PSD Design Principles	Theories of Addiction
Primary Task Support	
Reduction	BT, SRT, LT, DMT
Tunnelling	SRT
Personalisation	SRT
Self-Monitoring	SRT
Rehearsal	SRT
Dialogue Support	
Praise	LT, DMT, MT
Rewards	SRT, LT, DMT
Reminders	SRT, LT
Suggestions	LT, DMT
Liking	DMT
Social Support	
Social Learning	LT
Normative Influences	PST
Social Facilitation	PST
Competition	PST, DMT
Recognition	PST
System Credibility Support	
Authority	PST
Other	
Scarcity	DMT
In-Game Control Elements	DMT
Near Misses	LT, DMT, MT

5.4.2.1   PRIMARY SUPPORT

A.   REDUCTION

A system that reduces the effort that users expend with regard to performing their target behaviour may be more persuasive (Oinas-Kukkonen and Harjumaa 2009).

I.   ONLINE GAMBLING CONTEXT

The reduction technique persuades players to have an uninterrupted interaction with the game by reducing the effort to gamble.

- o **Auto-play feature:** auto-play enables repetitive play by spinning the

reels consecutively and automatically without requiring the player to press any buttons.

- o Linking credit card to online gambling account for easy deposit.

II.   *RELATIONSHIP WITH GAMBLING DISORDER*

BIOLOGICAL THEORIES AND SELF-REGULATION THEORIES: DIMINISHED SELF-CONTROL

One way the reduction technique could directly relate to gambling disorder is through the concept of self-control. Neuroimaging studies showed that addicted individuals had significantly reduced activity in brain regions involved in self-control on tasks that involve response inhibition (Goldstein and Volkow 2002). Similarly, self-regulation theories explain addictive behaviour through one's inability to override impulse (Baumeister and Heatherton 1996). Thus, reducing the steps needed to perform an action may worsen an individual's ability to restrain from performing the action. For example, the ability to link one's credit card to their online gambling account may make money deposits as simple as a single click. Such reduction technique can increase the likelihood of failing to suppress automatic deposit responses and result in continuous gambling and large debts (Hing et al. 2015).

LEARNING THEORIES: STRENGTHENED CUE-OUTCOME ASSOCIATION

Because the reduction technique reduces the steps between the cue and the outcome, the increased proximity between the two can strengthen their association (Molet and Miller 2014). For example, the appearance of a deposit icon at the gambling interface reduces the effort to deposit money into the gambling account. Thus, once a person is triggered by an external or internal cue, the ease in taking action can possibly strengthen the association between depositing money and the perception of winning with the new deposit. This strengthened association, in return, can increase the likelihood of repeating the behaviour. This example is supported by Parke and Griffiths (2007), who suggested

that the reward and speed of reward play a role in forming gambling disorder.

DECISION-MAKING THEORIES: BIASED DECISION-MAKING

Reducing the steps in taking action may speed up the decision-making process. In such cases, individuals may rely on intuitive processing as heuristics allow fast decision-making (Evans 2008). However, intuitive processing may make individuals prone to cognitive biases (Kahneman 2011). In the context of online gambling, biases such as the illusion of control (i.e., thinking one can influence the occurrence of an event) and gambler's fallacy (i.e., thinking one can predict the probability of an event) are found to be related to excessive gambling (Chóliz 2010).

B.   TUNNELLING

A system that breaks down a large task into manageable and achievable discrete steps may be more persuasive (Oinas-Kukkonen and Harjumaa 2009).

I.   ONLINE GAMBLING CONTEXT

Tunnelling is used to attract players to claim in-game rewards with complicated play requirements via a series of step-by-step instructions.

II.   RELATIONSHIP WITH GAMBLING DISORDER

SELF-REGULATION THEORIES: ACTION PLANNING

One way the tunnelling technique could indirectly relate to gambling disorder is through the concept of action planning. It has been suggested that people accomplish tasks more quickly when they have specific implementation plans (Gollwitzer and Bargh 1996; Kokkalis et al. 2012). This might result from the availability of an action plan or the value people place on consistency, adhering to a task after committing to it (Fogg 2003). For example, gambling platforms utilise tunnelling to entice players to claim in-game rewards via a series of step-by-step instructions to make it seem more straightforward. Such use of the tunnelling technique may make it difficult for players

to change their minds. Once players have committed themselves to a process, such as claiming an in-game reward, they may tend to adhere to it even if they change their minds later on.

C. PERSONALISATION

A system that offers personalised content or services has a greater persuasive capability (Oinas-Kukkonen and Harjumaa 2009).

I. ONLINE GAMBLING CONTEXT

Optimising game feeds in online gambling platforms based on player history or interests.

II. RELATIONSHIP WITH GAMBLING DISORDER

SELF-REGULATION THEORIES: DIMINISHED SELF-CONTROL

Personalisation may have an indirect relation to gambling disorder through the concept of self-control. Optimising feeds in online platforms based on individual interests may encourage individuals to continuously scroll through content, and the spontaneous joy experienced while doing so may create a flow experience (Csikszentmihalyi and Csikzentmihaly 1990; Webster et al. 1993). Online gambling platforms can track data such as gambling data (e.g., gambling frequency, money spent, types of games played, browsing history) and personal data (e.g., personality characteristics: sensation seeking, competitiveness) to provide tailoring and personalisation. It was suggested that flow experience is associated with low self-control (Khang et al. 2013); thus, providing personalised content may then arguably tamper an individual's ability to apply self-control, and this can, in turn, have an indirect effect on addictive behaviour.

D. SELF-MONITORING

A system that allows the user to track and evaluate their own performance may be more persuasive (Oinas-Kukkonen and Harjumaa 2009).

The self-monitoring technique persuades players to interact with the game by providing the ability to track and evaluate gambling performance.

- o The majority of gambling interfaces provide information regarding balance, total bet, and winnings.

II.   *RELATIONSHIP WITH GAMBLING DISORDER*

SELF-REGULATION THEORIES: MONITORING

People self-assess their actions and the impact it has on the environment to regulate their behaviour (Carver and Scheier 2001). Monitoring time and money spent in gambling sessions is reported to help self-regulation and hence responsible gambling behaviour (Moore et al. 2012; Byrne and Russell 2020). However, in certain cases where the player focuses on the losses due to internal distraction (e.g., preoccupation with intense emotions) or external distractions (e.g., triggering social settings), self-monitoring can reinforce loss chasing and increasing betting to win back prior losses (Zhang and Clark 2020).

E.   *REHEARSAL*

A system that allows the user to practise a behaviour without having to experience it in a real-world setting may be more persuasive (Oinas-Kukkonen and Harjumaa 2009).

I.   *ONLINE GAMBLING CONTEXT*

The rehearsal technique persuades players to interact with games by providing the ability to gamble without having to experience it in a real-world setting.

- o Gambling operators utilise the rehearsal technique in the form of demo games (i.e., gambling with dummy money or free spins).

SELF-REGULATION THEORIES: SELF-EFFICACY

An indirect link between the rehearsal technique and problem gambling might exist through the mediating effect of self-efficacy. A meta-analysis in the domain of nursing education showed that participation in simulation increases confidence and self-efficacy regarding the task and better equips individuals to succeed in real-world settings (Franklin and Lee 2014). Gambling operators utilise the rehearsal technique in the form of demo games to entice players by demonstrating game mechanics without the risk of losing money. Providing a rehearsal option with demo games within gambling platforms may, in certain cases, increase perceived self-efficacy regarding gambling and create a sense of control over gambling outcomes (Griffiths and Barnes 2008). Moreover, when the demo pay-out rates are inflated, demo games can produce positive expectancies about gambling outcomes in a real-world setting and increase the likelihood of risk-taking behaviour with real money (McCormack and Griffiths 2013).

5.4.2.2   DIALOGUE SUPPORT

A.   PRAISE

By offering praise, a system can make users more open to persuasion (Oinas-Kukkonen and Harjumaa 2009).

I.   ONLINE GAMBLING CONTEXT

The praise technique persuades players to interact with games by expressing approval or admiration via words, images, symbols, and sounds.

II.   RELATIONSHIP WITH GAMBLING DISORDER

LEARNING THEORIES: REINFORCEMENT

The praise technique, which can be in the form of words, images, symbols, or sounds,

may act as a positive reinforcement as it acknowledges the progress that has been made (Gable et al. 2009). While one cannot argue the use of praise will directly lead to gambling disorder, images, sounds and music used in online gambling platforms, such as encouraging statements, cheers, and claps, may contribute to the perception of a fun activity in which winning is more frequent and create positive feelings about gambling (Parke and Griffiths 2007).

DECISION-MAKING THEORIES: BIASED DECISION-MAKING

Due to intuitive biases that are controlled by emotions (Stanovich 2011), images, sound and music used in online gambling platforms to praise the player may distort player judgement, especially when losses are masked as wins through positive symbols and sounds.

MOTIVATION THEORIES: FULFILLING A HETEROGENOUS NEED

Praise may indirectly have a negative effect on individuals who perform an addictive behaviour to promote their self-esteem (Mei et al. 2016). For example, Sioni et al. (2017) suggested that internet gaming disorder may result from the association the player makes between their self-worth and their avatar's achievements. In the context of online gambling, having the opportunity to promote self-esteem through praises may also act as self-medication and prompt further gambling.

B.   IN-GAME REWARDS

Systems that reward target behaviours may have great persuasive powers (Oinas-Kukkonen and Harjumaa 2009).

I.   ONLINE GAMBLING CONTEXT

The reward technique persuades players to gamble by giving something in return when the players perform a target behaviour set by the gambling website.

- o   Cash/bonus reward
- o   Free spin reward

     o Chance to be in random draws

  II.   *RELATIONSHIP WITH GAMBLING DISORDER*

LEARNING THEORIES: CUE TO ACT AND REINFORCEMENT

The learned associations between signals and behaviour may lead to habit formation such that signals trigger automatic responses without the awareness of the individual (Limayem et al. 2007). According to Fogg (2009), one of the three important ingredients to initiate behaviour is the *trigger*. In the context of online gambling, in-game rewards may act as unconscious triggers that cue gambling activity.

DECISION-MAKING THEORIES: COST-BENEFIT ANALYSIS.

According to rational decision-making theories, individuals apply cost-benefit analysis and select behaviours that are aligned with their self-interest (Becker and Murphy 1988). While conducting such analysis, it is believed that individuals engage in temporal discounting in which they assign greater value to events that are closer in time and assign a lower value to future events. While such a tendency is generally not seen as irrational and problematic, problems may arise when the discounting curves get steeper, which is typical in addiction (Ainslie and Monterosso 2003). Thus, the presence and the appeal of in-game rewards in online gambling platforms may contribute to individuals assigning greater value to experiences they have in the present without focusing much on the negative effects in the long run, e.g., financial loss. Moreover, in-game rewards have the potential to distort a player's cost-benefit analysis of claiming rewards when they are advertised with the words "free" or "bonus". This is because such framing may reduce the perceived cost of play requirements and increase the perceived benefit of receiving rewards (Hing et al. 2019).

SELF-REGULATION THEORIES: DIMINISHED SELF-CONTROL

People might be less likely to self-regulate against addiction if they face internal

distractions (e.g., preoccupation with addiction-related goals and intense emotions) or external distractions (e.g., triggering social settings) (Baumeister and Vonasch 2015). In the context of online gambling, in-game rewards, which may be in the form of cash bonuses or free spins, can operate as external distractions and divert the player's attention away from their responsible gambling goals (Hing et al. 2014a).

C.   REMINDERS

If a system reminds users of their target behaviour, the users will be more likely to achieve their goals (Oinas-Kukkonen and Harjumaa 2009).

I.   ONLINE GAMBLING CONTEXT

The reminder technique persuades players to interact with the gambling website by reminding them about gambling.

- o Reminders could be in the form of advertising emails or in-game reminders displayed within the gambling interface to notify players about new games, promotions, and jackpots.

II.   RELATIONSHIP WITH GAMBLING DISORDER

LEARNING THEORIES: CUE TO ACT AND REINFORCEMENT

Similar to in-game rewards, reminders may act as triggers that cue an action (Osatuyi and Turel 2018). It was reported that gambling advertisements might trigger gambling urges in problem gamblers, raise their already high gambling involvement, and make it more difficult for them to comply with their choice to abstain from gambling (Binde 2009).

SELF-REGULATION THEORIES: DIMINISHED SELF-CONTROL

Reminders may have an indirect relation to gambling disorder through the concept of preoccupation. Visual and/or audio alerts may act as external triggers and disrupt individuals from their primary goals, making it difficult for them to disengage from

digital platforms (Du et al. 2019). Notifications may cause preoccupation with addiction-related goals and diminish self-control (Baumeister and Vonasch 2015). Preoccupation is one of the main symptoms of behavioural addiction (Alavi et al. 2012).

D.   SUGGESTION

Systems offering fitting suggestions will have greater persuasive power (Oinas-Kukkonen and Harjumaa 2009).

I.   ONLINE GAMBLING CONTEXT

The suggestion technique is used to suggest games to players according to their playing history or through gaming tips to "help" players perform better.

II.   RELATIONSHIP WITH GAMBLING DISORDER

LEARNING THEORIES: CUES FOR ACT AND REINFORCEMENT

The suggestion technique may have an indirect relation to gambling disorder by acting as cues for action similar to reminders. Consequently, algorithmic suggestions optimized by data characterising individual interest may promote prolonged activity where success in previous suggestions reinforces further user engagement (Gomez-Uribe and Hunt 2015). Moreover, in addition to the content, the timing and framing are significantly important for the success of suggestions and can be highly optimised through the power of usage data and AI (Siles et al. 2019).

DECISION-MAKING THEORIES: BIASED DECISION-MAKING

AI explanations provided with system suggestions for the purpose of transparency may also indirectly relate to gambling disorder. Presenting personalised explanations or explanations that use social proof for content suggestions may trigger biases that favour addictive behaviour. For example, explanations expressing why a certain game is suggested (e.g., because a majority of players played it) may activate bandwagon bias (Navazio 1977) which is a mental shortcut for acting in compliance with others, and this

can imply the correctness of prolonged engagement.

E. LIKING

A system that is visually attractive to its users is likely to be more persuasive (Oinas-Kukkonen and Harjumaa 2009).

I. ONLINE GAMBLING CONTEXT

The liking technique is utilised in online gambling platforms by employing attractive features (i.e., the use of colours, graphics, music, lights, and noise) that immerse players in the game.

II. RELATIONSHIP WITH GAMBLING DISORDER

DECISION-MAKING THEORIES: BIASED DECISION-MAKING

According to Cialdini (2001), liking is one of the six persuasive principles that can be used to influence and persuade people. One way liking might persuade people is through activating the halo effect bias, which is a mental shortcut for judging a trait, e.g. look and attractiveness, in a good light (Nisbett and Wilson 1977). Similar to the influence of attractive presentation of alcohol through advertisements and product placements (Sulkunen 2007), visually attractive software, e.g., online gambling products, may trigger such bias and motivate engagement (Fogg 2003). Adolescents with gambling disorder were substantially more drawn to the aura of gambling machines than non-problem gamblers (Griffiths 1995). In support of this argument, Vaghefi et al. (2017) stated that system design which is visually attractive is one of the causes explaining prolonged use, which suggests a potential indirect link between liking technique and addictive behaviour.

5.4.2.3 SOCIAL SUPPORT

A. *SOCIAL LEARNING*

A person will be more motivated to perform a target behaviour if they can use a system to observe others performing the same behaviour (Oinas-Kukkonen and Harjumaa 2009).

I. *ONLINE GAMBLING CONTEXT*

Gambling platforms' chat rooms or forums.

II. *RELATIONSHIP WITH GAMBLING DISORDER*

LEARNING THEORIES: SOCIAL LEARNING

The social learning technique may indirectly relate to addictive behaviour as being able to observe the relationship between other people's actions and related consequences may reinforce one to model similar behaviour to acquire similar outcomes (Bandura 1977). Hira and Monson (2000) found a correlation between students' gambling behaviour and that of their parents and closest friends and suggested that gambling behaviour could be a result of modelling others. In the context of online gambling, tips and tricks discussed in gambling platforms' chat rooms or forums might encourage attitudes and behaviours towards a harmful direction and reinforce problem behaviour (Sirola et al. 2021).

B. *NORMATIVE INFLUENCE*

A system can leverage normative influence or peer pressure to increase the likelihood that a person will adopt a target behaviour (Oinas-Kukkonen and Harjumaa 2009).

I. *ONLINE GAMBLING CONTEXT*

The normative influence technique persuades players to interact with the gambling website by showing how the majority acts.

− Game Categories:

- o All-time Favourites / Classics

- o Popular / Most Popular / Top Games

- o Trending Now

- o What's Hot

- o Our Long-Running Hits

II. RELATIONSHIP WITH GAMBLING DISORDER

PSYCHO-SOCIAL THEORIES: NORMATIVE INFLUENCE

The normative influence technique may indirectly relate to addictive behaviour through descriptive norms and injunctive norms as people choose to behave in ways that are common and seen as appropriate (Cialdini and Trost 1998). Online gambling platforms categorise and advertise their games to create normative influence, and such framing may be seen as implying the correctness of the behaviour. For example, "Most Popular Games" or "Trending Now" labels may communicate descriptive norms, indicating a majority of players choose these games. The players may rationalise this information by concluding that certain games must be more fun or have a greater chance of winning, so they may become motivated to engage with these games.

Another way normative influence technique may influence gambling disorder is through injunctive norms, which refer to the perception of approved behaviours by others (Cialdini et al. 1990). Injunctive norms act as building blocks of social relationships (Cialdini and Trost 1998), and because digital platforms enable people to observe and interact with each other, injunctive norms could be easily formed and transferred in this medium. Sirola et al. (2021) suggested that excessive gambling behaviour could be encouraged in online gambling communities or social media via social influence and perceived norms. This may be because not complying with expectations may mean a loss of connection with peers (Wang et al. 2016).

Users may be persuaded by a system if they recognise that others are engaging in the same activity along with them (Oinas-Kukkonen and Harjumaa 2009).

I.   ONLINE GAMBLING CONTEXT

The social facilitation technique persuades players to interact with the gambling website by showing how other players are engaging in the same activity.

- o Progressive jackpots: The jackpot continues to increase until it is won. As more individuals play, the prize increases.

II.   RELATIONSHIP WITH GAMBLING DISORDER

PSYCHO-SOCIAL THEORIES: NORMATIVE INFLUENCE

Social facilitation is defined as "an increase of response merely from the sight or sound of others making the same movements" (Allport 1924, P262). Online gambling platforms use the social facilitation technique in the form of progressive jackpots. When a game with a progressive jackpot is played, and the jackpot is not won, the jackpot continues to increase until it is won. Further, the highest amount is generally not distributed until it reaches a certain threshold (Li et al. 2016). Social facilitation may indirectly relate to addictive behaviour due to its physiological factors. According to Zajonc (1965), the presence of others may induce physiological arousal, which in turn increases the occurrence of behaviours with the strongest habit strength. For example, consumers may buy more than originally intended due to the arousal and intensity felt while in the consumer situation (Gaumer and LaFief 2005). Thus, in the online gambling context, social facilitation can increase arousal and reinforce gambling activity. Similar to the normative influence technique, social facilitation may also indicate descriptive norms suggesting a majority of players are actively playing these games. Moreover, progressive jackpots may create a sense of urgency and reinforce

further betting when the progressive jackpot reaches a certain point by creating a sense that it is "overdue". This impact is connected to the scarcity effect (Mittone and Savadori 2009), which will be described later in this section.

D. COMPETITION

A system can motivate users to adopt a target attitude or behaviour by leveraging human beings' natural drive to compete (Oinas-Kukkonen and Harjumaa 2009).

I. ONLINE GAMBLING CONTEXT

The competition technique persuades players to gamble by stimulating players to compete against themselves or each other.

- o Slot tournaments: the winner is the one who wins the most in a single spin compared to how much they bet.

- o Challenges: missions to be completed to get rewards.

II. RELATIONSHIP WITH GAMBLING DISORDER

DECISION-MAKING THEORIES: BIASED DECISION-MAKING

Research suggests that participating in a competition may induce negative feelings, which might, in turn, impact performance (Kubiak et al. 2019; Kou and Gui 2020). Accordingly, the use of "slot tournaments" within online gambling platforms has the potential to trigger negative emotions such as anger and stress during competition. Such an effect may activate intuitive biases that are controlled by emotions (Stanovich 2011) and make it hard for the players to reflect on their gambling activity.

PSYCHO-SOCIAL THEORIES: NORMATIVE INFLUENCE AND COMPARISON

Competition is based on self-progress in which individuals are driven by a unidirectional upward push to meet target performance or protect one's authority against others (Festinger 1954). Online gambling platforms utilise the competition technique by running "slot tournaments" or by creating "challenges". Using the

competition technique within online gambling platforms may, in certain cases, trigger social comparison and encourage competition as players want to achieve higher positions on leaderboards. Certain personality traits such as extraversion, assertiveness (Fong et al. 2021) and narcissism (Luchner et al. 2011) may make individuals prone to competition and increase their engagement.

E.   RECOGNITION

By offering public recognition for an individual or group, a system can increase the likelihood that a person or group will adopt a target behaviour (Oinas-Kukkonen and Harjumaa 2009).

I.   ONLINE GAMBLING CONTEXT

Gambling platforms use the recognition technique in the form of leaderboards in gambling tournaments.

II.   RELATIONSHIP WITH GAMBLING DISORDER

PSYCHO-SOCIAL THEORIES: IDENTITY

The recognition technique may indirectly relate to addictive behaviour through the sense of identity. Individuals with unfulfilled identity needs may attempt to establish a sense of self via addictive behaviours (Walters 1996). The use of the recognition technique in online gambling platforms may relate to gambling disorder, especially for individuals with low self-esteem. This is because individuals with low self-esteem might become involved in gambling activities to promote and enhance their self-concept (Ho 2017). The respect and reputation that these people receive from online gambling platforms in the form of money and acknowledgement in leaderboards may help individuals to avoid negative feelings and satisfy their quest for self-worth, which in turn can explain their excessive gambling.

5.4.2.4 SYSTEM CREDIBILITY SUPPORT

A. AUTHORITY

A system that leverages roles of authority is more persuasive (Oinas-Kukkonen and Harjumaa 2009).

I. ONLINE GAMBLING CONTEXT

The authority technique persuades players to interact with the gambling website by promoting statements or norms of authority figures.

  o Celebrities could be used for advertisement, or celebrity-themed games could be designed to attract fans and players.

II. RELATIONSHIP WITH GAMBLING DISORDER

PSYCHO-SOCIAL THEORIES: NORMATIVE INFLUENCE

Authority may have an indirect relation to gambling disorder. People have a tendency to comply with authority figures (e.g., politicians and celebrities) as they believe such people have high levels of knowledge and power (Milgram 1963). In the context of online gambling, gambling operators (e.g., the operator's top picks) or celebrities may be positioned as authority figures to increase the popularity of the games. The use of celebrity endorsements in gambling increases the credibility of commercials, message memory, brand identification, and favourable brand attitudes (Monaghan and Blaszczynski 2010). Using the authority technique within online gambling platforms may, in certain cases, contribute to positive attitudes towards gambling and reinforce trying out new gambling activities and games promoted through celebrity endorsement.

5.4.2.5 OTHER

A. SCARCITY

A system that emphasises limitedness or exclusivity may be more persuasive (Cialdini

2001).

I.   ONLINE GAMBLING CONTEXT

Gambling platforms use scarcity to persuade players to interact with the platform by emphasising limitedness or exclusivity or by underlying possible losses of an advantage.

- o   Exclusive games or exclusive offers.
- o   Limited offer, limited time to attend or space to attend the gambling tournaments.

II.   RELATIONSHIP WITH GAMBLING DISORDER

DECISION-MAKING THEORIES: BIASED DECISION-MAKING

Scarcity bias is defined as attributing a greater subjective value to something just because it is rare or limited and leads to hastier decision-making (Mittone and Savadori 2009). According to research, scarcity bias can influence customer impression by increasing the appeal and desire for the scarce product (Lynn 1991; Barton et al. 2022). The use of scarcity technique within online gambling platforms may relate to gambling disorder as it can create a sense of urgency and reinforce gambling, especially when the scarcity is due to high demand from others.

B.   IN-GAME CONTROL ELEMENTS

A system that allows the user to exercise control over tasks may be more persuasive (McCormack and Griffiths 2013).

I.   ONLINE GAMBLING CONTEXT

Online gambling platforms use in-game control elements such as "nudge", "hold", and "gamble" buttons to persuade players to gamble by stimulating their perceived control over betting outcomes (Griffiths 1993).

- o Nudge: allow the player to move one or more of the three reels on their next few spins.

- o Hold: keep winning symbols in place until the next round begins.

- o Gamble: give the opportunity to double the wins; if you win, your profits are doubled; if you lose, your profits are lost.

II.   RELATIONSHIP WITH GAMBLING DISORDER

DECISION-MAKING THEORIES: BIASED DECISION-MAKING

In-game control elements may indirectly relate to gambling disorder as they may create the illusion of control over betting outcomes (Griffiths 1993; McCormack and Griffiths 2013). The illusion of control is defined as the belief that one can control or affect anything, even completely random occurrences (Langer 1975). Griffiths (1993) suggested that the inclusion of in-game control elements stimulates the illusion of control via engagement, the feeling of expertise, and familiarity. Thus, in-game control elements within online gambling platforms may, in certain cases, provide a false impression of control over the result of betting and contribute to the development of erroneous beliefs such as "controlling the game makes me win more." These erroneous beliefs may stimulate further gambling (Ladouceur and Sévigny 2005).

C.   NEAR MISSES

A system that allows users to re-engage in completing a failed task may be more persuasive (Oyama et al. 2018).

I.   ONLINE GAMBLING CONTEXT

Near misses persuade people to gamble by implying that the win is missed marginally by just a symbol and is around the corner.

II.   RELATIONSHIP WITH GAMBLING DISORDER

LEARNING THEORIES: REINFORCEMENT

It has been suggested that at a lower cognitive level, near misses may serve as reinforcements for gambling behaviour since the thrill that comes from a near miss is similar to the excitement that comes from a win (Reid 1986; Griffiths 1990). As a result, players may perceive near misses as positive outcomes, and this may, in turn, reinforce further gambling.

DECISION-MAKING THEORIES: BIASED DECISION-MAKING

In certain cases, some players may perceive a near miss as proof that their ability to influence the outcome of the betting is improving (Reid 1986; Jacobsen et al. 2007). In such cases, the player may begin to anticipate that they will soon win, and this can encourage them to continue gambling (Côté et al. 2003).

MOTIVATION THEORIES: AVOIDING DISCOMFORT

Near misses may indirectly relate to gambling disorder via feelings of frustration. According to the Frustration Theory (Amsel 1958), failure to achieve a goal results in frustration, and this frustration reinforces re-engaging in the behaviour. Moreover, Kahneman and Tversky (1982) suggested that regret related to a loss caused by an action is often more profound than the regret caused by inactivity. Thus, the sensation of "almost winning" may heighten the regret that may be removed by gambling again.

5.5　　DISCUSSION

This chapter presented one of the first attempts to examine the relationship between persuasive design techniques and gambling disorder. It can be hypothesised that certain persuasive design techniques, such as reduction and reward, may have a more direct effect on gambling disorder, and other techniques, such as personalisation and liking, may have a more moderating effect. However, the differentiation made between the direct and moderating effect of persuasive design techniques should be treated as hypotheses that need to be addressed in future research. Overall, the purpose of this

chapter is not to argue causation but rather to open a discussion around the potential effects of persuasive design techniques on gambling disorder in certain contexts and modalities of usage. The chapter does not discuss whether persuasive design techniques trigger, worsen or contribute to gambling disorder. It is also possible that the relationship between persuasive design techniques and gambling disorder might also be explained by additional factors, given that online gambling platforms hold unique characteristics in comparison to addictive substances, e.g., their intelligent, interactive, personalised, and real-time nature. Nevertheless, analysing the potential role of persuasive design in triggering or expediting gambling disorder from the lens of addiction theories is a start to discuss behavioural, cognitive, psycho-social, and other psychological mechanisms that may be involved in the development and maintenance of addictive behaviour in the digital space. Identifying such mechanisms can also facilitate developing frameworks to design for responsible technology through proactive (e.g., psychometric tests) and reactive measures (e.g., self-regulation tools).

The next chapter explores players' awareness of the use of persuasive interfaces in online gambling platforms.

6. CHAPTER 6: USER AWARENESS AND SUSCEPTIBILITY TO PERSUASION IN ONLINE GAMBLING PLATFORMS

6.1 INTRODUCTION

The previous chapter examined the potential impact of persuasive design techniques used in online gambling platforms on gambling disorder. This chapter explores what users know about persuasive design techniques utilised in online gambling platforms. The chapter investigates whether users are aware of the use, persuasive intent and the potential negative impact of the main persuasive design techniques utilised in online gambling platforms and whether demographic and psychometric aspects (i.e., problem gambling severity) contribute to user awareness. This chapter also explores users' perception of susceptibility to persuasive design techniques in themselves and in others in the context of online gambling.

The findings of this study are published in the Journal of Systems and Software (Cemiloglu et al. 2023a) and in the Conference Proceeding of Persuasive Technology 2023 (Cemiloglu et al. 2023b).

6.2 RATIONALE

Persuasive systems are often tailored to the interests of the end user, whether they are designed to encourage the user to achieve a self-defined goal or to increase engagement with systems. However, given that persuasive systems influence users' cognitive or emotional state (Oinas-Kukkonen 2013), ethical concerns may arise (Spahn 2012; Karppinen and Oinas-Kukkonen 2013). This is more likely to be the case when persuasion is not self-directed but designed to influence for the advantage of a third party (Spahn 2012). Due to the rising significance of digital technology and the internet, the global economy has shifted significantly towards the attention economy, in which businesses compete for people's attention to sell goods and services (Goldhaber 1997).

As a result, interactive online platforms have started to employ persuasive interfaces to engage users and increase business profit (Hogan 2001). In this context, ethical concerns need to be addressed. When interacting with persuasive interfaces, users may be unaware either that they are being persuaded (Atkinson 2006; Smids 2012) or may be unaware that interacting with persuasive interfaces may produce unintended consequences (Berdichevsky and Neuenschwander 1999). This can hinder the user's ability to evaluate the persuasion attempt as well as to reflect and direct their behaviour (Timmer et al. 2015). Moreover, persuasive interfaces intended to maximise user engagement may induce or accelerate psychological and cognitive mechanisms related to addictive behaviour (Alrobai et al. 2014; Ali et al. 2015; Kuonanoja and Oinas-Kukkonen 2018). For example, the use of the reduction technique such as autopay within digital platforms may speed up users' decision-making process (Cemiloglu et al. 2021b). In such cases, users may rely on intuitive processing and this may make users prone to cognitive biases (Kahneman 2011). Concerns regarding system persuasion may increase when the persuasion target is an emotionally or cognitively vulnerable group (Davis 2009). As the market for online gambling expands, the gambling platform and gaming interface become crucial structural elements for gambling operators. Numerous online gambling platforms are now equipped with persuasive design techniques to boost player engagement, and these approaches may contribute to the development of gambling disorder. In discussing responsible gambling policy and practises and the responsibility of gambling operators to meet conditions for informed choice, it is important to explore players' awareness of persuasive design techniques and their awareness of the possible negative effects those techniques could have on player behaviour.

Users' perception of susceptibility to persuasive design techniques may also impact how they interact with potentially addictive platforms. Those who engage in addictive

behaviours have the tendency to resort to denial (i.e., being assured that there is no problem to be fixed) (Gorski 2000) or to illusory superiority cognitive bias (i.e., having an inflated sense of their own skills relative to others) to resolve discomfort they experience from having conflicting beliefs and actions (Festinger 1957). In the context of gambling, studies show that erroneous beliefs (i.e., perceived skill, biased recall, superstition, incorrect perceptions of randomness) are a risk factor and may contribute to the increased prevalence of gambling disorder (Jacobsen et al. 2007; MacKay and Hodgins 2012). According to the Protection Motivation Theory (Rogers 1975), an individual's self-protective behaviours in the face of a threat are shaped by their threat appraisal (i.e., the perceived severity of the threat, the perceived probability of the threat harming the individual, the perceived reward linked to threat) and their coping appraisal (i.e., response efficacy, self-efficacy and the response costs). Accordingly, the development and maintenance of addiction or addiction-type behaviour for the user may relate to incorrect beliefs about the dangers associated with the behaviour or underestimating the probability of dangers happening to them even when they know about are aware of the related risks (Orphanides and Zervos 1995). It is argued that those who attempt to quit an undesired behaviour strive to mentally separate themselves from that behaviour's stereotypical characterisation (Gibbons and Gerrard 1995). However, when individuals engage in downward social comparison to defend their self-esteem and mood (i.e., comparing themselves to others who they perceive are doing worse than them) (Wills 1981), such distancing may be hindered, and this can further reinforce the undesired behaviour (Gerrard et al. 2005).

To this end, this chapter explores whether users are aware of the use, persuasive intent and the potential negative impact of the main persuasive design techniques utilised in online gambling platforms. It also explores users' perception of susceptibility to persuasive design techniques in themselves and in others. Accordingly, an online survey

has been conducted with a sample of 250 participants. While the online survey was extensive and included additional questions, this chapter concentrates on the following research questions within the context of online gambling platforms and their players.

RQ1: Are users aware of the use, intent and impact of persuasive design techniques used in online gambling platforms?

RQ2: Do users believe that persuasive design techniques can trigger addictive usage?

RQ3: How susceptible do users believe they are to persuasive design techniques?

RQ4: Is there a difference between how susceptible people think they are to persuasive design techniques and how susceptible they think others are?

6.3   METHOD

The online survey results are reported in Chapters 6, 7 and 8. This section describes how the online survey was conducted. When reading Chapters 7 and 8, please refer to this section for information on the methodology.

6.3.1   PARTICIPANTS

In total, 250 participants (age range 18 – 75, 123 male and 125 female) were recruited through Prolific[TM] (www.prolific.co), an established platform for online recruitment for research studies. Gender was considered a significant factor as previous studies reported gender differences with respect to gambling duration, gambling motive (McCormack et al. 2014) and attitudes towards responsible gambling measures (Gainsbury et al. 2013; Engebø et al. 2019). The distribution and recruiting of male and female participants in the present study occurred by chance. This might be owing to the fact that the distribution prevalence of female and male gamblers is similar in online gambling as opposed to land-based gambling, where male gamblers are more prevalent. Statista (2022) reported that in 2021 approximately 27.7% of male respondents and 23.1% of

female respondents engaged in at least one kind of online gambling during the previous four weeks. Participants who regularly bet online on slot or roulette games in the past 12 months were considered. The researcher wanted to limit the study to persuasive design techniques used in pure chance games and eliminate games where players can use some analysis, e.g., poker and horse racing. Moreover, games with a small time lag between betting and the outcome and which provide frequent betting, such as slot machines and roulette, were suggested to be played with less self-awareness and by problem gamblers (Monaghan 2009). Additional inclusion criteria included being 18 years or older, fluent English speakers and UK-based. The screening ensured that participants were familiar with the persuasive design techniques presented in the study and minimised the confounding effect of skill and experience in player engagement, which can be observed in online poker and sports betting (Bjerg 2010).

6.3.2   QUESTIONNAIRE DESIGN

The questionnaire was designed on Qualtrics^{TM} (https://www.qualtrics.com), a web-based survey platform, and consisted of closed-ended and open-ended questions (See Appendix B). There were three main parts to the questionnaire:

First, participants were asked about their gambling experience (e.g., number of online gambling accounts, time spent gambling per week). The 9-item PGSI was used to assess problem gambling severity (Ferris and Wynne 2001a, 2001b). The scale includes items related to gambling behaviour (e.g., How often have you bet more than you could really afford to lose?) and adverse consequences experienced due to gambling (e.g., How often has your gambling caused any financial problems for you or your household?). Each item is rated on a 4-point scale: 0 never; 1 = sometimes; 2 = most of the time; 3 = almost always. The standard cut-points are 0 = non-problem gambler; 1-2 = low-risk gambler; 3-7 = moderate-risk gambler; and 8 and more = problem gambler. The PGSI

has been shown to have a high rate of internal consistency and test reliability and is commonly used in gambling research (Holtgraves 2009; Currie et al. 2013; Calado and Griffiths 2016). For the sample, Cronbach's Alpha was 0.93, indicating acceptable internal consistency.

The first part of the questionnaire defined persuasive design techniques in the context of online gambling and informed participants that online gambling platforms use persuasive design techniques to increase player engagement. Participants were asked about their awareness of the use of persuasive design techniques in online gambling platforms (Yes/No response). Participants were also asked to list any persuasive design techniques they knew about in a free recall setting. Participants indicated whether they agreed with the claim that persuasive design techniques could contribute to problem gambling using a 5-point scale (1 = strongly disagree, and 5 = strongly agree). This question was repeated after Part 2.

The second part introduced participants to 13 persuasive design techniques used in online gambling platforms, using explanation cards. The findings of the scoping review described in Chapter 5 were used to design the content of the explanation cards. Initially, 19 persuasive design techniques were identified from the scoping review. Of these, 13 techniques were selected for the questionnaire. Persuasive design techniques that could be experienced differently according to individual factors were excluded. For example, the personalisation experience (i.e., providing content adapted to user characteristics or online behaviour) would differ from one person to another; hence exemplifying such a technique in the explanation card would not be possible. Other excluded persuasive design techniques comparable to personalisation were liking, suggestion, and social learning. The recognition technique and competition technique were considered together. Persuasive design techniques that were rarely used were also

excluded from the final list of explanation cards. For example, only one gambling website used the tunnelling technique (i.e., leading the user through a predetermined sequence of steps one by one). The final list of the 13 persuasive design techniques included in the study is organised according to the PSD model. See Table 26.

TABLE 26. PERSUASIVE DESIGN TECHNIQUES PRESENTED IN THE STUDY

Persuasive Design Technique	Definition in The Context of Online Gambling
Primary Task Support	
Reduction	Persuades players to have continuous/uninterrupted interaction with the game by reducing the effort to gamble.
Self-Monitoring	Persuades players to interact with the game by providing the ability to track and evaluate gambling performance.
Rehearsal	Persuades players to interact with games by providing the ability to gamble without having to experience it in a real-world setting (i.e., without betting real money).
Dialogue Support	
Praise	Persuades players to interact with games by expressing approval or admiration via words, images, symbols, and sounds.
In-Game Rewards	Persuades players to gamble by giving something in return when the players perform a target behaviour set by the gambling platform.
Reminders	Persuades players to interact with the gambling platform by reminding them about gambling.
Social Support	
Social Norms	Persuades players to interact with the gambling platform by showing how the majority acts.
Social Facilitation	Persuades players to interact with the gambling platform by showing how other players are engaging in the same activity simultaneously.
Competition	Persuades players to gamble by stimulating players to compete against themselves or each other.
System Credibility Support	
Authority	Persuades players to interact with the gambling platform by promoting statements or norms of authority figures.
Other	
Scarcity	Persuades players to interact with the gambling platform by emphasising rarity and exclusivity or by underlining possible losses of missing such an advantage.
In-Game Control Elements	Persuade players to gamble by stimulating their perceived control over betting outcomes.
Near Misses	Persuade people to gamble by implying that the win is missed marginally by just a symbol and is around the corner.

Following this, explanation cards were designed for each of the 13 persuasive design techniques (See Appendix B). The Persuasion Knowledge Model (PKM) (Friestad and Wright 1994) was the main reference model to determine the content of the explanation cards. As the study focused on persuasion awareness, only information relating to the
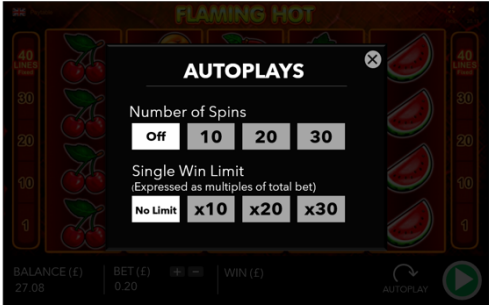
persuasion agent (i.e., about intention, tactic and psychological mediators underlying it) was provided in the explanation cards. The cards also provided information on the risks of interacting with the persuasive design technique, which was adopted from the Informed Consent Theory (Faden and Beauchamp 1986). The information on how the persuasive design technique could facilitate problem gambling was based on the findings of previous research (Cemiloglu et al. 2021b). The completeness, validity, and clarity of the explanation cards were evaluated by two responsible gambling officials, four academics, and one ex-problem gambler. One example of a persuasive design technique explanation card is shown in Figure 13.

FIGURE 13. EXAMPLE PERSUASIVE DESIGN TECHNIQUE EXPLANATION CARD

Participants were instructed to read each explanation card carefully and answer questions for each technique. With Yes/No questions, participants were asked whether they had seen examples of each technique in their gambling experience, whether they

knew about the persuasive intent of each technique, and whether they knew that each technique could potentially trigger addictive usage. On a 5-point Likert scale (1 = extremely unlikely, and 5 = extremely likely), participants were asked how much they believed they would be influenced by the persuasive technique and how much they believed others would be influenced by the same persuasive technique. Participants also indicated whether they agreed with how each technique impacts addictive usage using a 5-point Likert scale (1 = strongly disagree, and 5 = strongly agree). In the context of online gambling, addictive usage was defined as problem gambling, characterised as an excessive amount of time and money spent on gambling which can cause severe distress and harm to one's life (Neal et al. 2005).

The third part of the questionnaire examined participants' attitudes towards receiving *explainable persuasion* within online gambling platforms. Participants were asked whether they agreed with the claim that *explainable persuasion* can help players stay more in control of their gambling using a 5-point scale (1 = strongly disagree, and 5 = strongly agree). With an open-ended question, participants were required to justify their answers. Using the PKM (Friestad and Wright 1994) and the Informed Consent Theory (Faden and Beauchamp 1986) as reference models, participants were also asked to state what information they required when receiving *explainable persuasion*. Moreover, participants were asked how their attitude would change toward gambling operators that provide *explainable persuasion* in their platforms using a 5-point scale (1 = become more negative, and 5 = become more positive).

The questionnaire concluded with demographic information about gender, age, education level, employment status and country of origin.

6.3.3 PILOT TEST

A pilot test was conducted before actual data collection, which was active for two

weeks. 12 participants completed the pilot survey. Following the pilot test, several changes were made to improve the questionnaire. A scenario-based question was eliminated from the questionnaire as it was found redundant by the participants. To reduce the impact of fatigue and habituation (Porter et al. 2004b), the sequence in which the 13 persuasive design technique explanation cards were presented was randomised. One dummy graphic resembling those used in online gambling platforms was re-designed to have a more realistic look, and the content of one of the explanation cards was re-phrased to be more comprehensible.

6.3.4   PROCEDURE

Bournemouth University Research Ethics Committee approved the ethics (ID: 35847). Data collection took place in the first two weeks of December 2021. Participants were recruited through Prolific[TM] (www.prolific.co). Participants were invited to participate in an online survey that explored the impact of persuasive design techniques used in online gambling platforms on player engagement. Individuals who met the inclusion criteria were given the link to the anonymous questionnaire. Before starting the questionnaire, the participants were asked to read the participant information sheet and consent to participate. Participants were informed that they were free to stop at any time. Participants took a mean of 30.4 minutes (SD = 14.8) to complete the questionnaire. There were three attention checks within the questionnaire. The survey included seven open-ended questions, and all participants were required to write a minimum of 100 characters. Eligible participants received £5 for their participation.

6.3.5   DATA ANALYSIS

The study included both continuous and ordinal data, which was analysed using SPSS version 28. Non-parametric tests were used as the data was not normally distributed (See Appendix B). A chi-squared test was used to analyse group differences. Mann-

Whitney's U and Wilcoxon signed-rank tests were used on ordinal data to analyse group differences. Spearman correlation was used to analyse the association between continuous and ordinal variables, and the Mantel-Haenszel test of trend to analyse the association between ordinal variables (Sheskin 2003). Data from the open-ended questions was analysed using thematic analysis (Braun and Clarke 2006). (See Appendix B). The coding was verified by another member of the research team.

6.4   RESULTS

6.4.1   PARTICIPANT DEMOGRAPHICS

In total, 250 participants completed the online survey. Four participants reported that they work or have worked in the gambling industry. Table 27 summarises demographics.

TABLE 27. PARTICIPANT DEMOGRAPHICS

N	250
Age: M(SD)	36 (10.4)
Age: Range	18 – 75
Gender: Males (%)	123 (49.2)
Females (%)	125 (50)
Gambling Activity Days Per Week: M(SD)	2.8 (1.9)
Number of Online Gambling Accounts (%)	
1 account	9.6
2 accounts	23.6
3 accounts	23.2
4 accounts	7.2
5 accounts	5.6
6 or more accounts	30.8
Problem Gambling Severity Index (%)	
Non-problem gambler	17.6
Low-risk gambler	25.6
Moderate-risk gambler	29.2
Problem gambler	27.6
Education (%)	
Compulsory school education completed	14.8
Vocational training	6.0
College	23.6
University degree	40.4
Postgraduate qualification (e.g., MSc, PhD)	15.2
Employment (%)	
Full-time employment	62.4
Part-time employment	14.4

Self-employed	6.0
Unemployed	2.8
On sick leave	1.6
Student	5.6
Retired	0.4
Homemaker	6.0
Other	0.8

6.4.2 RQ1: ARE USERS AWARE OF THE USE, INTENT AND IMPACT OF PERSUASIVE DESIGN TECHNIQUES USED IN ONLINE GAMBLING PLATFORMS?

In the first phase of the questionnaire, participants were informed about the use of persuasive design techniques in online gambling platforms and asked whether they were aware of the utilisation of such techniques with a Yes/No response. The majority of participants (88.4%) stated that they were aware that online gambling platforms use persuasive design techniques. There was no significant difference in awareness based on gender ($p = 0.08$) and PGSI groups ($p = 0.18$). In a free recall setting, participants were also asked to list persuasive design techniques they were familiar with. As shown in Table 28, in-game rewards (74.4%) was the most recalled persuasive design technique, followed by game mechanics (12%) and personalisation (11.6%). Of all the participants, 2.4% reported other persuasive design techniques such as "the lack of time trackers, clocks", "the ability to bet with sums as low as 1p", and "the launch of new games". In total, 6.8% of the participants stated that they did not know any examples of persuasive design techniques that are used in online gambling platforms.

"I was not aware of the use of persuasive techniques by online gambling websites. Although I do receive free spin offers in my inbox very regularly, but I have always considered this as the websites gesture of goodwill rather than any persuasive technique to lure me in." [Moderate-problem gambler, Male, 41]

A chi-square test was conducted to determine whether an equal number of participants from each of the PGSI groups recalled persuasive design techniques. The chi-square test

indicated that the proportion of participants in each PGSI group that recalled persuasive design techniques was statistically significantly different, $\chi2(3) = 17.1$, $p < 0.001$, with the non-problem gambler group having the lowest frequency and moderate-risk gamblers group having the highest frequency of participants. The chi-square for gender showed that the proportion of participants who recalled persuasive design techniques was not significantly different between males and females, $\chi2(1) = 3.4$, $p < 0.06$.

TABLE 28. FREE RECALL OF PERSUASIVE DESIGN TECHNIQUES USED IN ONLINE GAMBLING PLATFORMS BY GENDER AND PROBLEM GAMBLING SEVERITY GROUPS (%)

	Overall (%)	PGSI (%)				Gender (%)	
		Non-problem gambler	Low-risk gambler	Moderate-risk gambler	Problem gambler	Female	Male
In-game rewards	74.4	12	19.6	22	20.8	35.2	38.4
Game mechanics	12	2	3.6	4.4	2	6	5.6
Personalisation	11.6	1.2	2.8	3.6	4	4.8	6.8
Scarcity (i.e., exclusivity and temporality)	10.4	2.4	1.2	4	2.8	4.4	6
Aesthetics	8.8	2.4	1.6	2.4	2.4	3.2	5.2
Reminders	8.4	0.4	3.2	2	2.8	4.4	4
Loyalty schemes	6.8	2	2.8	0.4	1.6	2	4.8
Self-monitoring	4.8	0	1.6	1.6	1.6	2	2.8
Advertising	4.8	0.4	1.2	1.6	1.6	0.8	3.6
Simulation	2.8	0.8	0	1.2	0.8	1.6	1.2
Competition	2.8	0	0.8	0.8	1.2	1.2	1.6
Social Learning	2.4	0.4	0.4	1.2	0.4	1.2	1.2
Near Miss	2	0.4	0.4	0.8	0.4	1.2	0.8
Social facilitation (i.e., progressive jackpots)	1.6	0.8	0	0	0.8	0	1.6
Authority	1.6	0	0	0.4	1.2	0.4	1.2
Suggestion	1.2	0	0.8	0	0.4	0.4	0.8
Normative influence (i.e., refer to a friend)	1.2	0.4	0.4	0.4	0	0.8	0.4
Chat room	1.2	0	0.8	0	0.4	1.2	0
Other	2.4	0.8	0.8	0.4	0.4	1.2	1.2
Not familiar with any	6.8	2	2.4	1.2	1.2	4.8	2

The second phase of the questionnaire introduced participants to 13 persuasive design techniques used in online gambling platforms. For each technique, participants were asked whether they had seen examples, realised the persuasive intent, and knew that it

might trigger addictive usage with a Yes/No response. Each technique's reported awareness of use, awareness of intent and potential harm were taken as a total and treated as three continuous variables ranging from 0 to 13. Participants reported having seen an average of 10.7 (SD = 1.8) of the thirteen persuasive design techniques in their gambling experience (range six to thirteen). Participants were aware of the persuasive intent of an average of 8.4 (SD = 3.1) persuasive design techniques and were aware of the potential harm of an average of 8.1 (SD = 3.2) persuasive design techniques. Awareness of persuasive intent and potential harm for the persuasive design techniques ranged from zero to thirteen. While two participants (0.8%) were not aware of the persuasive intent of any of the persuasive design techniques, 20 participants (8%) were aware of the persuasive intent of all the techniques. Similarly, while four participants (1.6%) were not aware of the potential harm of any of the presented persuasive design techniques, 25 (10%) were aware of the potential harm of all the persuasive design techniques. No significant difference was observed in awareness of use, persuasive intent and potential harm of persuasive design techniques based on gender (p = 0.31, p = 0.65, p = 0.97, respectively) and PGSI groups (p = 0.39, p = 0.89, p = 0.98, respectively).

A Spearman's rank-order correlation analysis revealed a significant positive correlation between awareness of the use of persuasive design techniques presented in the study and the number of gambling accounts, $r_s(248)$ = 0.3, $p < 0.05$, and gambling activity per week $r_s(248)$ = 0.3, $p < 0.05$. Participants who had more gambling accounts and more gambling activity per week were more likely to also be participants who were aware of the use of persuasive design techniques presented in the study and vice-versa. There was also a significant positive correlation between weekly gambling activity and awareness of persuasive intent of persuasive design techniques presented in the study, $r_s(248)$ = 0.1, $p < 0.05$, and awareness of potential harm of persuasive design techniques

presented in the study, $r_s(248) = 0.1$, $p < 0.05$. Participants who gambled more per week were more likely to also be participants who were aware of the persuasive intent and potential harm of persuasive design techniques presented in the study and vice-versa. The correlation matrix for the study variables is shown in Appendix B.

As shown in Table 29, out of the 13 persuasive design techniques presented in the study, participants were mainly aware of the use of in-game rewards (98.8%), reminders (96.4%) and praise (92.4%). In contrast, authority (58.8%), near misses (64.8%) and competition (69.6%) were known by the lowest percentage of participants. Participants mainly reported being aware of the persuasive intent of in-game rewards (96.4%), reminders (90.4%) and social facilitation (72.8%). However, far fewer participants were aware of the persuasive intent of self-monitoring (26.8%), social norms (53.2%) and rehearsal (53.6%). Lastly, participants mainly reported being aware of the potential harm of in-game rewards (92%), reminders (86.8%) and social facilitation (70%). However, fewer participants were aware of the potential harm of self-monitoring (28.8%), social norms (48.8%) and authority (49.6%).

TABLE 29. AWARENESS OF USE, INTENT AND POTENTIAL HARM OF EACH PERSUASIVE DESIGN TECHNIQUE PRESENTED IN THE STUDY (%)

	Awareness of Use	Awareness of Persuasive Intent	Awareness of Potential Harm
Reduction	86	62	64
Self-Monitoring	84.8	26.8	28.8
Rehearsal	80	53.6	51.2
Praise	**92.4**	62.4	58.0
In-game Rewards	**98.8**	**96.4**	**92**
Reminders	**96.4**	**90.4**	**86.8**
Social Norms	88.8	53.2	48.8
Social Facilitation	86.8	**72.8**	**70**
Competition	69.6	68.4	67.6
Authority	58.8	57.6	49.6
Scarcity	83.2	68.4	68.4
In-game Control Elements	81.6	64.4	66
Near Misses	64.8	70	68
Average (%)	82.4	65.1	63

6.4.3 RQ2: DO USERS AGREE THAT PERSUASIVE DESIGN TECHNIQUES CAN TRIGGER ADDICTIVE USAGE?

In the context of online gambling, addictive usage was defined as problem gambling. Participants were asked whether they agreed with the claim that persuasive design techniques may contribute to problem gambling before and after viewing persuasive design technique explanation cards. Participants indicated their attitudes towards the claim (from 1 = strongly disagree, to 5 = strongly agree) before and after viewing the explanation cards. As shown in Figure 14, 91.6% of the participants agreed or strongly agreed that persuasive design techniques may contribute to problem gambling before viewing the explanation cards. There was no significant difference in agreement scores based on gender ($p = 0.42$) and PGSI groups ($p = 0.55$). Figure 15 shows participants' attitudes towards the claim after viewing explanation cards.

FIGURE 14. TIME 1: AGREEMENT THAT PERSUASIVE DESIGN TECHNIQUES CONTRIBUTE TO PROBLEM GAMBLING (%)
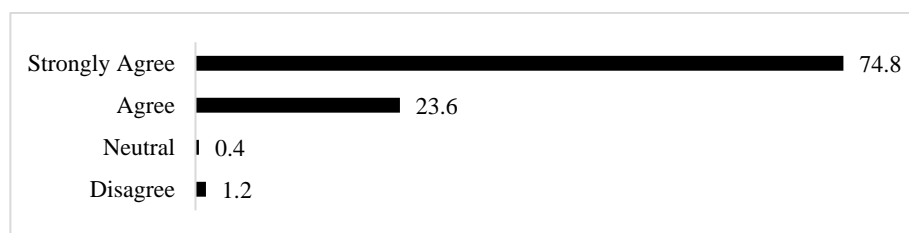
FIGURE 15. PHASE 2: AGREEMENT THAT PERSUASIVE DESIGN TECHNIQUES CONTRIBUTE TO PROBLEM GAMBLING (%)

A Wilcoxon signed-rank test was conducted to determine whether viewing persuasive design technique explanation cards had an impact on user attitudes towards the claim that persuasive design techniques may contribute to problem gambling. There was a statistically significant difference in agreement scores (5), z = -8.0, $p < 0.001$. Viewing

explanation cards elicited an increase in 93 participants' agreement scores, whereas six participants' agreement scores decreased after viewing explanation cards. A total of 151 participants did not change their agreement scores. When asked to explain their scores for time two, participants who agreed or strongly agreed that persuasive design techniques can contribute to problem gambling also stated that persuasive design techniques can <u>trigger excitement</u>, <u>create false hope</u> that a big win is near and <u>impair decision-making and self-control</u>. The six participants who gave lower scores at time two stated that they <u>did not find most of the shown persuasive design techniques persuasive</u> and that <u>only a small number of vulnerable individuals</u> may be persuaded by them. Moreover, they mentioned that persuasive design techniques <u>present customer value</u> by offering the opportunity to earn money or to play new games, and everyone should be responsible for how to play and how much to gamble. As shown in Table 30, the largest proportion of participants whose agreement scores decreased were females and non-problem gamblers. After viewing explanation cards, problem gamblers were the only PGSI group to exhibit no negative change in agreement scores, and this group had the highest number of participants with a positive change.

TABLE 30. CHANGE IN AGREEMENT SCORES BY GENDER AND PROBLEM GAMBLING SEVERITY GROUPS

Agreement with Claim	N	Mean Ranks	Sum of Ranks	Z	Asymp. Sig. (2-tailed)
All Participants (n = 250)					
Negative Ranks	6[a]	58.7	352	-8.0	<0.001
Positive Ranks	93[b]	49.4	4598		
Ties	151[c]				
Gender					
Female (n = 125)					
Negative Ranks	4[a]	32.7	131	-5	<0.001
Positive Ranks	44[b]	23.7	1045		
Ties	77[c]				
Male (n = 123)					
Negative Ranks	2[a]	22	44	-6.2	<0.001
Positive Ranks	49[b]	26.1	1282		
Ties	72[c]				

Non-problem gambler (n =44)

Negative Ranks	4[a]	10.2	41	-2.1	<0.03
Positive Ranks	14[b]	9.2	130		
Ties	26[c]				

Low-risk gambler (n = 64)

Negative Ranks	0[a]	0	0	-4.4	<0.001
Positive Ranks	22[b]	11.5	253		
Ties	42[c]				

Moderate-risk gambler (n = 73)

Negative Ranks	2[a]	19.5	39	-4.1	<0.001
Positive Ranks	27[b]	14.6	396		
Ties	44[c]				

Problem gambler (n = 69)

Negative Ranks	0[a]	0	0		<0.001
Positive Ranks	30[b]	15.5	465		
Ties	39[c]				

a. T2 Agreement with Claim < T1 Agreement with Claim

b. T2 Agreement with Claim > T1 Agreement with Claim

c. T2 Agreement with Claim = T1 Agreement with Claim

6.4.4 RQ3: HOW SUSCEPTIBLE DO USERS BELIEVE THEY ARE TO PERSUASIVE DESIGN TECHNIQUES?

Participants were asked how much they thought they could be influenced by persuasive

design techniques with a 5-point Likert scale (1 = extremely unlikely, and 5 = extremely

likely). The overall self-reported mean susceptibility scores for the persuasive design

categories and standard deviations are displayed in Figure 16. A Friedman test showed

that susceptibility to persuasive design categories differed significantly between

categories, $\chi2(4) = 305$, p < .001. Significance was set at $p = 0.005$ using a Bonferroni

correction as multiple tests were conducted. Post hoc analysis revealed that

susceptibility to the dialogue support category (M:3.8, SD:0.8) was significantly higher

than susceptibility to the other persuasive design categories, and susceptibility to system

credibility support (M:2.6, SD:1.2) was significantly lower than susceptibility to the

other persuasive design categories.
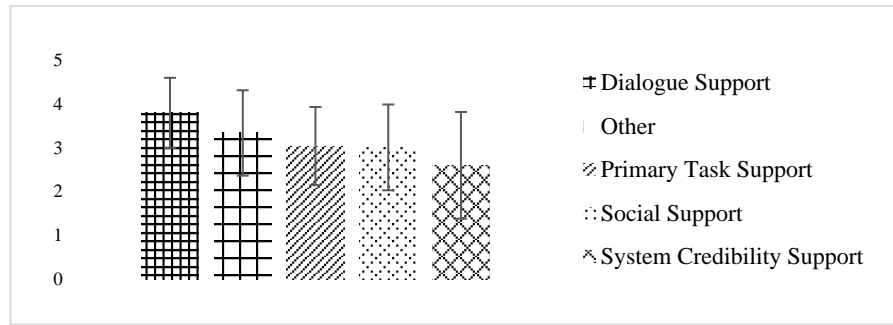
FIGURE 16. MEAN SCORE FOR SUSCEPTIBILITY TO EACH PERSUASIVE DESIGN CATEGORY

As shown in Figure 17, when examined individually, out of the 13 persuasive design techniques presented in the study, participants mainly reported susceptibility to in-game rewards (M:4.2, SD:0.9), reminders (M:3.9, SD:1.0) and near misses (M:3.4, SD:1.3). In contrast, participants reported the lowest susceptibility to social norms (M:2.9, SD:1.2), competition (M:2.9, SD:1.3) and authority (M:2.6, SD:1.2). A Friedman test revealed that susceptibility to persuasive design techniques differed significantly by technique, $\chi 2(12) = 528$, p < .001. Significance was set at $p = 0.0009$ using a Bonferroni correction as multiple tests were conducted. Susceptibility to in-game rewards was significantly higher than all other persuasive design techniques except reminders. Susceptibility to authority was significantly lower than all other persuasive design techniques except self-monitoring, social norms, and competition.
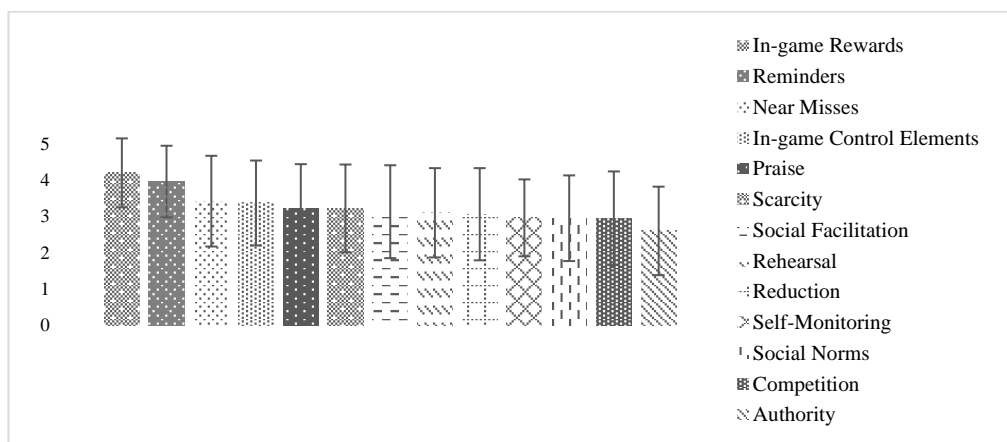
FIGURE 17. MEAN SCORE FOR SUSCEPTIBILITY TO EACH PERSUASIVE DESIGN TECHNIQUE

6.4.5 RQ4: IS THERE A DIFFERENCE BETWEEN HOW SUSCEPTIBLE PEOPLE THINK THEY ARE TO PERSUASIVE DESIGN TECHNIQUES AND HOW SUSCEPTIBLE THEY THINK OTHERS ARE?

Participants were asked how much they thought they could be influenced by the persuasive design technique and how much they thought the same persuasive design technique could influence others, using a 5-point Likert scale (1 = extremely unlikely, and 5 = extremely likely). A Wilcoxon signed-rank test was conducted to compare participants' self-reported susceptibility to persuasive design categories and how they perceived susceptibility in other players. As shown in Table 31, for all persuasive design categories, there was a statistically significant difference between the self-reported susceptibility scores and the susceptibility scores they assigned to others. For each persuasive design category, most participants assigned higher susceptibility scores to others compared to themselves. Thus, participants assigned greater susceptibility to persuasive design categories in other players.

TABLE 31. SELF-REPORTED SUSCEPTIBILITY VERSUS PERCEIVED SUSCEPTIBILITY OF OTHERS TO PERSUASIVE DESIGN CATEGORIES.

Persuasive Design Category	N	Mean Ranks	Sum of Ranks	Z	P
Primary Task Support					
Negative Ranks	12[a]	28	336.5	-10.614[x]	< .001
Positive Ranks	152[b]	86.8	13193.5		
Ties	86[c]				
Total	250				
Dialogue Support					
Negative Ranks	44[d]	48.6	2140.5	-10.366[x]	< .001
Positive Ranks	170[e]	122.7	20864.5		
Ties	36[f]				
Total	250				
Social Support					
Negative Ranks	19[g]	41.3	785	-11.125[x]	< .001
Positive Ranks	175[h]	103.6	18130		
Ties	56[i]				
Total	250				
System Credibility Support					

	N	Mean Rank	Sum of Ranks		
Negative Ranks	6[j]	42	252	-10.409[x]	< .001
Positive Ranks	144[k]	76.9	11073		
Ties	100[l]				
Total	250				
Other					
Negative Ranks	29[m]	53.4	1549	-10.334[x]	< .001
Positive Ranks	169[n]	107.4	18152		
Ties	52[o]				
Total	250				

a. Primary Task_Others < Primary_Task_Me

b. Primary_Task_Others > Primary_Task_Me

c. Primary_Task_Others = Primary_Task_Me

d. Dialogue_Support_Others < Dialogue_Support_Me

e. Dialogue_Support_Others > Dialogue_Support_Me

f. Dialogue_Support_Others = Dialogue_Support_Me

g. Social_Support_Others < Social_Support_Me

h. Social_Support_Others > Social_Support_Me

i. Social_Support_Others = Social_Support_Me

j. System Credibility_Support_Other < Credibility_Support_Me

k.System Credibility_Support_Other > Credibility_Support_Me

l. System Credibility_Support_Other = Credibility_Support_Me

m. Other_Others < Others_Me

n. Other_Others > Others_Me

o. Other_Others = Others_Me

x. Based on negative ranks

6.5 DISCUSSION

This chapter explored whether users are aware of the use, persuasive intent and the potential negative impact of the main persuasive design techniques utilised in online gambling platforms. The chapter also explored users' perception of susceptibility to persuasive design techniques in oneself and others.

The survey showed that most users are aware that online gambling platforms use persuasive design techniques. In a free recall setting, the most recalled persuasive design technique was in-game rewards (74.4%), followed by game mechanics (12%). This finding suggested that persuasive design techniques are not as well recognised, given the significant percentage difference between the most and second most recalled

persuasive design technique. Non-problem gamblers had the lowest frequency of recalling persuasive design techniques. Users tended to be less aware of the persuasive intent and potential harm such techniques could cause, and further analysis showed that users with more gambling accounts and more weekly gambling activity were more likely to be aware of the use, persuasive intent, and potential harm of persuasive design techniques. These findings suggest that *explainable persuasion* might be particularly useful for new and regular players who may not be as familiar with online gambling mechanics as heavy players. This ties in with research suggesting that persuasive design techniques to manage responsible online gambling would be more effective for low to moderate gamblers (Arden-Close et al. 2022). The results also showed that most of the users already agreed that persuasive design techniques may contribute to problem gambling. Their level of agreement increased after viewing the explanation cards. The rise in agreement scores might be attributed to psychological inoculation (McGuire 1961, 1964), in which players' responsible gambling attitudes were reinforced after they were triggered to re-think the potential influence and harm. Inoculation has shown to be helpful as a preventative strategy for other addictive behaviours such as smoking and drinking (Pfau et al. 1992; Godbold and Pfau 2000).

Despite the fact that majority of early studies saw inoculation as a prophylactic strategy utilised to prevent attacks on established attitudes (McGuire 1964; Pfau et al. 2004), it has been claimed that inoculation intervention can also have a "therapeutic" impact (Compton 2020; Van der Linden and Roozenbeek 2020). That is, inoculation intervention has the capacity to generate resistance in those with slightly indifferent or opposing attitudes (Compton and Ivanov 2013). The findings supported this claim; after viewing the explanation cards, problem gamblers were the PGSI group with the highest number of participants who increased their agreement scores on the claim that persuasive design techniques may contribute to problem gambling. Thus, as a

therapeutic measure, the inoculation intervention helped problem gamblers to develop coping strategies. Future research should investigate whether *explainable persuasion* is more effective as a preventive approach or a corrective approach.

With respect to self-reported susceptibility to persuasive design techniques, the findings showed that susceptibility to the dialogue support category was significantly higher, with users reporting the highest susceptibility to in-game rewards. This finding contradicts earlier research suggesting that reward is the least effective persuasive design technique in the health domain after customisation (Orji 2014). This difference in the findings may be attributable to domain differences since extrinsic motivation could be more associated with gambling (Back et al. 2011), whereas intrinsic motivation could be more associated with having a healthy lifestyle (Papacharisis et al. 2003). Also, people who gamble online may be more exposed to in-game rewards such as cash bonuses and free spins.

In terms of the mismatch between self-reported susceptibility and susceptibility assigned to others, participants assigned higher susceptibility scores to others than to themselves for each persuasive design category. Individuals' underestimation of their own vulnerability to online phishing attempts is comparable with the findings of this study (Halevi et al. 2013; Williams et al. 2017). People may have this mismatch in perception as a result of denial and self-deception since they may denigrate others in order to maintain their self-image (Fein and Spencer 1997; Oyibo et al. 2017).

The next chapter explores users' attitudes towards the concept of *explainable persuasion* in the context of online gambling.

7.   CHAPTER 7: USERS' ATTITUDES TOWARDS THE CONCEPT OF EXPLAINABLE PERSUASION

7.1   INTRODUCTION

The previous chapter examined users' awareness of the use, persuasive intent and the potential negative impact of the main persuasive design techniques and users' perception of susceptibility to persuasive design techniques in oneself and others. Through the online survey outlined in Chapter 6, this chapter investigates the concept of *explainable persuasion* from the users' perspective.

The findings of this study are published in the Journal of Systems and Software (Cemiloglu et al. 2023a).

7.2   RATIONALE

In designing ethical persuasive interfaces, *explainable persuasion* could be a potential solution to address issues related to system transparency, ethics, and user control. However, the first step in any innovation is user acceptance, which is users' willingness to use the tool for the purpose it was designed for (Dillon 2001). There is little use in proceeding with the design process if users do not recognise its utility or refuse to use it (Nielsen 1994; Norman 1998). Therefore, in the context of online gambling, it is important to understand whether users agree that *explainable persuasion* can help them to stay more in control of their gambling.

In the event that users recognise the benefit of *explainable persuasion*, caution needs to be given to its usability. According to the usability principle, interactive interfaces should avoid the use of redundant information (Nielsen 2005). Therefore, the depth to which information should be provided with *explainable persuasion* may be a significant factor that can influence usability. As discussed in Chapters 2 and 4, excessive information disclosure by system explanations can result in information overload,

frustrate users, and hamper user experience, as demonstrated in the XAI domain (Chazette and Schneider 2020). In the present study, the PKM (Friestad and Wright 1994) and the Informed Consent Theory (Faden and Beauchamp 1986) were used as reference models to determine the content of *explainable persuasion.* A significant challenge is designing *explainable persuasion* that is usable and contextual enough not to impair user experience but disruptive enough to catch user attention and foster critical thinking. It should be noted that the content depth of *explainable persuasion* may need to change depending on the type of persuasive interface, user cognitive ability, or user motivation. By taking online gambling as an extreme case, this thesis investigates the required content depth of *explainable persuasion* for persuasive interfaces with addictive potential.

The utilisation of *explainable persuasion* may not only benefit users but could also benefit businesses. From a business perspective, employing *explainable persuasion* in persuasive interfaces may help build a trusting relationship between the user and the platform. Amazeen and Wojdynski (2020) reported that individuals who were able to identify the commercial intent of a native advertisement with a disclosure statement had more favourable opinions of journalism and trusted the media to report objectively. Moreover, employing *explainable persuasion* in persuasive interfaces can work as a proactive strategy against addictive usage and help business sustainability, as users would not need to take extreme measures such as self-exclusion from websites (Cemiloglu et al. 2020).

In the context of online gambling, it was shown that the use of responsible gambling tools could lead to more positive views about a gambling operator among players (Gainsbury et al. 2013). Accordingly, utilising *explainable persuasion* within online gambling platforms has the potential to increase positive attitudes towards online

gambling operators and build trust.

To this end, this chapter explores whether *explainable persuasion* is a user requirement on demand, user requirements of explainable persuasion content and whether *explainable persuasion* might influence player attitudes towards online gambling operators.

Within the context of online gambling platforms and their players, this chapter concentrates on the following research questions.

RQ1: Do users believe that *explainable persuasion* can help them stay in control of their gambling?

RQ2: What information do users require when receiving *explainable persuasion*?

RQ3: What will users' attitudes be towards gambling operators that provide *explainable persuasion* within online gambling platforms?

7.3   METHODOLOGY OVERVIEW

After viewing and answering questions about 13 persuasive design techniques utilised by online gambling platforms (Chapter 6), participants were asked whether they agreed with the claim that *explainable persuasion* can help players stay more in control of their gambling using a 5-point scale (1 = strongly disagree, and 5 = strongly agree). In order to ensure participants' full comprehension of the concept, the term "*explainable persuasion*" was defined as "explanation cards about persuasive design techniques" similar to those shown in the questionnaire. This adjustment was made as the term *explainable persuasion* could have been too technical for participants to comprehend. Using the PKM (Friestad and Wright 1994) and the Informed Consent Theory (Faden and Beauchamp 1986) as reference models, participants were asked to state what information they required when receiving *explainable persuasion*. Moreover,

participants were asked how their attitude would change toward gambling operators that provide *explainable persuasion* in their platforms using a 5-point scale (1 = become more negative, and 5 = become more positive).

7.4 RESULTS

7.4.1 PARTICIPANT DEMOGRAPHICS

In total, 250 participants completed the online survey. Four participants reported that they work or have worked in the gambling industry. Table 27 in Chapter 6 summarises demographics.

7.4.2 RQ1: DO USERS AGREE THAT EXPLAINABLE PERSUASION CAN HELP PLAYERS STAY MORE IN CONTROL OF THEIR GAMBLING?

As shown in Figure 18, 70% of participants agreed or strongly agreed that *explainable persuasion* can help players stay more in control of their gambling. There was no significant difference in agreement scores based on gender ($p = 0.86$) and PSGI groups ($p = 0.60$).

FIGURE 18. AGREEMENT WITH EXPLAINABLE PERSUASION HELPING PLAYERS STAY MORE IN CONTROL OF THEIR GAMBLING (%)

A Spearman's rank-order correlation analysis revealed a statistically significant negative correlation between participant agreement with the claim that *explainable persuasion* helps players and age, $r_s(248) = -0.18$, $p < 0.05$. Older participants were less likely to also be participants who agree that *explainable persuasion* can help players stay more in control of their gambling and vice-versa.

7.4.3 RQ2: WHAT INFORMATION DO USERS REQUIRE WHEN RECEIVING EXPLAINABLE PERSUASION?

As shown in Table 32, participants required information about the potential negative impact (70%), use (67.6%), and coping tactics (66.8%) from *explainable persuasion*. In contrast, information about coping goals (54.4%) and persuasive psychological mediators (57.2%) was requested by the lowest percentage of participants. Only 2.8% of participants requested other information not covered by the information categories provided.

TABLE 32. PERCEPTION OF INFORMATION REQUIRED FROM EXPLAINABLE PERSUASION BY GENDER AND PROBLEM GAMBLING SEVERITY GROUPS (%)

	Overall (%)	PSGI (%)				Gender (%)	
		Non-problem gambler	Low-risk gambler	Moderate-risk gambler	Problem gambler	Female	Male
Information About Use	**67.6**	56.8	**71.9**	**64.4**	**73.9**	**69.6**	**65**
Information About Persuasive Intent	65.2	**72.7**	56.3	**64.4**	**69.6**	60	**69.9**
Information About Persuasive Tactic	64.4	**68.2**	**65.6**	57.5	68.1	64	**65**
Information About Persuasive Psychological Mediator	57.2	**68.2**	56.3	50.7	58.0	52.8	61.7
Information About Potential Negative Impact	**70**	**77.3**	**65.6**	**68.5**	**71.0**	**68.8**	70.7
Information About Coping Goal	54.4	56.8	51.6	52.1	58.0	58.4	49.5
Information About Coping Tactic	**66.8**	**68.2**	**68.8**	**67.1**	63.8	**69.6**	64.2
Other Information	2.8	28.6	0.0	28.6	42.9	2.4	3.2

Seven participants suggested other information could be part of the *explainable persuasion* content. Participants stated that details about users' betting history (i.e., wins and losses) and information about time spent on gambling could also be provided to raise self-awareness of gambling behaviour and help users reflect on their interaction with the persuasive design techniques. Participants also requested information about gambling addiction helplines, showing users where they can get help if they struggle to control their gambling. Moreover, participants stated that *explainable persuasion* content could include information about how to disable the persuasive design technique.

The total number of content participants requested from *explainable persuasion* was treated as a continuous variable ranging from 0 – 8 (use, intent, tactic, psychological mediator, negative impact, coping goal, coping tactic, other). The total number of contents requested from *explainable persuasion* did not vary by gender (p = 0.87) or PSGI group (p = 0.50). A Spearman's rank-order correlation analysis revealed a statistically significant positive correlation between the number of content requested from *explainable persuasion* and participant awareness of the intent of the persuasive design techniques presented in the study, $r_s(248) = 0.15$, $p < 0.05$. Moreover, there was a statistically significant positive correlation between the number of content requested from *explainable persuasion* and awareness of the potential harm of persuasive design techniques presented in the study, $r_s(248) = 0.15$, $p < 0.05$. That is, participants who were aware of the persuasive intent and potential harm of more persuasive design techniques presented in the study were more likely to also be participants who requested more content from *explainable persuasion* and vice-versa. A statistically significant negative correlation was also observed between the number of requested content from *explainable persuasion* and age, $r_s(248) = -0.14$, $p < 0.05$. Older participants were more likely to also be participants who requested less content from *explainable persuasion* and vice-versa.

7.4.4 RQ3: WHAT WILL USERS' ATTITUDES BE TOWARDS GAMBLING OPERATORS THAT PROVIDE EXPLAINABLE PERSUASION WITHIN ONLINE GAMBLING PLATFORMS?

As shown in Figure 19, 58.8% of participants stated that their attitudes towards gambling operators would become positive or more positive if they provided *explainable persuasion* within online gambling platforms. There was no significant difference in attitudes based on gender ($p = 0.93$) and PSGI groups ($p = 0.29$).

Becomes more positive	23.2
Becomes positive	35.6
Neutral	26
Becomes negative	11.2
Becomes more negative	4
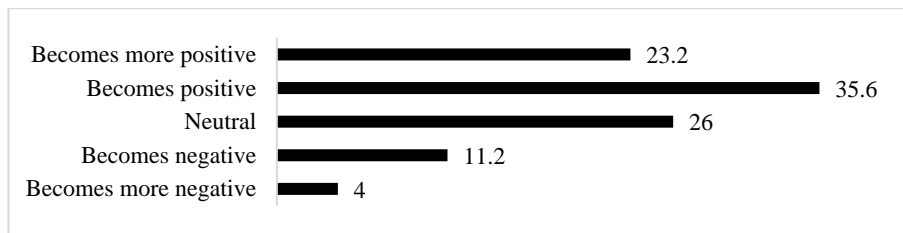
FIGURE 19. USERS' ATTITUDES TOWARDS GAMBLING OPERATORS IF THEY PROVIDE EXPLAINABLE PERSUASION (%)

A Mantel-Haenszel test of trend analysis revealed a statistically significant linear association between attitudes towards gambling operators and agreement with *explainable persuasion* being helpful to players, $\chi2(16) = 15.54$, $p < 0.05$, $r = 0.3$. Participants who agreed that *explainable persuasion* could help players control their gambling were more likely to have a positive attitude towards gambling operators that provided *explainable persuasion* and vice-versa. A statistically significant negative correlation was observed between attitudes towards gambling operators and age, $r_s(248) = -0.13$, $p < 0.05$. Older participants were less likely to also be participants who have a positive attitude towards gambling operators that provided *explainable persuasion* and vice-versa.

Regarding participants' qualitative comments on their attitudes towards gambling operators, some stated that providing *explainable persuasion* on online gambling platforms is the responsible action to take and demonstrates integrity on the part of gambling operators.

"It provides integrity and an honest approach and can be really thought-provoking for the user so can make them think about their actions and learn about their movements and how things can happen." [Low-risk gambler, Female, 29]

However, other participants were critical about the conflict between the duty of care and business motive. They believed that triggering player engagement with persuasive design techniques and then providing explanations of the negative impact is

contradictory.

"...to promote a caring side from gambling companies but then to load the screen full of techniques to spend more, I believe is very irresponsible."
[Problem gambler, Male, 38]

Some participants were sceptical that gambling operators would provide *explainable persuasion* with the players' best interests in mind.

"They will probably find a way to put the explanation in such a place or explain in such a way which renders it useless." [Moderate-risk gambler, Male, 36]

7.5 DISCUSSION

This chapter explored whether *explainable persuasion* is a user requirement on demand in the domain of online gambling. Although most users were aware that gambling sites use persuasive design techniques, the majority found the concept of *explainable persuasion* helpful and agreed that it could assist players in maintaining greater control over their gambling. Users considered information regarding the usage, potential negative impact, and coping tactics to be the most important components of *explainable persuasion*. Users who were aware of the persuasive intent and potential harm of more persuasive design techniques presented in the study were more likely to request more informational content from *explainable persuasion*. One plausible explanation for this could be related to individual differences in NfC (i.e., the tendency to enjoy effortful cognitive activities) (Cacioppo and Petty 1982). Users with a high NfC may have been more motivated to seek out and process more information. Studies conducted in the field of XAI and intelligent recommender systems show that people with a high level of NfC pay more attention to explanations (Conati et al. 2021) and are more willing to understand the provided attributes (Millecamp et al. 2019). Future research could

examine whether a correlation exists between the NfC and the request for in-depth informational content from *explainable persuasion*.

More than half the users stated that their attitudes towards gambling operators would become positive if the operators provided *explainable persuasion*, as such a practice would reflect the operators' integrity and duty of care. This finding relates to the trustworthiness dimensions of integrity and benevolence defined by Bolat et al. (2019) for the gambling industry. The finding is also consistent with Gainsbury et al. (2013), who showed that the use of responsible gambling tools could lead to more positive views about a gambling operator among players. Participants who agreed that *explainable persuasion* could help players control their gambling were more likely to have a positive attitude towards gambling operators that provided *explainable persuasion*. However, some users were concerned that gambling operators would not provide *explainable persuasion* in a legible and accessible format. Player mistrust in online gambling sites and operators regarding responsible gambling practices has been reported in previous studies (Yani-de-Soriano et al. 2012; Gainsbury et al. 2013).

It is important to achieve a balance between transparency and business success. The disclosure of a message's persuasive intent has the potential to impair its effectiveness. However, if businesses choose to be less transparent, they face the risk of users identifying the persuasive intent and interpreting it for intentional deception, triggering more negative feelings (Darke and Ritchie 2007; Amazeen and Wojdynski 2019). According to Bolat et al. (2019), gambling industry personnel acknowledge that transparency is an important strategy to build trust in the gambling industry and win customers.

There is limited evidence in the current study that gender and differences in problem gambling severity affected study variables. While previous studies show that females have a more positive attitude toward responsible gambling measures than males

(Gainsbury et al. 2013; Engebø et al. 2019), in the current study, both females and males had a similar view and agreed that *explainable persuasion* could assist players in exercising greater control over their gambling. Similarly, while studies show that problem gamblers have the least positive attitudes to responsible gambling initiatives (Nower and Blaszczynski 2010; Ivanova et al. 2019), all PGSI groups somewhat agreed that *explainable persuasion* could help players stay in control. One plausible explanation for this difference may be that users perceive *explainable persuasion* as a non-restrictive intervention aimed at fulfilling conditions for informed consent. Future research could investigate user attitudes towards *explainable persuasion* when it is designed as a mandatory or voluntary interaction.

While gender and problem gambling severity did not influence user attitudes towards the concept of *explainable persuasion*, age was found to be a determining factor. Older participants were less likely to agree that *explainable persuasion* can help players stay more in control of their gambling, less likely to request more content from *explainable persuasion* and less likely to have a positive attitude towards gambling operators that provided *explainable persuasion*. The correlation between older age and dismissive attitudes towards explainability could result from the decrease in the NfC due to age-related declines in cognitive ability. NfC is more likely to decrease over time in older people than middle-aged people (Spotts 1994; Bruinsma and Crutzen 2018). The age impact may also be related to usability, as information overload can overwhelm older users (Lee and Coughlin 2015). Moreover, the age impact may also be related to older gamblers having less favourable attitudes toward responsible gambling initiatives than younger adults (Gainsbury et al. 2013; Engebø et al. 2019). In general, older people tend to be less open to new technologies than younger people, citing concerns about the complexity and scepticism as barriers (Vaportzis et al. 2017).

The next chapter explores user acceptance and rejection factors of *explainable persuasion.*

8.   CHAPTER 8: USER ACCEPTANCE AND REJECTION FACTORS OF EXPLAINABLE PERSUASION

8.1   INTRODUCTION

The previous chapter explored whether *explainable persuasion* is a user requirement on demand. Through the online survey outlined in Chapter 6, this chapter investigates user acceptance and rejection factors of *explainable persuasion*. This exploration is needed because once we understand the acceptance and rejection factors, we can improve the design of *explainable persuasion* for a better user experience and higher user retention.

The findings of this study are published in the Journal of Systems and Software (Cemiloglu et al. 2023a).

8.2   RATIONALE

It is suggested that the mere presence of information does not automatically result in better decision-making and that useful transparency is achieved when quality information is made accessible to the audience in a meaningful and useful manner (Turilli and Floridi 2009; Schauer 2011; Hosseini et al. 2018). Accordingly, in order to optimise the design of *explainable persuasion* for a better user experience and increased retention, it is essential to investigate the user acceptance and rejection factors of *explainable persuasion* in greater depth. The Unified Theory of Acceptance and Use of Technology (UTAUT) model proposed by Venkatesh et al. (2003) offers a comprehensive framework to predict and assess user acceptance of information technology. UTAUT is based on the synthesis of prior technology acceptance research on the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM) (Davis 1989), the Motivational Model (MM) (Davis et al. 1992), the Theory of Planned Behaviour (TPB) (Ajzen 1991), the Combined TAM and TPB (C-TAM-TPB) (Taylor and Todd 1995), the Model of PC Utilization (MPCU) (Thompson et al. 1991), the

Innovation Diffusion Theory (IDT) (Roger 1995), and the Social Cognitive Theory (SCT) (Bandura 1986). Four main variables were identified in the UTAUT model: performance expectation, social influence, facilitating environment, and technology support. According to the model, acceptance and behavioural intention to use the technology is greater if the values of the four variables are greater. Empirical evidence indicates that it is a viable model for explaining information systems and technologies acceptance and use (Khechine et al. 2016).

The UTAUT model was mainly concentrated on organisational settings in which the use of technology is mandated (Venkatesh et al. 2012). Later, Venkatesh et al. (2012) revised their earlier model to accommodate the context of the consumer. The UTAUT2 included three new important variables: hedonic motivation, price value and experience and habit to predict consumer use. Moreover, demographics (e.g., age, gender) and experience were proposed as moderator variables. In the present study, the UTAUT2 model was employed to analyse and categorise participant responses of acceptance and rejection factors since it focuses on customer usage context. The list and definition of UTAUT2 variables are shown in Table 33.

TABLE 33. UTAUT2 MODEL VARIABLES

UTAUT2 Model Variables	Definition
Performance Expectancy	The extent to which employing a technology will give customers advantages when doing specific tasks.
Effort Expectancy	The level of ease people have using technology.
Social Influence	How strongly consumers believe that significant others think they should adopt a certain technology.
Facilitating Conditions	Customer perceptions of the assistance and support available to complete a behaviour.
Hedonic Motivation	The enjoyment and pleasure arising from the use of a technology.
Price Value	Cognitive trade-offs consumers make when weighing the benefits of certain applications against the costs of using them.
Experience and Habit	Experience is defined as the amount of time that has passed since the first use of a technology, while habit is defined as the degree to which people do learnt behaviours automatically.

To this end, this chapter explores acceptance and rejection factors of *explainable persuasion* based on the UTAUT2 model (Venkatesh et al. 2012). Within the context of

online gambling platforms and their players, this chapter concentrates on the following research questions.

RQ1: What are the user acceptance and rejection factors of *explainable persuasion*?

RQ2: How can the user acceptance of *explainable persuasion* be improved?

Drawing on the findings of user acceptance and rejection factors of *explainable persuasion*, the chapter further identifies a number of design tensions that could prohibit players from interacting with *explainable persuasion* and suggests ways to solve these tensions.

8.3 METHODOLOGY OVERVIEW

After viewing and answering questions about 13 persuasive design techniques utilised by online gambling platforms (Chapter 6), participants were asked whether they agreed with the claim that *explainable persuasion* can help players stay more in control of their gambling using a 5-point scale (1 = strongly disagree, and 5 = strongly agree). The term "*explainable persuasion*" was defined as "explanation cards about persuasive design techniques" similar to those shown in the questionnaire. With a mandatory open-ended question, all participants were required to justify their answers. The average response length was 48.5 words. Data from the open-ended questions was analysed using thematic analysis with a deductive approach (Braun and Clarke 2006). The theoretical foundation for the analysis was built on the UTAUT2 model's variables (Venkatesh et al. 2012). Recommendations for enhancing the design of *explainable persuasion* were evaluated through a separate analysis. The coding was verified by another member of the research team.

8.4 RESULTS

8.4.1 PARTICIPANT DEMOGRAPHICS

In total, 250 participants completed the online survey. Four participants reported that they work or have worked in the gambling industry. Table 27 in Chapter 6 summarises demographics.

8.4.2 RQ1: WHAT ARE THE USER ACCEPTANCE AND REJECTION FACTORS OF EXPLAINABLE PERSUASION?

8.4.2.1 ACCEPTANCE FACTORS

A total of 181 people mentioned acceptance factors, and in total, there were 309 statements. The distribution of gender and PGSI groups are shown in Figures 20 and 21, respectively.
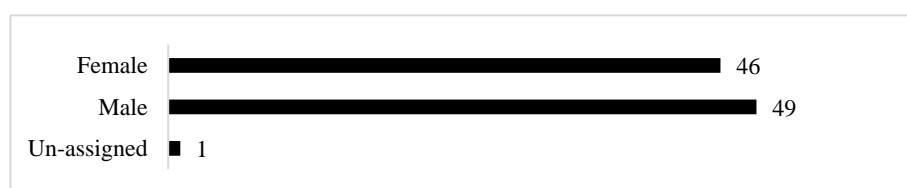

FIGURE 20. GENDER DISTRIBUTION AMONG ACCEPTANCE FACTOR STATEMENTS

FIGURE 21. DISTRIBUTION OF PROBLEM GAMBLING SEVERITY AMONG ACCEPTANCE FACTOR STATEMENTS

A summary of the acceptance factors of *explainable persuasion* is shown in Table 34.

TABLE 34. ACCEPTANCE FACTORS OF EXPLAINABLE PERSUASION

Main Themes	Frequency
A. Performance Expectancy	**306**
1. Raises awareness	**257**
a) of persuasive intent	
b) of the commercial nature of gambling	
c) of unknown persuasive design techniques	
d) of self-awareness	

e) of potential negative impacts	
f) of characteristics and operation of games	
2. Facilitates informed decision-making	**43**
B. Demographics	**3**

I.   RAISES AWARENESS

The first theme was related to raising awareness. Participants mentioned that *explainable persuasion* could be helpful as being aware of persuasion will make players less susceptible to influence. They felt that *explainable persuasion* might help players recognise the persuasive intent used in online gambling platforms:

"If people are aware about the persuasive techniques that are used to incentivise players to come back and gamble more, they would be able to spot them more in action and acknowledge that they are there." [Problem gambler, Male, 24]

Participants stated that *explainable persuasion* could raise awareness of the commercial nature of gambling. Some participants mentioned that even though they knew about the persuasive design techniques used in online gambling platforms, they did not realise the business motivation behind them:

"You are not even aware that these techniques are being carried out until pointed out to you in such cards. As a gambler, you just think it is to make the game more enjoyable, not a technique to make you play and gamble more." [Low-risk gambler, Female, 43]

Many participants found *explainable persuasion* helpful in controlling their gambling as it increased their awareness of previously unknown persuasive design techniques:

"I think of myself as fairly alert to the way gambling sites operate but had no idea about many of these techniques." [Low-risk gambler, Female, 49]

"It has certainly opened my eyes to some of the techniques which I had not thought about." [Problem gambler, Male, 30]

Some participants stated that *explainable persuasion* could also increase self-awareness, which was related to recognising feelings and gambling actions in relation to persuasive design techniques:

"Explanations can help you rationalise feelings of craving or excitement, and giving a name to things helps identify the cause of feelings." [Problem gambler, Female, 27]

"While viewing the cards, they would identify when such an instance has happened to them before. I think this would help prevent them from making the same mistakes and gain control." [Moderate-risk gambler, Male, 20]

Some participants stated that *explainable persuasion* can raise awareness of the potential negative impact of interacting with persuasive design techniques and reinforce the risks:

"If you know that the website is trying to influence you to keep playing, and you know that it could lead to problem gambling, you are more likely to try to stay in control of your gambling as you know the outcome could become a problem if you allow the persuasive techniques to persuade you." [Non-problem gambler, Female, 26]

A few participants suggested that *explainable persuasion* can raise awareness of the characteristics and operation of gambling and games. They stated that *explainable persuasion* can remind players that they are not in control of the gambling outcomes and that the house is more likely to win:

"...(when) hitting a nudge or hold button on a spin game, if a pop-up appeared the first time you pressed one that said something like, "pressing these buttons has no influence

on your chances or winning or losing", you might think twice about how much your chances of winning are." [*Moderate-risk gambler, Male, 31*]

II.   *FACILITATES INFORMED DECISION-MAKING*

The second theme was related to facilitating informed decision-making. Participants mentioned that *explainable persuasion* could help players feel more in control of their gambling by facilitating informed decision-making. They felt that *explainable persuasion* could help players stop and reflect on their behaviour before interacting with persuasive design techniques:

"If people understand that there is a degree of manipulation going on, and there is transparency on that, they may have a more sceptical or critical eye over the choices they are making on gambling sites." [*Non-problem gambler, Female, 29*]

B.   *DEMOGRAPHICS*

Some participants emphasised that *explainable persuasion* would be more useful to players who do not have a gambling disorder and have control over their gambling or players who have just started gambling:

"I think that "normal" steady gamblers betting with funds they can afford to lose and not tempted into chasing losses, these example cards would be beneficial." [*Moderate-risk gambler, Male, 43*]

8.4.2.2   REJECTION FACTORS

96 people mentioned rejection factors, and in total, there were 139 statements. The distribution of gender and PGSI groups are shown in Figures 22 and 23, respectively.

FIGURE 22. GENDER DISTRIBUTION AMONG REJECTION FACTOR STATEMENTS

FIGURE 23. DISTRIBUTION OF PROBLEM GAMBLING SEVERITY AMONG REJECTION FACTOR
STATEMENTS

A summary of the rejection factors of *explainable persuasion* is shown in Table 35.

TABLE 35. REJECTION FACTORS OF EXPLAINABLE PERSUASION

Main Themes	Frequency
A. Performance Expectancy	**69**
1. The disparity between knowledge and behaviour	**32**
2. Explanations considered irrelevant	**28**
a) perceived familiarity	**13**
b) denial (i.e., of a problem and negative impact)	**7**
c) perceived immunity to persuasion	**6**
3. Immersion effect	**7**
B. Demographics	**40**
1. Problem gamblers	**33**
2. Susceptibility to persuasion	**5**
C. Hedonistic Motivation	**12**
1. Hinders player experience	**4**
2. Patronising statements	**4**
D. Habit	**12**
1. Desensitisation to website warnings	**12**
E. Effort Expectancy	**6**
1. Prominence issue	**2**
2. Comprehension	**4**

A.   *PERFORMANCE EXPECTANCY*

I.   *THE DISPARITY BETWEEN KNOWLEDGE AND BEHAVIOUR*

The first theme of performance expectancy was related to the disparity between

knowledge and behaviour. Participants believed that players already know about persuasive design techniques used in online gambling platforms but interact with such techniques despite the potential risks. Participants stated that even if players did not know about the persuasive design techniques, knowing about them would not help. Some participants made a comparison with anti-smoking disclaimers on cigarette packaging and mentioned that knowing something is bad for you does not necessarily mean you will stop doing it:

"I think, for the most part, gamblers know what they are getting themselves into. It is like putting all of the anti-smoking stuff on cigarette packaging. At the end of the day, if people want to smoke, they will smoke, and the same applies to gamblers."
[Moderate-risk gambler, Male, 31]

Participants also mentioned that knowing about persuasive design techniques would not help players gain more control over gambling, as gambling is based on intuitive rather than rational reasoning:

"I believe the temptation to gamble cannot be solved by education since the personal reasons players want to continue impact their biases and heuristics more powerfully."
[Low-risk gambler, Male, 19]

II.   *EXPLANATIONS CONSIDERED IRRELEVANT*

The second theme of performance expectancy related to explanations being considered irrelevant. Some participants deemed *explainable persuasion* irrelevant due to the perceived familiarity of its content. They indicated that they were already aware of persuasive design techniques and their negative effects:

"I believe most players know exactly what persuasive techniques are being used on them by gambling websites, but it would still make no difference to them having that

knowledge. This would not change the desire or the habit of gambling on these websites." [Low-risk gambler, Female, 51]

A number of participants reported that players would skip or ignore *explainable persuasion* because they believe such explanations do not apply to them. Participants stated that players might ignore *explainable persuasion* because they deny having gambling problems, the negative impact or think they are immune to persuasion:

"I think if you are a problem gambler, you will ignore these warnings and kid yourself that you are different to other people and that it is they who have a problem, not you." [Non-problem gambler, Male, 52]

"I am not sure that explaining the techniques to people will help them. I think that those most likely to have gambling problems will think that they are "immune" to being persuaded." [Low-risk gambler, Female, 37]

III.   IMMERSION EFFECT

A few participants claimed that players might not engage with *explainable persuasion* as they are fully immersed in gambling:

"I think that you can clearly explain how these techniques work; however, in the excitement of the moment, such clarity can be difficult for many people to think of as they are living in the moment." [Problem gambler, Male, 55]

B.   DEMOGRAPHICS

I.   PROBLEM GAMBLERS

Participants felt that *explainable persuasion* might be helpful for regular players; however, they found it to be a naïve approach to those who had already developed gambling disorder. They stated that problem gambling is related to neurotransmitter dysregulation, loss of control and irrational thinking and that *explainable persuasion*

cannot convince problem gamblers by logical argument:

"*I believe just being aware of something does not mean they will be in more control of their addiction. For example, everyone knows objectively that smoking kills, but people are chemically addicted to nicotine. similarly, with gambling, people are addicted to the adrenaline rush, the dopamine hits etc.*" [Problem gambler, Male 22]

When further examined, it was found that the argument "naïve approach for problem gamblers" was stated more by problem gamblers. As shown in Table 36., problem gamblers stated the argument more compared to other groups.

TABLE 36. PROBLEM GAMBLING SEVERITY DIFFERENCE OF PARTICIPANTS WHO MADE AN ARGUMENT FOR EXPLAINABLE PERSUASION BEING NAIVE

PGSI Type	Naïve Approach to Problem Gamblers
Problem gambler	29 (65.9%)
Moderate-risk gambler	16 (25 %)
Low-risk gambler	13 (17.8%)
Non-problem gambler	6 (8.9%)

A few participants' naivety concerns related to the textual presentation of *explainable persuasion*.

"*...I think that if somebody is going to gamble or has an issue than they probably would not take a great deal of notice to the text.*" [Problem gambler, Male, 37]

II.   SUSCEPTIBILITY TO PERSUASION

The second theme of demographics related to difficulty in resisting persuasion. Participants stated that it might be challenging for some players to resist persuasion. They argued that resistance to persuasion requires self-control as certain offers can be highly enticing:

"*These tools entice you to spend spend spend. It is down to the mental strength of the*

individual to resist and keep resisting the allure of more wins, more spins, more stuff."

[Non-problem gambler, Male, 48]

C.   HEDONISTIC MOTIVATION

I.   HINDERS PLAYER EXPERIENCE

The first theme of hedonistic motivation related to hindering the player experience. Participants expressed worry about *explainable persuasion* hindering the player experience. They believed that explanations and notifications might cause information overload, and as a result, players might leave the gambling platform:

"I think if you have to start explaining things, it will just clog up the website with information that the people who need to read it will not. People do not care about stuff like that when they are a gambler, and if it starts annoying them, they will just move sites." [Moderate-risk gambler, Male, 34]

II.   IRRITATION BY PATRONISING STATEMENTS

The second theme of hedonistic motivation was related to players feeling patronised by the statements. Some participants stated that players would not engage with *explainable persuasion* because they may regard such explanations as patronising and paternalistic, thus irritating:

"It depends upon how much the player believes that the explanation is true, and not just "nannying" from health authorities." [Non-problem gambler, Male, 31]

D.   HABIT

Participants reported that some players would not pay attention to any notices due to their habitual tendencies that inhibit them from recognising differences in their settings when they are gambling:

"For some players, explanations will be useful and will encourage them to take the

messages with a pinch of salt. For others, however, any explanations will be quickly

minimised/skim read, etc." [Moderate-risk gambler, Male, 41]

E.   EFFORT EXPECTANCY

I.   LACK OF VISIBILITY CONCERN

Two participants were concerned that gambling operators will display *explainable*

persuasion in small print and hide it in the platform, and thus it would not assist players

in regulating their gaming.

"They will probably find a way to put the explanation in such a place or explain in such

a way which renders it useless." [Moderate-risk gambler, Male, 36]

F.   POOR COMPREHENSION CONCERN

A few participants believed that explanations would be hard to understand for players:

"I think that the explanations are usually longwinded - or they are complicated -

because the persuasive techniques are complicated." [Non-problem gambler, Male, 61]

8.4.3   RQ2: HOW CAN THE USER ACCEPTANCE OF EXPLAINABLE PERSUASION BE IMPROVED?

A total of 19 participants mentioned how user acceptance factors of *explainable*

persuasion could be improved. See Table 37.

TABLE 37. SUGGESTIONS TO IMPROVE ACCEPTANCE FACTORS OF EXPLAINABLE PERSUASION

Main Themes	Frequency
A. Performance Expectancy **1. User control** **2. Self-monitoring**	**8**
B. Effort Expectancy **1. Reminders** **2. Clear and straightforward information** **3. Option-out choice from persuasive design techniques**	**10**
C. Hedonistic Motivation	**1**

8.4.3.1   PERFORMANCE EXPECTANCY

A.   USER CONTROL

Participants had conflicting views about user control regarding *explainable persuasion*. Some participants suggested that *explainable persuasion* should be mandated to players before gambling, and their comprehension should be assessed by attention checks throughout. Others argued that interactions with *explainable persuasion* should be voluntary as the explanations might be distracting or overlooked at the time of gambling. They suggested that *explainable persuasion* could be presented on a separate webpage for those who are interested.

B.   SELF-MONITORING

Four participants suggested that players should be able to monitor how much they have interacted with persuasive design techniques throughout their gambling session and also have the option to limit interaction with persuasive design techniques such as auto spin.

8.4.3.2   EFFORT EXPECTANCY

A.   REMINDERS

Some participants suggested that, for *explainable persuasion* to be effective, players must be frequently reminded of the persuasive design techniques they are exposed to throughout the gambling session. It was also suggested that just-in-time reminders might be more useful as it would be easier for players to recognise and consent to the techniques at the point of interaction.

B.   CLEAR AND STRAIGHTFORWARD INFORMATION

According to a few participants, the content and delivery of *explainable persuasion* are crucial variables in capturing attention and easing comprehension. Participants indicated that explanations must be brief and straightforward and delivered in a bullet point format to be effective.

C. OPTION-OUT CHOICE FROM PERSUASIVE DESIGN TECHNIQUES

While most participants agreed that *explainable persuasion* can assist responsible gambling, several proposed that gambling platforms should give the choice of opting out of persuasive design techniques altogether if they so desire.

8.4.3.3 HEDONISTIC MOTIVATION

A. USE OF PERSUASIVE DESIGN TECHNIQUES

One of the participants proposed that the experience of interacting with *explainable persuasion* may be made more enjoyable by utilising persuasive design techniques, such as providing rewards and prizes for those players who engage with them.

8.5 DESIGN TENSIONS AND POSSIBLE SOLUTIONS

The previous sections within this chapter explored user acceptance and rejection factors of *explainable persuasion*. The findings pointed to a number of design tensions that could prohibit players from interacting with *explainable persuasion*. Design tensions are defined as trade-offs and conflicts that may occur throughout a system design process due to technical constraints, user and business requirements (Tatar 2007). With the Design Tension Framework, Tatar (2007) argues that it is important to design a system as a whole and achieve a balance between its components rather than designing parts of it individually. For system transparency to be useful in supporting user decisions, it must extend beyond information availability and lead to information actionability (Turilli and Floridi 2009; Schauer 2011; Hosseini et al. 2018). Moreover, in their discussion of informed choice and gambling, Blaszczynski et al. (2008a) emphasised the necessity of developing optimal strategies for disseminating information to facilitate informed choice. Therefore, addressing design tensions in the *explainable persuasion* design process can fulfil users' needs and help increase user engagement. Drawing on the findings of user acceptance and rejection factors of *explainable persuasion*, this

section identifies a number of design tensions that could prohibit players from interacting with *explainable persuasion* and suggests ways to solve these tensions.

As shown in Table 38, five design tensions have been proposed to support the design of *explainable persuasion* within persuasive interfaces. Before elaborating on the design tensions, it is important to clarify what it is that this thesis is working toward achieving. The primary focus is not to disrupt the user experience in order to raise awareness of each persuasive design technique. This would not be feasible as it would interrupt the primary task and hinder the user experience. The focus is to address the unintended consequences caused by the use of persuasive design techniques. By providing *explainable persuasion* that promotes consent and choice, we can empower users who desire control over their digital usage. It is important to note that the proposed design tensions are not a comprehensive list; rather, they serve as a beginning point for the design of *explainable persuasion*. Furthermore, it is critical to emphasise that focusing solely on user demands when designing *explainable persuasion* would not be the optimal strategy, given the intention-behaviour gap in addictive behaviours. This is because the user's perception of what needs to be done may contradict what is done in the heat of the moment. To overcome this challenge, future research should include not only users but also other essential players within the larger system (e.g., gambling operators, designers, and responsible gambling organisations).

TABLE 38. EXPLAINABLE PERSUASION DESIGN TENSIONS

1. User autonomy versus mandatory interaction
2. Concise explanations versus fostering comprehension
3. Interrupting primary task versus not hindering user experience
4. Constant exposure versus desensitisation
5. Caring versus patronising

8.5.1.1 USER AUTONOMY VERSUS MANDATORY INTERACTION

Some users suggested that *explainable persuasion* should be mandatory and that users' knowledge and awareness should be assessed throughout their interaction with persuasive platforms, while others advocated for user autonomy in their decision to interact with *explainable persuasion*. Since *explainable persuasion* is proposed as an initiative against addictive usage, it is important that all users interact with such content at least once while engaging with persuasive platforms. One way to approach this design tension could be by providing *explainable persuasion* at the sign-up stage to such platforms so that users could consent to the use of such persuasive design techniques. According to Atkinson (2006), ethical protection can be obtained if the objective of the persuasion is disclosed at the outset of a person's interaction with a system. Thus, a user has the choice to accept or reject the persuasive interface's impact on attitudes and behaviour. Interaction with explanations could also be encouraged by nudging (Caraban et al. 2019). Users could be automatically enrolled to the *explainable persuasion* feature, with the option to exercise control by opting out via the control panel. Also, the presentation and delivery of *explainable persuasion* can be delivered in a way that adapts to the user's needs and preferences in order to respect user autonomy (Van Welie et al. 1999). Users could be allowed to customise the explainable persuasive interface by selecting the persuasive design techniques for which they wish to receive explanations, the depth of information they would like to receive, and when they would like to receive explanations.

8.5.1.2 CONCISE EXPLANATIONS VERSUS FOSTERING COMPREHENSION

Disclosing too much information about persuasion mechanics may lead to information overload, frustrate users, and hinder user experiences. According to the usability principle of aesthetic and minimalist design, interactive interfaces should avoid using redundant information and be straightforward to be effective (Nielsen 2005). However,

it might be difficult to promote comprehension with brief explanations due to the complexity of the psychological dynamics related to persuasive design techniques. One possible solution to this design tension could be utilising secondary channels, channels where notifications are given outside of the usage context and are accessible to the user at a specific location within the system (Schaub et al. 2015). Users could simply be informed about the use of persuasive design techniques at the point of interaction, similar to cookie disclaimers, rather than being given all the information. Detailed information on persuasive design techniques can be delivered in an accessible secondary channel within the platform (e.g., the responsible gambling page), and players who want to learn more can be directed to it via a link. Additionally, because different user profiles could have varying demands for comprehension, explainability requirements could be elicited using personas, as such a method will help identify various user groups' needs for explanation (Anvari et al. 2017). Also, through public channels such as marketing campaigns, users can be educated about the use and impact of persuasive design techniques.

8.5.1.3 INTERRUPTING PRIMARY TASK VERSUS NOT HINDERING USER EXPERIENCE

A significant challenge is designing *explainable persuasion* that is usable and contextual enough to not impair user experience but also disruptive enough to catch user attention and foster critical thinking. Therefore, the main challenge is designing engaging explainable persuasive interfaces that assist both informed consent and positive user experiences and which are neutral in the sense of affecting the user's decision. *Explainable persuasion* may be designed to be adaptive to the context of use in order to minimise disruptions to the primary task and be relevant to the user. This can be explained by reference to the auto-spin example in the online gambling context. In this situation, providing real-time explanations about the persuasive nature of the auto-spin when the user exceeds a certain amount of time playing or the amount of money

using this function may lead to the user seeing such explanations as relevant and acceptable. Information can also be provided after the behaviour has occurred to help the user reflect more on the link between their behaviour and the persuasive element. Moreover, as suggested by one of the users, providing information about time spent interacting with the persuasive design technique, similar to "screen time" features under iOS and Android, could be used as a passive notification that will not interfere with the primary tasks while also being useful to track one's own gambling behaviour. Another solution to this design tension could be gamifying the interaction with *explainable persuasion*. For example, it was found that positive user experience attained through digital badges increased student engagement with learning activities (Ibanez et al. 2014). In this manner, *explainable persuasion* can become a part of the user experience rather than interfering with it.

8.5.1.4   CONSTANT EXPOSURE VERSUS DESENSITISATION

While users requested constant exposure to *explainable persuasion* for it to be effective, they also raised concerns about users simply ignoring *explainable persuasion* or losing interest due to immersion in the primary task or repeated exposure. One approach to address this design tension could be presenting *explainable persuasion* in different formats over time, such as changing the layout or wording, as this can facilitate attention switch and maintenance (Kim and Wogalter 2009). Another solution could be having users actively interact with the explanation instead of utilising checkboxes in obtaining user consent. For example, drag-and-drop or swiping actions were shown to be more engaging in obtaining informed consent than checkboxes (Lindegren et al. 2021).

8.5.1.5   CARING VERSUS PATRONISING

Users stated that providing *explainable persuasion* demonstrates integrity on the part of gambling operators and shows that they care for their users. However, users also raised

concerns about feeling patronised by such explanations and saw it as a "nanny state" (i.e., overprotective and interfering with individual freedom). According to the Reactance Theory (Brehm 1966), persuasive health communication may fail if individuals perceive the message as a threat to their freedom to choose (Dillard and Shen 2005). One possible approach to this design tension could be related to explanation framing. Positive framing (i.e., emphasising the benefits of reducing interaction with persuasive interfaces), as opposed to negative framing (i.e., emphasising the negative consequences of interacting with persuasive interfaces, as presented in the explanation cards), could help address this negative perception. Moreover, providing suggestions or hints rather than direct commands (Brown et al. 1987) and using empathy-inducing communication (i.e., utilising language or graphic elements that promote perspective-taking and emotional reactions) may reduce the perception of threats to freedom (Shen 2010).

8.6   DISCUSSION

This chapter investigated user acceptance and rejection factors of *explainable persuasion*. Drawing on these findings, the researcher further identified design tensions that could prohibit players from interacting with *explainable persuasion* and provided solutions to address these tensions.

Users stated that *explainable persuasion* could raise awareness of less familiar persuasive design techniques, the persuasive intent, the commercial nature of gambling, self-awareness, potential negative impacts and characteristics and operations of games.

In discussing why *explainable persuasion* might not be helpful, users emphasised the disparity between knowledge and behaviour. Research suggests that knowledge does not always translate to intent, followed by behaviour or action and that there could be mediating factors in play. For example, according to the Protection Motivation Theory

(Rogers 1975), an individual's self-protective behaviours in the face of a threat are shaped by their threat appraisal (i.e., the perceived severity of the threat, the perceived probability of the threat harming the individual, the perceived reward linked to threat, whether extrinsic or intrinsic) and their coping appraisal (i.e., response efficacy, the belief that counter behaviour will reduce the threat, self-efficacy (Bandura et al. 1999), the belief that one will be successful in performing the counter behaviour, and the response costs; the costs assigned to counter behaviour). Thus, these cognitive constructs may mediate the relationship between knowledge and behaviour. For example, studies on smoking cessation show that self-efficacy plays an important role between the intention to quit smoking and maintaining abstinence (Ockene et al. 2000). Regarding self-efficacy, some users in the study emphasised the perceived difficulty of resisting persuasion. Studies on metacognition research suggest that self-beliefs about one's susceptibility to persuasion can affect responses to persuasion (Rucker et al. 2004; Chang 2017). Similarly, future research can investigate the role of self-efficacy in understanding the disparity between knowledge and behaviour regarding *explainable persuasion*.

Users also stated that people might find *explainable persuasion* content irrelevant due to denying their gambling problems or thinking they are immune to persuasion. This finding could be explained by the absolute denial pattern (i.e., being convinced that there is no problem to be addressed) (Gorski 2000), the stigma associated with problem gambling (Hing et al. 2014b) and illusory superiority cognitive bias (i.e., overestimating own abilities in comparison to others) (Hoorens 1995). Users in the study stated that explanations would be ignored due to the immersion effect of gambling. Flow experience (Csikszentmihalyi 2013), a mental state of intense concentration on a specific task, devoid of distractions, can induce this immersion. Research suggests that when players are overly immersed in the game, they may lose their ability to perceive

external stimuli beyond it (Schüll 2012; Murch et al. 2020). Future research could explore how to design the delivery of *explainable persuasion* to disrupt the flow state and attract focused attention.

Users have expressed concern that long-worded explanations and notifications might affect their gameplay and take the fun out of the experience. From a user experience standpoint, Chazette and Schneider (2020) reported similar findings regarding system explanations and user concerns over impairment, interruption, distraction, and time consumption. Additionally, some users stated that explanations appeared patronising and could have a negative impact on their enjoyment.

Furthermore, users, especially those in the problem gambling group, stated that *explainable persuasion* may be a naïve approach for problem gamblers. Given that problem gamblers somewhat agree that *explainable persuasion* can help players stay more in control of their gambling (M:3.8 SD:1.18), the argument "naïve approach for problem gamblers" might arise not due to dismissive attitudes towards explainability but other factors. For example, problem gamblers' concern about naivety could be a sign of cognitive dissonance (Festinger 1957). Such cognitive dissonance may be manifested through the conflicted user cognition of "wanting to control behaviour" versus "wanting to perform addictive behaviour", in which dissonance is eliminated by dismissing the help of responsible gambling features. It has been suggested that when people come across information contradicting their own beliefs, they might exhibit "selective avoidance" to decrease the cognitive discomfort they experience due to contradictory views (Knobloch-Westerwick and Meng 2009; Fransen et al. 2015a), and those with stronger attitudes exhibit selective avoidance more often (Roets et al. 2015). Another reason for the naivety concern could be because this group believe that problem gamblers' main objective is to continue gambling regardless of the consequences

(Nower and Blaszczynski 2010). Given that problem gamblers gamble for reasons other than entertainment, *explainable persuasion* will have little influence on encouraging responsible gambling. Moreover, the naivety concern could be related rather to the presentation of *explainable persuasion*. Users believed that people would not take a great deal of notice of the text as they are eager to get to gambling. In the design of *explainable persuasion*, it is crucial to address the conflict that exists between the desire to satisfy hedonistic motivation and the need for logical reflection. Future research can investigate *explainable persuasion* with respect to dual processing (Petty and Cacioppo 1986; Evans 2008) and test whether *explainable persuasion* that targets the peripheral route to information processing is more effective than *explainable persuasion* that targets the central route for specific groups, such as problem gamblers.

Drawing on the findings of acceptance and rejection factors, the researcher further identified design tensions that could prohibit players from interacting with *explainable persuasion:* i) user autonomy versus mandatory interaction, ii) concise explanations versus fostering comprehension, iii) interrupting primary task versus not hindering user experience, iv) constant exposure versus desensitisation, and v) caring versus patronising. Overall, the design tensions could be related to Hovland and Janis's (1959) phases of message processing (e.g., attention, understanding, and acceptance). Accordingly, future research can explore what effect factors relating to source (i.e., perceived trustworthiness of the business), message (i.e., one-sided versus two-sided message) and audience (i.e., initial attitude) may have on the identified design tensions of *explainable persuasion*.

The next chapter evaluates the effectiveness of *explainable persuasion* as an inoculation intervention in building resilience against persuasive design techniques.

9. CHAPTER 9: EXPLAINABLE PERSUASION AS AN INOCULATION INTERVENTION

9.1 INTRODUCTION

Chapters 6,7 and 8 took online gambling as an example domain and explored user awareness of persuasive design techniques used in online gambling platforms and user attitudes towards the concept of *explainable persuasion*. This chapter proposes the use of *explainable persuasion* as an inoculation intervention to build resistance against persuasive interfaces. The effectiveness of this approach is evaluated through an online study using an experimental design. Online gambling was taken as an exemplar domain and application to examine the inoculation effect of *explainable persuasion* on the persuasive design technique of in-game rewards (i.e., pop-up online casino bonus). The online experiment was conducted with 240 participants.

The findings of this study are submitted to the International Journal of Human-Computer Interaction.

9.2 RATIONALE

Along with individual factors, such as genetics (Slutske et al. 2000), personality (Bagby et al. 2007) and neurobiology (Potenza 2013), structural factors (i.e., game features that reinforce gambling activity through appeal and arousal) are suggested to present a risk for the development and maintenance of gambling disorder (Griffiths 1993; Schüll 2012; McCormack and Griffiths 2013). With the growth of the online gambling industry, persuasive interfaces have become a crucial component of the gambling experience. While persuasive interfaces are typically employed to enhance the user experience, in certain cases, ethical concerns may arise. Users may be unaware of being persuaded (Atkinson 2006; Smids 2012), unaware of the unintended negative repercussions of interacting with persuasive interfaces (Berdichevsky and Neuenschwander 1999), or may find it difficult to resist persuasion. Moreover, it is

suggested that, in certain cases, persuasive gambling interfaces might trigger gambling disorder and contribute to excessive time and money spent on gambling (McCormack and Griffiths 2013; Cemiloglu et al. 2021b). Consequently, monitoring and controlling gambling behaviour while interacting with persuasive interfaces may become challenging, especially for at-risk players.

One way to increase awareness of persuasion attempts and confer resistance to persuasion is through psychological inoculation (McGuire 1961, 1964). McGuire (1964) suggested that exposing someone to a weakened version of a persuasive attack can assist them to defend their established attitudes against subsequent stronger persuasive attacks. Psychological inoculation is suggested to trigger resistance to persuasion through threat and refutational pre-emption (McGuire 1961, 1964). The threat component warns individuals about their vulnerability to persuasive attacks, and the refutational pre-emption component raises arguments that may be used in persuasive attacks and then refutes those arguments to help individuals protect their attitudes. This two-sided approach triggers greater resistance than a one-sided message as, through being introduced to the opposing viewpoint, the individual has been offered a basis for challenging the opposite view (Lumsdaine and Janis 1953). By motivating individuals to protect their established attitudes and by providing content for counterarguments, psychological inoculation helps people critically analyse persuasion attempts and decide whether to be persuaded (McGuire 1961, 1964; Pfau et al. 1997). If the persuasion attempt is not aligned with the individual's attitudes and personal goals, the individual may use counterarguments as a defence mechanism to resist persuasion (McGuire 1961, 1964).

Inoculation interventions can be implemented using either a prophylactic approach (i.e., with the aim of preventing attacks on established attitudes) (McGuire 1964; Pfau et al.

2004) or a therapeutic approach (i.e., with the aim of building resistance to persuasion among individuals with neutral or opposing attitudes) (Compton 2020; Van der Linden and Roozenbeek 2020). Furthermore, inoculation interventions are not only effective on argument-specific resistance but also have the potential to inoculate individuals against the very tactics used in persuasive attacks (Roozenbeek and van der Linden 2019a, 2019b). Inoculation interventions have been conducted in various contexts, such as advertising, political campaigns, social issues and health (Banas and Rains 2010). Studies successfully conferred resistance to deceptive food advertising (Mason and Miller 2013), native advertisements (Amazeen 2020), fake news (Roozenbeek and Van Der Linden 2019b), legalisation of the use of handguns and marijuana (Pfau et al. 2009), and pressures to smoke cigarettes (Pfau et al. 1992) and consume alcohol (Godbold and Pfau 2000). Inoculation success has been evaluated with print (Parker et al. 2012) video (Godbold and Pfau 2000), game-based interventions (Roozenbeek and Van Der Linden 2019b; Van der Linden and Roozenbeek 2020) and automatized on-line systems (Levy et al. 2019; Gidron et al. 2023). According to the inoculation literature (McGuire 1961, 1964; Pfau et al. 2009; Banas and Rains 2010; Mason and Miller 2013; Roozenbeek and van der Linden 2019a), if an inoculation intervention is successful, participants report:

- greater elicited threat with regards to the persuasive attack.

- higher issue involvement levels about the attitudinal object after inoculation.

- less favourable attitudes towards the object of the persuasive attack.

- less intention to interact with the object of the persuasive attack.

- less favourable attitudes towards the persuasive attack.

- higher likelihood to counterargue against the object of the persuasive attack.

Based on the preceding review of literature and rationale, the following research question was raised:

RQ1: Can inoculation intervention confer resistance against persuasive design techniques used in online gambling platforms?

H1: Participants who receive the inoculation intervention will report (a) higher elicited threat, (b) greater issue involvement and (c) more counterarguments. They will also report (d) less favourable attitudes towards online casino bonuses, (e) less favourable attitudes towards persuasive attack, and (f) lower intention to claim online casino bonuses compared to the control condition.

Research suggests that the threat component on its own can confer resistance to persuasion (Kiesler and Kiesler 1964; Petty and Cacioppo 1979). Knowles and Linn (2004) suggested that just as persuasion can result from peripheral cues, so can resistance to persuasion. Inoculation can also work heuristically through peripheral cues requiring minimal cognitive effort (Banas and Miller 2013). Studies conducted in the advertising domain support this claim and argue that native advertising (when a marketer presents paid content in a manner that closely resembles the publisher's original content to leverage the publisher's credibility (Wojdynski and Golan 2016)) disclosures can act as forewarning which helps the individual recognise the commercial content (Amazeen and Wojdynski 2019; Amazeen 2020; Amazeen and Vargo 2021). (Wojdynski and Golan 2016). When a persuasive incentive is observed, persuasion knowledge, which consists of information relating to the persuader and the persuasion target, is activated (Friestad and Wright 1994). The Persuasion Knowledge Model postulates that when individuals have information on both the persuader and the persuasion target (i.e., self) they can analyse the persuasion attempt critically, reducing

their susceptibility to persuasion (Livingstone and Helsper 2006; Panic et al. 2013). Thus, recognising the persuasive intent helps the individual evaluate the persuasion attempt and resist persuasion if it is not in line with their personal goals (McGuire 1964; Friestad and Wright 1994). In this regard, like the use of disclosure statements in native advertising, such as "this celebrity has been paid to appear in this advert," *explainable persuasion* in the form of a just-in-time disclosure statement can potentially inoculate the viewer promoting resistance to persuasion when interacting with persuasive interfaces. Based on the literature review and rationale, the following research question was raised:

RQ2: Can *explainable persuasion* be employed as an inoculation intervention to confer resistance against persuasive design techniques used in online gambling platforms?

While research indicates that threat on its own can confer resistance (Kiesler and Kiesler 1964; Petty and Cacioppo 1979), McGuire and Papageorgis (1962) argue that the threat itself is not as impactful as the threat paired with refutational pre-emption. Moreover, inoculation is suggested to be more effective when delivered multiple times over a specific time period rather than once (Ivanov et al. 2018). Accordingly, it was hypothesised that:

H2: Participants who receive both the inoculation intervention and *explainable persuasion* during the persuasive attack will report (a) more counterarguments, l(b) less favourable attitudes towards online casino bonuses, (c) less favourable attitudes towards the persuasive attack, and (d) lower intention to claim online casino bonuses compared to the control condition.

Gambling is recognised as a social and public health issue (Korn and Shaffer 1999) and in response, governments and gambling providers globally introduced responsible gambling policies and practices to prevent and mitigate the adverse effects of gambling

disorder on players and the community (Blaszczynski et al. 2011). The principle of autonomy and informed choice are fundamental to responsible gambling policies and practises (Blaszczynski et al. 2004). It is argued that the main responsibility of the gambling industry is to offer adequate and useful information that will facilitate informed player choices. That is, the gambling industry is obligated to disclose and inform players about games' features and how they work, along with the potential harm and consequences related to interacting with such games. This information should be relevant, accurate, accessible, understandable and provided on a timely basis (Blaszczynski et al. 2008a). Accordingly, *explainable persuasion* has the potential to help players assess the implications of interacting with persuasive gambling interfaces so that they can make informed choices.

Gambling is recognised as a social and public health issue (Korn and Shaffer 1999) and in response, governments and gambling providers globally introduced responsible gambling policies and practices to prevent and mitigate the adverse effects of gambling disorder on players and the community (Blaszczynski et al. 2011). The principles of autonomy and informed choice are fundamental to responsible gambling policies and practices (Blaszczynski et al. 2004). Blaszczynski et al. (2011) argued that the main responsibility of the gambling industry is to offer adequate and useful information that will facilitate informed player choices. That is, the gambling industry is obligated to disclose and inform players about games' features and how they work, along with the potential harm and consequences related to interacting with such games. This information should be relevant, accurate, accessible, understandable and provided on a timely basis (Blaszczynski et al. 2008a).

Studies have shown that responsible gambling pop-up messages can increase self-awareness among casual gamblers, resulting in more responsible gambling behaviour

and more informed decisions (Monaghan 2009; Auer and Griffiths 2016). However, most published research on the effectiveness of pop-up messages on gambling behaviour do not compare problem gamblers to non-problem gamblers (Bjørseth et al. 2021). Caillon et al. (2021) found that informative pop-up messages decreased the illusion of control (i.e., believing that one has control over gambling outcomes) (Langer 1975; Cantinotti et al. 2004) for at-risk gamblers compared to control participants. Nevertheless, more research is needed to provide insight into the effectiveness of informative messages among different gambler profiles.

Similar to responsible gambling pop-up messages, *explainable persuasion* has the potential to help players assess the implications of interacting with persuasive gambling interfaces so that they can make informed choices. To identify the diverse needs of different players, it is important to evaluate the effectiveness of *explainable persuasion* in conferring resistance to persuasion across different gambler profiles. As no specific direction of the relationship has been proposed previously, it was hypothesised that,

H3: There will be a difference in the level of (a) elicited threat, (b) issue involvement, (c) attitudes towards online casino bonuses, (d) intention to claim online casino bonuses, (e) attitudes towards persuasive attack, and (f) number of counterarguments between different problem gambling severity groups.

In addition to exploring differences in study variables among different gambler groups, the aim is to also investigate the potential interaction between inoculation condition and problem gambling severity on these study variables.

H4: There will be an interaction between inoculation condition and problem gambling severity on study variables.

9.3 METHOD

9.3.1 STUDY DESIGN

A 4x2 design was used in the online study. The inoculation intervention was administered through an animated video. *Explainable persuasion* was operationalised as a disclosure statement of persuasive intent during the persuasive attack, i.e., a message stating that the casino bonus offer is intended to persuade the player to continue gambling. Inoculation intervention types (inoculation intervention + disclosure of persuasive intent during persuasive attack, inoculation intervention alone, disclosure of persuasive intent during persuasive attack alone, and control) and problem gambling severity (non-problem and low-risk gamblers, moderate-risk gamblers) as determined by the Problem Gambling Severity Index (PGSI) (Ferris and Wynne 2001a, 2001b), served as the independent variables. Non-problem gamblers and low-risk gamblers were merged into a single group. This group will be referred to as 'non-problem + low-risk gamblers'. Baseline attitude toward online casino bonuses was used as a covariate. The study design enabled comparing the influence of inoculation intervention and problem gambling severity on resistance to persuasion. The dependent variables were elicited threat, issue involvement with responsible gambling, attitudes towards online casino bonuses, intention to claim online casino bonuses, attitudes towards the persuasive attack and number of counterarguments.

9.3.2 PARTICIPANTS

A total of 240 participants (age range 18 – 73, 138 male) were recruited to the online survey through Prolific™ (www.prolific.co), an established online research participant recruitment platform. Participants who had regularly bet on the online slot and roulette games in the previous 12 months (i.e., daily or weekly recurring gambling activity), who were 18 years or older (i.e., due to legislation requirements) and who were fluent English speakers were recruited for the study. Participants were informed that the

study's objective was to examine their attitudes about casino bonuses used by online gambling websites. Initially, 394 participants were screened for the study. Participants who were undergoing treatment or who are experiencing any negative consequences as a result of their gambling were excluded from the study. There were three screening steps for participant recruitment.

1. In the invitation letter, participants were informed that the study was intended for moderate gamblers (i.e., gambling within reasonable and proper limits) and those who thought they may need support were directed to relevant support services.

2. Before participants could take part in the study, they were required to check a box stating they were not experiencing problems due to gambling in the participant information sheet.

3. To avoid recruiting participants who might be unaware of their problems, participants were assessed by the Problem Gambling Severity Index (PGSI) (Ferris and Wynne 2001a, 2001b), which is a valid and reliable instrument commonly used in gambling research to screen out problem gamblers. Participants with a PGSI score of eight or higher were classified as problem gamblers and disqualified from the study. A message through Prolific was sent to disqualified individuals informing them of where they may receive help. These screening procedures helped ensure that the study participants were moderate gamblers who were unlikely to suffer from psychological stress or anxiety due to gambling.

9.3.3   PROCEDURE

The study was designed on Qualtrics (https://www.qualtrics.com/), a web-based survey platform. Bournemouth University Research Ethics Committee approved the study on 11 May 2022 (ID: 39653), and data collection began on 5 September 2022 and closed

on 9 December 2022. The study consisted of three phases. The study flow is shown in Figure 24.
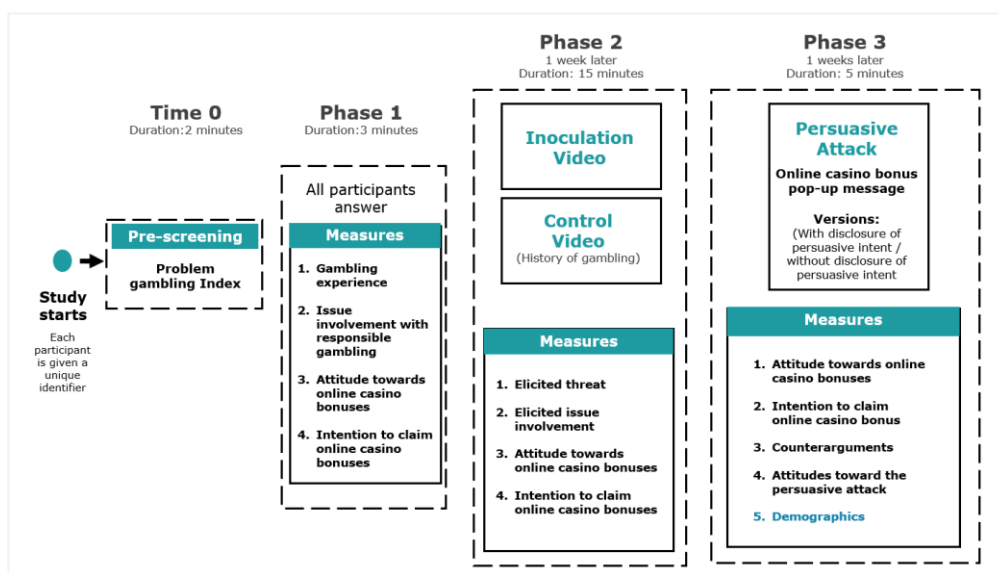
FIGURE 24. INOCULATION STUDY FLOW

9.3.3.1   PRE-SCREENING

Participants were screened based on the inclusion criteria. Participants who had regularly bet on the online slot and roulette games in the previous 12 months, who were 18 years or older and who were fluent English speakers were recruited for the study. Participants who were experiencing negative consequences as a result of their gambling and participants with a PGSI score of eight or higher were disqualified from the study.

Because problem gambling severity was used as an independent variable, the researcher aimed to enrol an equal number of non-problem + low-risk gamblers and moderate-risk gamblers in the study. Due to the random nature of the problem gambling severity scores among participants, 394 participants were screened for the study. Eventually, 120 non-problem + low-risk gamblers and 120 moderate-risk gamblers were recruited to the study, totalling 240 participants.

9.3.3.2   PHASE 1

In the first phase, all participants were asked to provide information about their

gambling experience (e.g., number of online gambling accounts, time spent gambling per week). Participants' attitudes towards online casino bonuses, their intention to claim online casino bonuses and their issue involvement with responsible gambling at baseline were assessed by a questionnaire.

9.3.3.3   PHASE 2

Phase 2 took place one week after Phase 1. In Phase 2, the inoculation intervention was delivered. 120 participants were assigned to the inoculation intervention condition and 120 participants to the control condition. A matched pair approach was taken since problem gambling severity was used as an independent variable. Participants in the inoculation and control groups were paired according to their PGSI groups to lessen the impact of confounding factors on the results of the experiment. Accordingly, an equal number of non-problem + low-risk gamblers and moderate-risk gamblers were randomly allocated to one of the two conditions. In both the inoculation intervention condition and the control condition, there were 60 non-problem + low-risk gamblers and 60 moderate-risk gamblers, totalling 240 participants.

Participants in the inoculation intervention condition were initially asked how well they knew how online gambling websites can motivate them to gamble on a scale from 0 (no knowledge) to 100 (high knowledge) to elicit threat. Later, participants in this condition watched a 5-minute inoculation video about online casino bonuses. The inoculation video contained arguments that gambling operators may use to persuade players to claim online casino bonuses and refutations of these arguments. After watching the video, participants were asked to confirm that they had watched the video. As an attention check, participants were asked two multiple-choice and one open-ended question about the video.

Participants in the control condition watched a 5-minute video about the history of

gambling. The control video presented information about gambling from ancient times to the digital age. After watching the video, participants were asked to confirm that they had watched the video. As an attention check, participants in this condition were also asked two multiple-choice and one open-ended question about the video. Following the videos, participants across all conditions were asked to answer a questionnaire on elicited threat, issue involvement with responsible gambling, attitudes towards online casino bonuses and intention to claim online casino bonuses.

9.3.3.4   PHASE 3

Phase 3 took place one week after Phase 2. It has been suggested there needs to be a delay between the inoculation intervention and the attack as it takes time to counterargue and generate arguments for defence (McGuire 1964). In Phase 3, both the inoculation intervention condition and the control condition received the following scenario:

Imagine you have been gambling at a gambling website called Fun & Bet Casino. You realise that you lost more money than you expected in your gambling session and are considering leaving the website. Just before you close the website, a pop-up message appears.

After reading the scenario, the persuasive attack was presented in the form of a pop-up online casino bonus message resembling those used in gambling websites (See Appendix C). Half the participants in the inoculation intervention condition and the control condition were exposed to the pop-up message with a threat forewarning in the form of a disclosure statement about the persuasive intent of the pop-up message. The other half of the participants in the inoculation intervention condition and the control condition were exposed to the same pop-up message without the disclosure statement. Following the persuasive attack, all participants answered a questionnaire on counter-

argumentation, attitudes towards online casino bonuses, attitudes towards the persuasive attack (i.e., pop-up bonus offer), and intention to claim online casino bonuses. Participants who were exposed to the pop-up message with a disclosure statement of persuasive intent were asked how likely they were to click the "learn more" button to find out how persuasive features may impact their gambling behaviour with a 5-point scale (1 = very unlikely, and 5 = very likely). Participants were also asked to give a rationale for their answers. In the last phase, demographic information was also collected from participants. Participants who completed all three phases of the study received £2.70 for their participation. Four participants who did not provide sensible answers were excluded from the study. The flow of participants through the intervention is detailed in Figure 25.
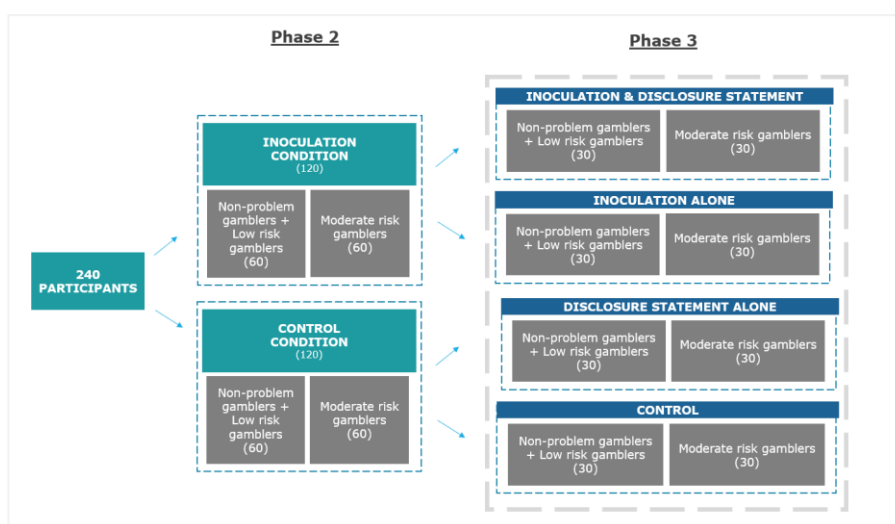
FIGURE 25. INOCULATION STUDY EXPERIMENTAL CONDITIONS

9.3.4 MATERIALS

The materials include experimental stimuli, which are the inoculation intervention video, the control video and the persuasive attack.

9.3.4.1 INOCULATION INTERVENTION VIDEO

The script of the inoculation intervention video consisted of three parts. The first part of the script was intended to induce threat. Participants were warned that while many players control their gambling and enjoy it as a leisure activity, gambling operators

successfully create online casino bonuses such as cash bonuses or free spins to persuade players to spend more time and money than they initially intended. The second and third parts consisted of arguments that gambling operators may use to persuade players to claim online casino bonuses and refutations of these arguments. The arguments for claiming online casino bonuses included: i) getting a head start by spending less of your own money and ii) trying out exciting new games for free through exclusive bonuses. These arguments reflected those used in online casino bonus advertisements. The arguments against claiming online casino bonuses included: i) online casino bonuses being subject to specific play requirements and the use of words like "bonus" and "free" reducing the apparent cost of play requirements, ii) and online casino bonuses disrupting players from their responsible gambling goals by acting as triggers and making it difficult for players to reflect on future repercussions. These arguments were based on the findings of a study that examined the relationship between persuasive interfaces and addictive behaviour (McCormack and Griffiths 2013; Cemiloglu et al. 2021b). In total, the inoculation video script was 417 words. The video script was animated with PowToon (https://powtoon.com), a web-based animation platform. The text was narrated by a British-accented female narrator (See Figure 26). See Appendix C for the video text.
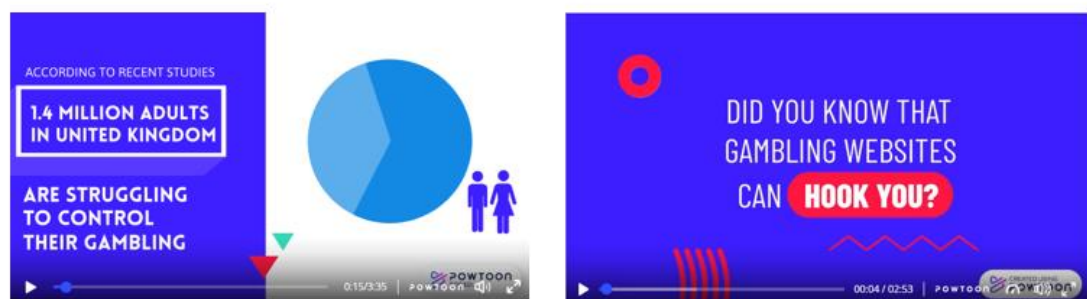
FIGURE 26. SCREENSHOTS OF THE INOCULATION VIDEO

9.3.4.2   CONTROL VIDEO

The script of the control video consisted of six parts. The script gave a review of

gambling throughout history and consisted of the earliest foundations, the Ancient

World, the Middle Ages, the Enlightenment, Modern History, and the Digital Age. The

content of the script was based on information presented in online articles

(Encyclopædia Britannica 1998; Reader's Digest 2020). In total, the inoculation video

script was 396 words. Similar to the inoculation intervention video, the video script was

animated with PowToon and narrated by the same British-accented female narrator (See

Figure 27). See Appendix C for the video text.
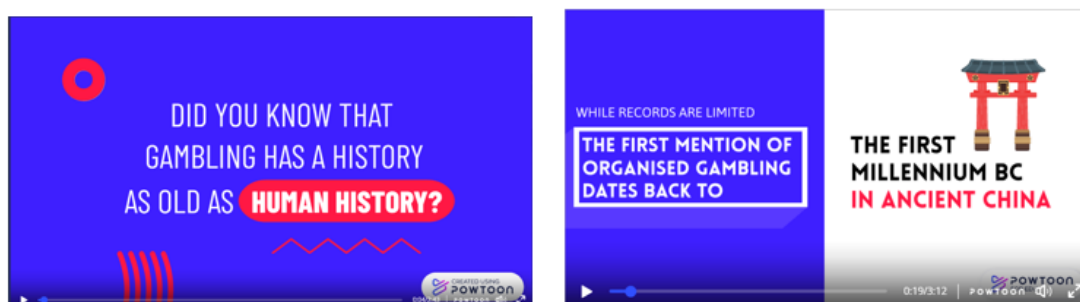
FIGURE 27. SCREENSHOTS OF THE CONTROL VIDEO

9.3.4.3 PERSUASIVE ATTACK

The persuasive attack was in the form of a pop-up casino bonus offer for a new online

slot game resembling those used in gambling websites (See Figure 28). This choice was

based on research indicating that slot machine gamblers are more susceptible to

irrational thinking and biases than players of other games (Walker 1992). Furthermore,

research suggested that the short period between betting and the outcome of such games

may result in less self-aware betting (Monaghan 2009). The similarity, validity, and

clarity of the pop-up casino bonus offer was evaluated by two responsible gambling

officials, four academics, and one ex-problem gambler.

The pop-up message consisted of three parts. The top part addressed the player with,

"Feeling out of luck today? Try our newest game for a chance to win!" The middle part

introduced a new game called Gold Tower with a colourful visual and offered 50 free

spins. Similar to typical online casino bonus offers, the fine print detailed play

requirements. The fine print read, "Min £30 staking required. Reward valid for 7 days."
The email had a clickable button that was labelled with the call-to-action phrase "Play
Now". The bottom part further advertised the benefits of claiming the offer. Two
different versions of the pop-up message were utilised in the study. One version
included a disclosure statement about the persuasive intent of the pop-up message in the
footer, while the other version did not (See Appendix C). All other aspects were
identical in both versions. The disclosure statement was as following:

*As Fun & Bet, we acknowledge that this message intends to persuade you to continue
gambling. Click **learn more** to find out how persuasive features may impact your
gambling behaviour.*

FIGURE 28. PERSUASIVE ATTACK WITH DISCLOSURE STATEMENT

9.3.5 MEASURES

9.3.5.1 PROBLEM GAMBLING SEVERITY INDEX

The 9-item PGSI was used to assess problem gambling severity (Ferris and Wynne 2001a, 2001b). The scale includes items related to gambling behaviour (e.g., How often have you bet more than you could really afford to lose?) and experienced adverse consequences due to gambling (e.g., How often has your gambling caused any financial problems for you or your household?). Each item is rated on a 4-point scale: 0 never; 1 = sometimes; 2 = most of the time; 3 = almost always. The standard cut-points are 0= non-problem gambler; 1–2= low-risk gambler; 3–7= moderate-risk gambler; and 8 and more= problem gambler. Utilising PGSI ensured that each condition had an equal number of gambler profiles. PGSI has high internal consistency and test-retest reliability (Devlin and Walton 2012; Lopez-Gonzalez et al. 2018; So et al. 2019). Cronbach's alpha was 0.70, indicating good reliability.

9.3.5.2 ATTITUDES TOWARDS THE USE OF ONLINE CASINO BONUSES AND THE PERSUASIVE ATTACK

Attitudes towards online casino bonuses was assessed at Phases 1, 2 and 3 using six bipolar adjective pairs (Pfau and Burgoon 1988; Pfau et al. 2001b; Pfau et al. 2006): foolish-wise, unacceptable-acceptable, wrong-right, unfavourable-favourable, bad-good, and negative-positive on a 7-point scale. The pairs were rated 1 (e.g., unacceptable) to 7 (e.g., acceptable). The reliability ratings of the attitude scale were Phase 1: 0.93, Phase 2: 0.95, and Phase 3: 0.95 (n = 240). Attitudes towards the persuasive attack was assessed with the same measure. Reliability (Cronbach's alpha) of the attitude scale for the persuasive attack was 0.85.

9.3.5.3 INTENTION TO CLAIM ONLINE CASINO BONUSES

Intention to claim online casino bonuses was assessed at Phases 1, 2 and 3 using a single item, 0–100-point scale (Pfau et al. 2001a; Compton and Pfau 2004). The

question asked, "on a scale from 0 (no probability) to 100 (certain probability), what is the likelihood you will claim online casino bonuses (e.g., cash bonuses and free spins)?".

9.3.5.4   ISSUE INVOLVEMENT WITH RESPONSIBLE GAMBLING

Issue involvement was assessed at Phases 1 and 2 using a shortened version of Zaichkowsky's (1985) Personal Involvement Inventory (PII). Similar to other inoculation studies (Ivanov et al. 2009; Parker et al. 2012), seven items were utilised for the assessment: unimportant-important, irrelevant-relevant, nonessential-essential, of no concern-of concern to me, does not matter-matters to me, useless-useful, and trivial-fundamental. Participants were asked to indicate what responsible gambling meant to them using a 7-point scale for each item. The pairs were rated 1 (e.g., unimportant) to 7 (e.g., important). The reliability ratings for the issue involvement scale were Phase 1: 0.86 and Phase 2: 0.82 (n = 240), as assessed by Cronbach's coefficient alpha.

9.3.5.5   ELICITED THREAT

Elicited threat was assessed at Phase 2 using five bipolar adjective pairs (Pfau et al. 1992; Mason and Miller 2013): unintimidating–intimidating, nonthreatening–threatening, not risky–risky, not harmful–harmful, and safe–dangerous. Participants were given the following scenario:

"Imagine that you are at the end of your gambling session for the day and are ready to leave the gambling website. You receive a notification offering you an extra £20 bonus to spend on a new game if you deposit £20. This notification intends to cause you to rethink your decision of leaving the gambling website. We want to know how this would make you feel."

After reading the scenario, participants were asked to indicate how this would make them feel on a 7-point scale for each adjective pair. The pairs were rated 1 (e.g.,

unintimidating) to 7 (e.g., intimidating). Greater elicited threat was reflected by higher scores. The reliability of the elicited threat scale was 0.85 (n = 240), as assessed by Cronbach's coefficient alpha.

9.3.5.6   COUNTERARGUMENTS

Counterarguments were assessed using a thought-listing technique (Cacioppo and Petty 1981; Cacioppo et al. 1997). The method used by Reynolds-Tylus et al. (2019) was adopted in the present study. After viewing the pop-up online casino message, participants were instructed to take 90 seconds to list all the thoughts that came to their minds while they viewed the message. Participants were provided with 10 text boxes and were asked to write down each thought in a different box. On the following page, participants were asked to indicate whether each thought was about the content of the pop-up message or not to assess relevance. On the next page, participants were asked to indicate for each thought whether it was unfavourable (i.e., a negative thought about the pop-up message), neutral (i.e., neither favourable nor unfavourable thought about the pop-up message) or favourable (i.e., a positive thought about the pop-up message) to assess valence. Only relevant and negative thoughts were counted as counterarguments, yielding a single metric to assess counter-argumentation. The coding for study variables was verified by another member of the research team.

9.3.6   DATA ANALYSIS

Data was analysed using SPSS version 28. Non-parametric tests were used when appropriate, as the data was not normally distributed. Three main analyses were performed.

Analysis of Covariance (ANCOVA) was used as the main analysis to test the effect of the inoculation intervention and problem gambling severity on elicited threat, issue involvement, attitudes towards online casino bonuses, intention to claim online casino

bonuses, counterarguments, and attitudes towards the persuasive attack. Baseline attitude toward online casino bonuses was used as a covariate in all analyses. A 2x2 ANCOVA was used to test three dependent variables at Phase 2. The dependent variables were elicited threat, attitudes towards online casino bonuses, intention to claim online casino bonuses and issue involvement with responsible gambling measured at Phase 2. Inoculation condition (inoculation, no inoculation) and problem gambling severity (non-problem + low-risk gamblers, moderate-risk gamblers) served as the independent variables. A 4x2 ANCOVA was used to test four dependent variables at Phase 3. The dependent variables were attitudes towards online casino bonuses, intention to claim online casino bonuses, attitudes towards persuasive attack and counterarguments measured at Phase 3. Inoculation condition (inoculation and disclosure, inoculation only, disclosure only, control) and problem gambling severity (non-problem + low-risk gamblers, moderate-risk gamblers) served as the independent variables. Assumption checks were made prior to running the tests (See Appendix C).

Spearman correlations were used to analyse the association between continuous and ordinal variables (Sheskin 2003). Data from the open-ended question was analysed using thematic analysis (Braun and Clarke 2006) (See Appendix C). The coding was verified by another member of the research team.

9.4   RESULTS

9.4.1   PARTICIPANT DEMOGRAPHICS

In total, 240 participants completed the online study. Nine participants reported that they work or have worked in the gambling industry. Table 39 summarises demographics.

TABLE 39. PARTICIPANT DEMOGRAPHICS

N	240
Age: M(SD)	38.3 (11.1)
Age: Range	$18 - 73$
Gender: Males (%)	138 (58)
Females (%)	100 (42)
Gambling Activity Days Per Week: M(SD)	2.85 (1.96)
Number of Online Gambling Accounts (%)	
1 account	12.9
2 accounts	20.0
3 accounts	21.7
4 accounts	10.0
5 accounts	5.0
6 or more accounts	30.4
Problem Gambling Severity Index (%)	
Non-problem gambler	26.7
Low-risk gambler	23.3
Moderate-risk gambler	50.0
Education (%)	
Compulsory school education completed	15.4
Vocational training	9.2
College	23.8
University degree	38.8
Postgraduate qualification (e.g., MSc, PhD)	12.9
Employment (%)	
Full-time employment	55.8
Part-time employment	15.4
Self-employed	7.9
Unemployed	8.3
Student	2.1
Retired	2.5
Homemaker	7.1
Other	0.8

9.4.2 MANIPULATION CHECK: ELICITED THREAT

Researchers have suggested that threat vulnerability is required for inoculation to work (McGuier 1962; Godbold and Pfau 2000). A two-way ANCOVA was run to examine the effects of the inoculation intervention and problem gambling severity on elicited threat at Phase 2 after controlling for baseline attitudes towards online casino bonuses. There was no statistically significant interaction between problem gambling severity and experimental condition on elicited threat levels in Phase 2, $F(1, 235) = 0.1$, $p = 0.7$,

partial η2 = 0.001. Therefore, the main effects of problem gambling severity and inoculation intervention were analysed.

There was a statistically significant main effect of the inoculation intervention on Phase 2 elicited threat levels, $F(1, 235) = 4.7$, $p = 0.03$, partial η2 = 0.02. The adjusted marginal mean of elicited threat level for the inoculation condition (M = 4.7, SE = 0.1) was higher than the no inoculation condition (M = 4.4, SE = 0.1), a statistically significant difference of 0.3 in mean scores (95% CI, 0.3 to 0.6). There was no statistically significant main effect of problem gambling severity on Phase 2 elicited threat levels, $F(1, 235) = 3.1$, $p = 0.08$, partial η2 = 0.01. Due to the statistically significant main effect of the inoculation intervention on Phase 2 elicited threat levels, it was found acceptable for putting the Inoculation Theory to test.

For the inoculation intervention condition, a Spearman's rank-order correlation analysis revealed a statistically significant negative correlation between elicited threat and Phase 2 attitudes towards online casino bonuses, $r_s(238) = -0.2$, $p < 0.01$. That is participants who had lower elicited threat scores were more likely to also be participants who had more positive attitudes towards online casino bonuses and vice-versa. The correlation matrix for the study variables is shown in Appendix C.

9.4.3 ISSUE INVOLVEMENT WITH RESPONSIBLE GAMBLING

A two-way ANCOVA was run to examine the effects of the inoculation intervention and problem gambling severity on issue involvement with responsible gambling at Phase 2 after controlling for baseline attitudes towards online casino bonuses. There was a statistically significant interaction between problem gambling severity and experimental condition on Phase 2 issue involvement with responsible gambling, $F(1, 235) = 6.6$, $p = 0.01$, partial η2 = 0.02. Therefore, an analysis of the simple main effects for problem gambling severity and inoculation intervention was performed. Means,

adjusted means, standard deviations and standard errors are presented in Table 40.

TABLE 40. P2 ISSUE INVOLVEMENT WITH RESPONSIBLE GAMBLING

	Intervention Groups			
	Non + Low-risk gamblers		Moderate-risk gambler	
P2 Issue Involvement	Inoculation	No Inoculation	Inoculation	No Inoculation
M	6.4	6.5	6.5	6.1
(SD)	0.6	0.6	0.5	0.7
M(adj)	6.4	6.5	6.5	6.2
(SE)	0.08	0.08	0.08	0.08

The effect of inoculation intervention on the issue involvement levels at Phase 2 for the non + low-risk gambler group was not statistically significant, $F(1, 235) = 1.0$, $p = 0.3$, partial $\eta2 = 0.004$, whereas the effect of inoculation intervention for the moderate-risk gambler group was statistically significant, $F(1, 235) = 6.8$, $p = 0.01$, partial $\eta2 = 0.02$. Within the moderate-risk gambler group, the inoculation condition group had a higher issue involvement level compared to the no inoculation group, with a statistically significant difference of 0.3 in mean scores (95% CI, 0.07 to 0.5).

The effect of problem gambling severity on issue involvement levels at Phase 2 for inoculation condition was not statistically significant, $F(1, 235) = 0.7$, $p = 0.3$, partial $\eta2 = 0.003$, whereas the effect of problem gambling severity for the no inoculation condition was statistically significant, $F(1, 235) = 7.5$, $p = 0.006$, partial $\eta2 = 0.03$. For the no inoculation condition, the non + low-risk gambler group had a higher issue involvement level compared to the moderate-risk gambler group, with a statistically significant difference of 0.3 in mean scores (95% CI, 0.09 to 0.5).

For the inoculation intervention condition, a Spearman's rank-order correlation analysis revealed a statistically significant positive correlation between baseline issue involvement with responsible gambling and Phase 2 issue involvement with responsible gambling, $r_s(238) = 0.3$, $p < 0.001$. That is, participants who had high issue involvement with responsible gambling at baseline also had high issue involvement with responsible at phase 2.

A two-way ANCOVA was run to examine the effects of the inoculation intervention and problem gambling severity on attitudes towards online casino bonuses at Phase 2 after controlling for baseline attitudes towards online casino bonuses. There was no statistically significant interaction between problem gambling severity and experimental condition on Phase 2 attitudes towards online casino bonuses, $F_{(1, 235)} = 1.3$, $p = 0.2$, partial $\eta2 = 0.006$. Therefore, the main effects of problem gambling severity and inoculation intervention were analysed.

There was a statistically significant main effect of the inoculation intervention at Phase 2 attitudes towards online casino bonuses, $F_{(1, 235)} = 24.2$, $p < 0.001$, partial $\eta2 = 0.09$. The adjusted marginal mean of attitudes towards online casino bonuses for the inoculation condition (M = 4.0, SE = 1.1) was lower than the no inoculation condition (M = 4.7, SE = 0.1), a statistically significant difference of 0.7 in mean scores (95% CI, 0.4 to 1.0). Lower scores meant less favourable attitudes towards online casino bonuses. There was no statistically significant main effect of problem gambling severity on attitudes towards online casino bonuses, $F_{(1, 235)} = 0.4$, $p = 0.5$, partial $\eta2 = 0.002$.

A two-way ANCOVA was run to examine the effects of the inoculation intervention type and problem gambling severity on attitudes towards online casino bonuses at Phase 3 after controlling for baseline attitudes towards online casino bonuses. See Table 41. There was no statistically significant interaction between problem gambling severity and type of inoculation intervention on Phase 3 attitudes towards online casino bonuses, $F_{(3, 231)} = 1.2$, $p = 0.3$, partial $\eta2 = 0.015$. Also, there was also no statistically significant main effect of problem gambling severity and type of inoculation intervention, $F_{(1, 231)} = 0.7$, $p = 0.3$, partial $\eta2 = 0.003$ and $F_{(3, 231)} = 1.1$, $p = 0.3$, partial $\eta2 = 0.01$, respectively.

TABLE 41. P3 ATTITUDES TOWARDS ONLINE CASINO BONUSES

P3 Attitudes towards Online Casino Bonuses	Inoculation Conditions			
	Inoculation + Disclosure	Inoculation Alone	Disclosure Alone	Control
All Participants (n: 240)				
M	4.0	4.1	4.2	4.3
(SD)	1.3	1.5	1.5	1.5
M(adj)	4.0	4.0	4.2	4.4
(SE)	0.1	0.1	0.1	0.1
Non + Low-risk gamblers (n:120)				
M	4.0	4.2	4.0	4.2
(SD)	1.2	1.4	1.6	1.4
M(adj)	3.9	4.2	4.1	4.1
(SE)	0.2	0.2	0.2	0.2
Moderate-risk gambler (n:120)				
M	4.0	4.0	4.3	4.4
(SD)	1.4	1.5	1.4	1.6
M(adj)	4.0	3.8	4.3	4.7
(SE)	0.2	0.2	0.2	0.2

9.4.5 INTENTION TO CLAIM ONLINE CASINO BONUSES

A two-way ANCOVA was run to examine the effects of the inoculation intervention and problem gambling severity intention to claim online casino bonuses at Phase 2 after controlling for baseline attitudes towards online casino bonuses. There was no statistically significant interaction between problem gambling severity and experimental condition on Phase 2 intention to claim online casino bonuses, $F(1, 235) = 0.6$, $p = 0.2$, partial $\eta 2 = 0.001$. Therefore, the main effects of problem gambling severity and inoculation intervention were analysed.

There was a statistically significant main effect of the inoculation intervention at Phase 2 intention to claim online casino bonuses, $F(1, 235) = 5.4$, $p = 0.02$, partial $\eta 2 = 0.02$. The adjusted marginal mean of intention to claim online casino bonuses for the inoculation condition ($M = 54.2$ $SE = 2.6$) was lower than the no inoculation condition ($M = 62.9$, $SE = 2.6$), a statistically significant difference of 8.6 in mean scores (95% CI, 1.3 to 16.0). There was no statistically significant main effect of problem gambling severity on intention to claim online casino bonuses, $F(1, 235) = 0.5$, $p = 0.5$, partial $\eta 2 = 0.002$.

A two-way ANCOVA was run to examine the effects of inoculation intervention type

and problem gambling severity on intention to claim online casino bonuses at Phase 3 after controlling for baseline attitudes towards online casino bonuses. See Table 42. There was no statistically significant interaction between problem gambling severity and type of inoculation intervention on Phase 3 intention to claim online casino bonuses, $F(3, 231) = 1.0$, $p = 0.3$, partial $\eta^2 = 0.01$. Also, there was also no statistically significant main effect of problem gambling severity and type of inoculation intervention, $F(1, 231) = 1.4$, $p = 0.2$, partial $\eta^2 = 0.006$ and $F(3, 231) = 1.0$, $p = 0.3$, partial $\eta^2 = 0.01$, respectively.

TABLE 42. P3 INTENTION TO CLAIM ONLINE CASINO BONUSES

P3 Intention to Claim Online Casino Bonuses	Inoculation Conditions			
	Inoculation + Disclosure	Inoculation Alone	Disclosure Alone	Control
All Participants (n: 240)				
M	47.9	53.9	56.0	55.0
(SD)	32.3	31.5	31.1	33.3
M(adj)	47.6	52.8	56.6	55.7
(SE)	4.0	4.0	4.0	4.0
Non + Low-risk gamblers (n:120)				
M	40.8	55.4	54.8	53.6
(SD)	32.7	32.4	30.9	29.3
M(adj)	40.5	54.9	56.2	51.4
(SE)	5.6	5.6	5.6	5.6
Moderate-risk gambler (n:120)				
M	54.9	52.4	57.1	56.3
(SD)	30.9	31.0	31.9	37.3
M(adj)	54.7	50.7	57.1	59.9
(SE)	5.6	5.6	5.6	5.6

9.4.6 ATTITUDES TOWARDS THE PERSUASIVE ATTACK

A two-way ANCOVA was run to examine the effects of the inoculation intervention type and problem gambling severity on attitudes towards the persuasive attack at Phase 3 after controlling for baseline attitudes towards online casino bonuses. See Table 43. There was a statistically significant interaction between problem gambling severity and experimental condition on attitudes towards the persuasive attack at Phase 3, $F(3, 235) = 2.6$, $p = 0.04$, partial $\eta^2 = 0.03$. Therefore, an analysis of the simple main effects for problem gambling severity and inoculation intervention was performed.

TABLE 43. P3 ATTITUDES TOWARDS PERSUASIVE ATTACK

P3 Attitudes towards Persuasive Attack	Inoculation Conditions			
	Inoculation + Disclosure	Inoculation Alone	Disclosure Alone	Control
All Participants (n: 240)				
M	3.7	3.8	4.0	4.1
(SD)	1.4	1.3	1.5	1.6
M(adj)	3.7	3.8	4.0	4.2
(SE)	0.2	0.2	0.2	0.2
Non + Low-risk gamblers (n:120)				
M	3.5	4.0	4.1	3.9
(SD)	1.2	1.4	1.7	1.4
M(adj)	3.5	3.9	4.1	3.8
(SE)	0.2	0.2	0.2	0.2
Moderate-risk gambler (n:120)				
M	4.0	3.7	3.9	4.3
(SD)	1.5	1.3	1.4	1.7
M(adj)	3.9	3.6	3.9	4.6
(SE)	0.2	0.2	0.2	0.2

The effect of inoculation intervention on attitudes towards the persuasive attack at Phase 3 for the non + low-risk gambler group was not statistically significant, $F(3, 231) = 1.4$, $p = 0.2$, partial $\eta2 = 0.02$, whereas the effect of inoculation intervention for the moderate-risk gambler group was statistically significant, $F(3, 231) = 2.8$, $p = 0.04$, partial $\eta2 = 0.03$. Within the moderate-risk gambler group, the inoculation only condition group had less favourable attitudes towards the persuasive attack compared to the control group (i.e., no inoculation and no disclosure of persuasive intent during the attack) with a statistically significant difference of 0.9 in mean scores (95% CI, 0.07 to 1.9).

The effect of problem gambling severity on attitudes towards the persuasive attack at Phase 3 was only significant within the control condition (i.e., no inoculation and no disclosure of persuasive intent during attack), $F(1, 231) = 5.3$, $p = 0.02$, partial $\eta2 = 0.02$. For the control condition, the non + low-risk gambler group had less favourable attitudes towards the persuasive attack compared to the moderate-risk gambler group, with a statistically significant difference of 0.8 in mean scores (95% CI, 0.1 to 1.4).

A two-way ANCOVA was run to examine the effects of inoculation intervention type and problem gambling severity on the number of counterarguments at Phase 3 after controlling for baseline attitudes towards online casino bonuses. Means, adjusted means, standard deviations and standard errors are presented in Table 44. There was no statistically significant interaction between problem gambling severity and experimental condition on the number of counterarguments at Phase 3, $F(3, 231) = 0.7$, $p = 0.5$, partial $\eta2 = 0.009$. Therefore, the main effects of problem gambling severity and inoculation intervention were analysed.

TABLE 44. P3 COUNTERARGUMENTS

P3 Counterarguments	Inoculation Conditions			
	Inoculation + Disclosure	Inoculation Alone	Disclosure Alone	Control
All Participants (n: 240)				
M	3.4	2.4	2.1	2.5
(SD)	2.6	2.0	1.8	2.0
M(adj)	3.4	2.4	2.0	2.4
(SE)	0.3	0.3	0.3	0.3
Non + Low-risk gamblers (n:120)				
M	3.5	2.7	1.9	2.7
(SD)	2.7	2.1	1.5	2.1
M(adj)	3.5	2.7	1.9	2.7
(SE)	0.4	0.4	0.4	0.4
Moderate-risk gambler (n:120)				
M	3.2	2.0	2.2	2.2
(SD)	2.6	1.8	2.0	1.8
M(adj)	3.2	2.0	2.2	2.1
(SE)	0.4	0.4	0.4	0.4

There was a statistically significant main effect of the inoculation intervention type on the number of counterarguments, $F(3, 231) = 4.3$, $p = 0.005$, partial $\eta2 = 0.05$. The adjusted marginal mean score of counterarguments for the inoculation + disclosure condition was higher than the disclosure only condition, with a statistically significant difference of 1.3 in mean scores (95% CI, 0.3 to 2.3). That is, participants in the inoculation + disclosure condition generated more counterarguments than participants in the disclosure only condition. There was no statistically significant main effect of problem gambling severity on attitudes towards online casino bonuses, $F(1, 231)$

$=1.26$, $p = 0.26$, partial $\eta 2 = 0.005$.

9.4.8 DESIRE TO LEARN ABOUT THE DISCLOSURE STATEMENT

As shown in Figure 29, out of 120 participants who were shown the disclosure statement during the persuasive attack, only 28.4% stated that they would want to learn how persuasive features may impact their gambling behaviour. There was no significant difference in desire to learn based on gender, PGSI group or inoculation condition at Phase 2.
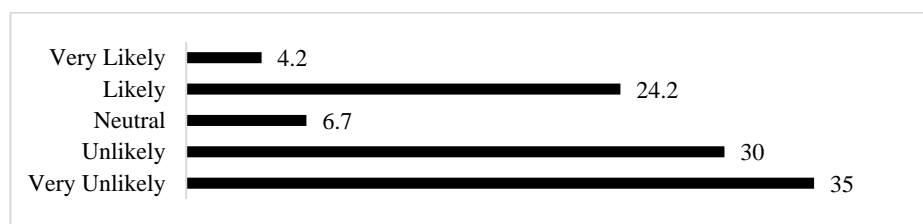
FIGURE 29. DESIRE TO LEARN MORE ABOUT THE DISCLOSURE STATEMENT

Participants who were asked how likely they were to click the "learn more" button were also asked to give a rationale for their answers. Figure 30 illustrates the rationale provided by the participants for their decision to either engage or not engage with the disclosure statement (i.e., *explainable persuasion*).
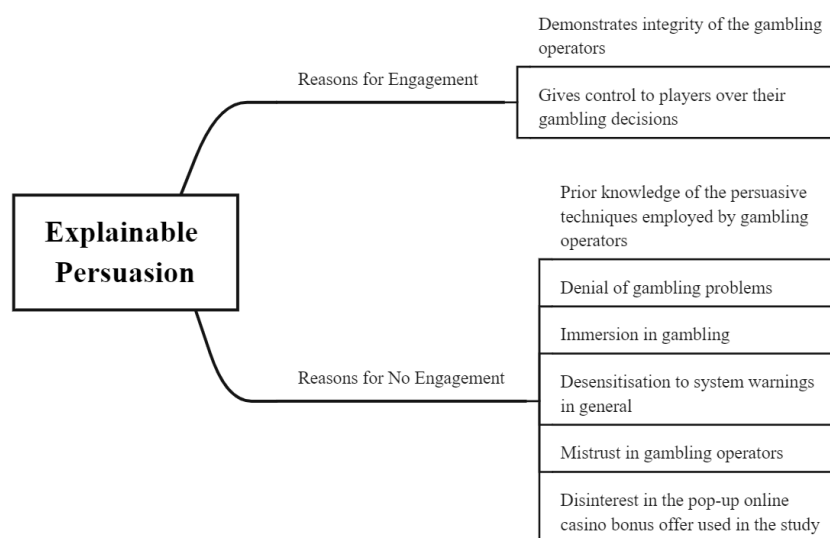
FIGURE 30. RATIONALE FOR ENGAGEMENT WITH EXPLAINABLE PERSUASION

Participants who stated that they would like to engage with the disclosure statement and learn more about how persuasive features may impact their gambling behaviour indicated that providing such explanations will show the integrity of the gambling operators and give control to players over their gambling decisions. One participant stated that such information could be especially beneficial when players are chasing losses, as interacting with the information can disrupt such harmful behaviour. Participants who said they would not engage with the disclosure statement and learn more about how persuasive features may impact their gambling behaviour indicated they would not be interested in such information. This lack of interest was due to prior knowledge of the persuasive techniques employed by gambling operators, denial of gambling issues, immersion in gambling, desensitisation to system warnings in general, and disinterest in the pop-up online casino bonus offer used in the study. Some participants expressed mistrust in gambling operators, claiming that such information will be "superficial" and offered just to comply with regulations. Several participants indicated concerns regarding the presentation of the disclosure statement. Participants claimed that the disclosure statement was difficult to read due to fine print and lengthy wording, neither of which encourage responsible gambling behaviour.

9.5 DISCUSSION

This chapter evaluated the effectiveness of *explainable persuasion* as an inoculation intervention in building resilience against persuasive design techniques used in online gambling platforms. Because the main effect of the inoculation intervention on Phase 2 threat levels was statistically significant, it was considered acceptable to test Inoculation Theory.

At Phase 2, the effect of the inoculation intervention (i.e., inoculation, no inoculation) and problem gambling severity were analysed. The inoculation intervention effectively

reduced positive attitudes towards online casino bonuses and lowered participants'

intention to claim online casino bonuses for both problem gambling severity groups.

Therefore, Phase 2 findings supported H1. This is comparable to inoculation studies in

other domains (Compton and Pfau 2004; Compton and Pfau 2008). In contrast, the

inoculation intervention was successful in increasing issue involvement levels with

responsible gambling for only moderate-risk gamblers at Phase 2. Within the moderate-

risk gambler group, the inoculation condition group had a higher issue involvement

level compared to the no inoculation group, while no difference was observed within

non + low-risk gambler groups. Therefore, Phase 2 findings supported H4. Also, for the

no inoculation condition, the non + low-risk gambler group had a higher issue

involvement level compared to the moderate-risk gambler group. This finding supported

H3. Such a difference in the findings may be attributable to participants' pre-existing

issue involvement levels. If issue involvement levels are extremely low or high, the

inoculation intervention will fail to generate threat since individuals might not worry

about their attitudes being attacked or may already have entrenched attitudes (Pfau et al.

1997; Compton and Pfau 2009). Accordingly, inoculation may have worked better for

the moderate-risk gambler group due to their level of issue involvement with

responsible gambling, which could be considered optimal. Also, given that the non +

low-risk gambler group may already be highly involved with responsible gambling, no

change may have been observed following the inoculation intervention. Since the non +

low-risk gambler group generally gambles within appropriate levels and may not be

concerned with problem gambling (Caillon et al. 2021), they may not have been

motivated to process the content of the inoculation video, which may have impacted the

results (Petty and Cacioppo 2012; Amazeen 2020).

At Phase 3, the effect of the inoculation intervention type (i.e., inoculation intervention

+ disclosure of persuasive intent during persuasive attack, inoculation intervention

alone, disclosure of persuasive intent during persuasive attack alone, and control) and problem gambling severity were analysed. The study revealed a discernible trend in the data suggesting that participants in inoculation intervention + disclosure condition reported the least positive attitudes towards online casino bonuses and persuasive attack, the least intention to claim online casino bonuses, and the highest number of counterarguments against online casino bonuses. This trend was followed by the participants in the inoculation intervention alone condition and disclosure alone condition, respectively. Therefore, Phase 3 findings provided support for H2.

There was no statistically significant main effect or two-way interaction on attitudes towards online casino bonuses and intention to claim online casino bonuses at Phase 3. This may be due to the amount of time between Phase 2 and Phase 3 (i.e., one week). Even though some researchers suggest that delay could be helpful for inoculation success (McGuire 1964), Banas and Rains's (2010) meta-analysis on inoculation research demonstrated that inoculation treatments may lose their effectiveness over time. People may feel more motivated to defend their attitudes right after inoculation intervention; however over time, this motivation may fade (Insko 1967). While evaluations for Phase 2 were carried out immediately after the inoculation phase, evaluations for Phase 3 were carried out one week after the inoculation phase was completed, meaning that the inoculation effect may have diminished.

In terms of attitudes towards the persuasive attack, the findings revealed a statistically significant interaction between problem gambling severity and inoculation intervention type on attitudes towards the persuasive attack. Within the moderate-risk gambler group, the inoculation only condition had less favourable attitudes towards the persuasive attack compared to the control group, while no difference was observed within non + low-risk gambler groups. Therefore, Phase 3 findings supported H4. This

finding is comparable to evidence suggesting that participants who are most susceptible to fake news benefit the most from inoculation intervention (Roozenbeek and van der Linden 2019a). In other words, the inoculation intervention benefited participants with a greater risk of problem gambling by elevating their negative attitudes towards the persuasive attack. Also, for the control condition (i.e., no inoculation and no disclosure of persuasive intent during attack), the non + low-risk gambler group had less favourable attitudes towards the persuasive attack compared to the moderate-risk gambler group. This finding supported H3.

Regarding counterarguments, the findings revealed a statistically significant main effect of inoculation intervention type on the number of counterarguments. The number of counterarguments for the inoculation + disclosure condition was higher than the disclosure only condition. Therefore, the findings showed that *explainable persuasion* has the potential to build resilience against persuasive interfaces when coupled with prior inoculation intervention. Compton (2013) indicated that in instances when the inoculation effect diminishes, booster doses may be used to maintain immunity against persuasive attacks. In this light, it is possible that *explainable persuasion* functioned as a just-in-time inoculation booster dose. This finding also provides support to the argument that threat itself is not as impactful as the threat paired with refutational pre-emption (McGuire and Papageorgis 1962). Regarding practical applications, similar to multimedia tools used for cybersecurity awareness and education (Zhang-Kennedy and Chiasson 2021), short films and animations, digital games, comics and learning modules could be utilised for inoculation, and *explainable persuasion* could be utilised as a booster dose to sustain the inoculation effect. Such an application may also function as a proactive measure to reduce the habituation effect that may occur with repeated exposure to inoculation content. Habituation happens when a user becomes less responsive to stimuli after repeated exposure (Kim and Wogalter 2009). Thus, by

appearing as salient stimuli, *explainable persuasion* may mitigate the negative effect of habituation.

In terms of the likelihood of engaging with disclosure statements during persuasive attacks, only 28.4% of participants reported wanting to learn how persuasive features may impact their gambling. This lack of interest was attributable to prior knowledge of the persuasive techniques employed by gambling operators, denial of gambling issues, immersion in gambling, desensitisation to system warnings in general, disinterest in the pop-up online casino bonus offer used in the study and mistrust in gambling operators. Similar findings were reported by Cemiloglu et al. (2023a).

The next chapter discusses the thesis contribution, conclusion, and future work.

10. CHAPTER 10: DISCUSSION, FUTURE WORK AND CONCLUSION

Persuasive systems are defined as "information systems designed to reinforce, change or shape attitudes or behaviours or both without using coercion or deception" (Oinas-Kukkonen and Harjumaa 2009, P486). Whether designed for self-directed behaviour change or to enhance user involvement in systems, persuasive systems are generally aligned with user interest. However, given that persuasive systems influence users' cognitive or emotional state (Oinas-Kukkonen 2013), ethical concerns may arise (Spahn 2012; Karppinen and Oinas-Kukkonen 2013). This is more likely to be the case when persuasion is not self-directed but designed to influence for the advantage of a third party (Spahn 2012). For example, interactive online platforms utilise persuasive interfaces to maximise user engagement, such as social networks, gaming, and online gambling platforms. When interacting with persuasive interfaces, users may be unaware that they are being persuaded (Atkinson 2006; Smids 2012) or may be unaware that interacting with persuasive interfaces may produce unintended consequences (Berdichevsky and Neuenschwander 1999). This can hinder the user's ability to evaluate the persuasion attempt as well as to reflect and direct their behaviour (Timmer et al. 2015). Moreover, persuasive interfaces designed to maximise user engagement may, in some cases, trigger or reinforce addictive usage (Alrobai et al. 2014; Ali et al. 2015; Kuonanoja and Oinas-Kukkonen 2018; Cemiloglu et al. 2021b). Concerns regarding system persuasion may increase when the persuasion target is an emotionally or cognitively vulnerable group (Davis 2009).

While different approaches were taken to discuss the role of ethics in persuasive technology, transparency and user voluntariness were suggested to be important factors in building ethical persuasive interfaces (Atkinson 2006; Smids 2012; Barral et al. 2014; Timmer et al. 2015). However, to date, the concept of transparent persuasive technology

mainly remained philosophical in academia (Atkinson 2006; Smids 2012; Barral et al. 2014; Timmer et al. 2015). This thesis addressed the design of ethical persuasive interfaces and proposes *explainable persuasion* as a potential solution to address issues related to system transparency, ethics, and user control, particularly within persuasive interfaces where emotions can bias decision-making (Hinson et al. 2006). This thesis utilised a case study as its research strategy and took online gambling as an example of an extreme case since gambling can be addictive. The thesis utilised a mixed method approach and conducted a scoping review, an online survey and an online experiment to obtain data for the case study. The findings from these studies helped investigate whether persuasive interfaces can trigger or expedite addictive behaviour, explore user awareness of persuasive design techniques used in online gambling platforms and users' attitudes towards the concept of *explainable persuasion*. The findings also helped examine user acceptance and rejection factors of *explainable persuasion* and evaluate the effectiveness of *explainable persuasion* as an inoculation intervention in building resilience against persuasive design techniques used in online gambling platforms.

Section **10.1** revisits research questions and objectives, Section **10.2** describes contributions to knowledge, Section **10.3** states limitations of the thesis, and Section **10.4** discusses potential future work.

10.1 RESEARCH QUESTIONS AND OBJECTIVES REVISITED

Objective 1: Define the concept of *explainable persuasion* in the context of persuasive interfaces.

The concept of *explainable persuasion* was offered as a solution to design ethical persuasive interfaces. With an analogy to XAI, the concept of *explainable persuasion* was defined as the system's transparency about its persuasion attempts so that users can

choose to be conscious of how system design may alter their behaviour and can consent to be subject to it. A literature review was undertaken on persuasive technologies, gambling disorder, resistance to persuasion, system transparency, and system explainability to determine the primary boundaries and function of *explainable persuasion* in the context of persuasive interfaces.

Objective 2: Analyse the relationship between persuasive design techniques and gambling disorder.

A literature synthesis was conducted to examine gambling disorder through addiction theories to understand etiological factors that give rise to addictive symptoms. As the second step, a scoping review was conducted to identify the main persuasive design techniques used in online gambling platforms by examining the gambling literature and analysing online gambling platforms. Through the scoping review, 19 persuasive design techniques used by online gambling platforms were identified. Later, the researcher hypothesised potential associations between gambling disorder and the identified persuasive design techniques in light of etiological factors that give rise to gambling disorder.

Objective 3: Explore users' awareness of the use, intent and impact of persuasive design techniques utilised in online gambling platforms.

The researcher conducted an online survey to examine whether users were aware of the use, intent and potential negative impact of the main persuasive design techniques utilised in online gambling platforms. This objective contributed to a better understanding of user awareness of persuasive interfaces used in online gambling platforms and whether demographic or psychometric factors (i.e., problem gambling severity) contribute to it. Findings showed that users were aware of the use, persuasive intent, and potential harm of various persuasive design techniques used in online

gambling platforms. The findings also showed a mismatch between self-reported susceptibility and susceptibility assigned to others, such that users assigned higher susceptibility scores to others than to themselves for each persuasive design category. Moreover, users agreed that persuasive design techniques may lead to problem gambling.

Objective 4: Explore users' attitudes towards the concept of *explainable persuasion*.

The researcher explored the concept of *explainable persuasion* from the user's perspective with the online survey mentioned in Objective 3. Users were asked whether they agreed that *explainable persuasion* can help players stay more in control of their gambling. Users were also asked about the delivery and presentation of *explainable persuasion,* what content they required from the explanation, and what they would think about operators that employ it. Although most users were aware that gambling sites use persuasive design techniques, the majority found the concept of *explainable persuasion* helpful and agreed that it could assist players in maintaining greater control over their gambling. Users considered information regarding the usage, potential negative impact, and coping tactics to be the most important components of *explainable persuasion*. More than half the users stated that their attitudes towards gambling operators would become positive if the operators provided *explainable persuasion*, as such a practice would reflect the operators' integrity.

Objective 5: Determine the user acceptance and rejection factors of *explainable persuasion*.

With the online survey mentioned in Objective 3, the researcher explored user acceptance and rejection factors of *explainable persuasion*. UTAUT2 (Venkatesh et al. 2012) was used to analyse and categorise user responses to acceptance and rejection

factors. Based on the findings, the researcher further identified design tensions that could prohibit players from interacting with *explainable persuasion* and provided solutions to address these tensions. The identified design tensions were i) user autonomy versus mandatory interaction, ii) concise explanations versus fostering comprehension, iii) interrupting primary task versus not hindering user experience, iv) constant exposure versus desensitisation, and v) caring versus patronising. By identifying user acceptance and rejection factors and further exploring design tensions, this objective helped optimise *explainable persuasion* design for a better user experience and higher retention.

Objective 6: Evaluate whether *explainable persuasion* can be adopted as an inoculation intervention to build resilience against persuasive design techniques used in online gambling platforms.

The researcher examined whether *explainable persuasion* can be used as an inoculation intervention within online gambling platforms. An online psychological inoculation study was conducted to address Objective 6. The study examined the inoculation effect of *explainable persuasion* on the persuasive design technique, in-game rewards (i.e., pop-up online casino bonus). The findings showed that in terms of generating counterarguments against persuasive design techniques, in-game reward, inoculation coupled with a disclosure statement of persuasive intent during the persuasive attack (i.e., *explainable persuasion*) was more effective than disclosure only for both low and moderate-risk gamblers.

10.2   CONTRIBUTION TO KNOWLEDGE

The main contributions of this thesis are as following.

Scientific Contributions

- This thesis contributed to the concept of transparent persuasive technology, which mainly remained philosophical in academia (Atkinson 2006; Smids 2012; Barral et al. 2014; Timmer et al. 2015). This thesis proposed *explainable persuasion* as a potential solution to address issues related to system transparency, ethics, and user control in persuasive interfaces. Moreover, the thesis evaluated the effectiveness of *explainable persuasion* as an inoculation intervention to build resilience against persuasive design techniques used in online platforms.

- This thesis contributed to transparency and explainability literature as it was one of the first attempts to examine the role of explainability in the domain of persuasive technology. The thesis identified explainability requirements *of explainable persuasion* as well as user acceptance and rejection factors, defined design tensions that could prohibit players from interacting with *explainable persuasion* and offered solutions to these design tensions. Identifying explainability requirements and design solutions of *explainable persuasion* may assist in the design of ethical persuasive interfaces that encourage informed use with improved user experience and increased retention. The contribution of the thesis may extend beyond persuasive technology, and *explainable persuasion* design solutions can be applied to other domains. Research areas such as combatting fake news and social engineering could also benefit from *explainable persuasion* in assisting informed decision-making. Also, *explainable persuasion* design solutions can be applied to domains in which notices are frequently viewed as distractions from the user's primary task (Iqbal and Horvitz 2010; Shepherd and Renaud 2018).

- While most research has focused on the Persuasion Knowledge Model within

traditional modes of persuasion, such as advertising and marketing (Ham et al. 2015), persuasive technology has not been the subject of considerable research. This thesis contributed to the literature on persuasive technology by using the persuasion knowledge model as a reference model to assess users' knowledge about the new range of digital persuasive techniques.

– This thesis contributed to ethical persuasive technology literature by identifying potential associations between persuasive design techniques and addiction in digital space. Identifying such associations can facilitate developing frameworks to design responsible technology through proactive (e.g., psychometric tests) and reactive measures (e.g., self-regulation tools). Accordingly, the explanation cards designed for the 13 persuasive design techniques for the current research could be utilised in gambling or in other domains.

Applied Contributions

– The concept of *explainable persuasion* contributes to ethics in software engineering by aligning with the principles outlined in the software engineering code of ethics (Anderson 1992; Aydemir and Dalpiaz 2018). By implementing *explainable persuasion* in persuasive interfaces, software engineers can avoid harm, maintain honesty, and uphold trustworthiness. Moreover, software engineers can fulfil their professional responsibility by providing accurate evaluations of persuasive interfaces. This will allow users to assess the impact of persuasive interfaces on their choices and empower them to make informed decisions. Thus, implementing *explainable persuasion* in persuasive interfaces prioritises user rights and can help promote an ethical and trustworthy online environment.

– The findings of the thesis have important implications for gambling operators

and regulators in expanding the scope of responsible gambling practices (Blaszczynski et al. 2004; Blaszczynski et al. 2008a; Blaszczynski et al. 2011; Collins et al. 2015; Shaffer et al. 2016). The findings can guide gambling operators in designing responsible online gambling platforms and aid policymakers in formulating responsible gambling policies regarding transparency and informed consent. Also, the findings related to susceptibility to persuasion can be utilised to identify vulnerable user groups that show high susceptibility to certain persuasive design techniques, and social-norm interventions can be applied to correct the misperceptions regarding the influence of persuasive interfaces.

10.3 THREATS TO VALIDITY

10.3.1 SURVEY STUDY

The study needs to be interpreted with considerations to validity that may have impacted the findings.

In terms of construct validity, one consideration is the completeness of the persuasive design techniques presented in the study. While the researcher acknowledges that the list of persuasive design techniques is not complete, the purpose of the list is to gain insight into commonly used persuasive design techniques in online gambling platforms in order to guide the conceptualisation and design of *explainable persuasion*. The analysis was mainly guided by the PSD model (Oinas-Kukkonen and Harjumaa 2009), which is a theoretically valid framework for building and analysing persuasive systems. PSD model is used in research to detect the various persuasive features used in e-commerce websites or apps and how persuasive techniques can increase persuasiveness (Langrial et al. 2012; Alhammad and Gulliver 2014; Adib and Orji 2021). To address the concern with completeness, the analysis was also informed by Cialdini's (2001)

work on principles of persuasion and McCormack and Griffiths's (2013) work on structural and situational characteristics of internet gambling. Relevant persuasive design techniques were extracted from these models and exemplified for the study. The list of persuasive design techniques can be expanded in future research, for example, by utilising persuasive techniques defined in advertising and marketing (O'Shaugnessy and O'Shaughnessy 2003). Another threat to the construct validity of the study could be the potential lack of understanding of explanation cards. Participants with lower education levels might have struggled to understand the explanation cards for persuasive design techniques. Specifically, 20% of the participants had only completed compulsory school education or vocational training. This subset of participants' limited comprehension raises concerns about whether the intended constructs were accurately assessed or understood by them. To mitigate this concern, the explanation cards were designed to include gambling interfaces that displayed examples of persuasive techniques commonly employed in online gambling websites.

Considering internal validity, one consideration is behaviour bias. The majority of the participants were biased against persuasive design techniques, as 91.6% of the participants agreed or strongly agreed that persuasive design techniques may contribute to problem gambling before viewing the explanation cards. This bias could be related to the negative perception of gambling. Studying *explainable persuasion* in other persuasive domains, such as e-commerce, could help minimise this bias. Another internal validity consideration could relate to the maturation effect due to the length of the study. Since the survey took approximately 30 minutes to complete, some participants may have become bored, and this may have impacted their responses. The order in which the 13 persuasive design technique explanation cards were presented was randomised to reduce this impact.

Participant selection could have been an external validity consideration. The majority of the participants were recruited from the United Kingdom, and this can pose a threat to validity in terms of the generalisability of the findings internationally. It has been suggested that cultural attitudes can influence gambling and help-seeking behaviours and that cultures that value gambling are more susceptible to gambling problems than cultures that do not have favourable cultural attitudes towards gambling (Raylu and Oei 2004; McMillen et al. 2007). Thus, cross-cultural research is needed to understand the concept of *explainable persuasion* from the standpoint of gamblers in different cultural contexts. In exploring *explainable persuasion* from users' perspectives, a distinct domain for persuasive technology, online gambling, was selected as a case study. This selection may also be an external validity consideration as the gambler profile may not represent the general user attitudes towards system persuasion in other domains, such as social media or online streaming platforms. Also, persuasive design techniques employed in online gambling platforms may differ from persuasive design techniques employed in other domains. Future research should examine the concept of *explainable persuasion* in other domains that utilise persuasive interfaces.

Lastly, the reliability of the findings may have been affected as participants were compensated for their participation. Given that gamblers have a higher demand for money, providing compensation could have threatened the validity of their participation, as participants could have rushed through the survey to get paid. To reduce this potential impact, three attention checks were added to the survey. Moreover, seven open-ended questions were included in the survey.

10.3.2   INOCULATION STUDY

This inoculation study has a number of limitations. In terms of internal validity, one consideration is social desirability bias. Participants' reported base issue involvement

level with responsible gambling was 6.3 (SD = 0.7), with seven being the highest value. Some participants may have been dishonest about their involvement with responsible gambling in order to appear in a favourable light. This may have hindered the ability to observe the change in issue involvement after inoculation intervention. Another consideration is related to the utilisation of the persuasive design technique in-game rewards (i.e., pop-up online casino bonus) for the inoculation study. As Cemiloglu et al. (2023a) report, in a free recall setting, the most recalled persuasive design technique was in-game rewards (74.4%). Since participants were aware of the use of in-game rewards, the inoculation intervention might have been less effective since players already apply contesting strategies against rewards. Future research can utilise persuasive design techniques that are less well-recognised, such as self-monitoring or social norms.

Considering ecological validity, one consideration is the pop-up online casino bonus used in the study. It is possible that the graphical design or the offer of the pop-up online casino bonus did not resemble those used in online gambling platforms, and as a result, the participants did not find it to be realistic. Even so, the use of the pop-up online casino bonus served as a useful template to evaluate the effectiveness of *explainable persuasion* in building resilience against persuasive design techniques used in online gambling platforms.

Another consideration is related to external validity. Because the findings are based on a controlled experiment, it is likely that in real life, individuals may respond differently, or not at all, to *explainable persuasion*. Due to the immersion effect of gambling, users may overlook explanations in real life and lose the ability to perceive external stimuli (Schüll 2012; Murch et al. 2020).

Lastly, the predictive validity of the findings also needs to be considered. The current study focused on changes in attitudes and intention but not actual behaviours. According to research, a change in attitude does not necessarily lead to a change in behaviour, and variables such as ability and motivation might influence the link between the two (Bada et al. 2019). Also, users' perception of susceptibility to persuasive design techniques may impact how they interact with potentially addictive platforms.

10.4   FUTURE WORK

Overall, the findings of this thesis suggest that *explainable persuasion* may increase awareness of the presence and risks of persuasive interfaces, ease the detection of persuasive design techniques, and strengthen user resistance if they are not aligned with personal goals. Moreover, the findings showed that *explainable persuasion* has the potential to function as both a preventative and a corrective approach for protecting users in the online gambling domain.

Future research is required to realise the potential of utilising *explainable persuasion* in other domains and investigate if it is effective as a preventive and a corrective approach for protecting users. The relation between *explainable persuasion* and ethical design requirements also requires further research. Although transparency typically has positive connotations, its implementation may not lead to desired impact, for example, due to information overload and lack of personalisation in the content and method of delivery. The findings revealed varying responses to *explainable persuasion* based on age and level of need for cognition, and this necessitates the identification of the various user groups' requirements and designing *explainable persuasion* accordingly.

The findings of the inoculation study showed that *explainable persuasion* could be a

cost-effective way to sustain resilience against persuasive interfaces and attenuate excessive gambling behaviour. Nevertheless, future research can examine how to deliver explanations based on mode, depth of information processing, framing, timing, and frequency, as these factors are important for attention switching, maintenance, and communication processing. For example, research has shown that messages designed to encourage players to reflect, self-evaluate, and self-regulate are more effective than those that focus on informing players of the hazards associated with gambling (Monaghan and Blaszczynski 2009). Also, it was suggested that inoculation is more effective when delivered multiple times over a period of time (Ivanov et al. 2018).

It has been suggested that awareness on its own may not be a significant predictor of an individual's ability to resist influence and that resistance may be enhanced by other design elements (Bongard-Blanchy et al. 2021). For example, Bongard-Blanchy et al. (2021) suggested employing design frictions and training games to induce user reflection and encourage more mindful interactions. With a similar approach, future research can investigate whether design elements or persuasive design techniques might encourage engagement with *explainable persuasion* and impact behaviour.

Future research could also assess the role of personal variables (e.g., demographics and psychometric factors) and user intentions, attitudes, and beliefs in engaging with *explainable persuasion*. The explanation may also need to go against user preferences, when necessary, for example, by making the interaction mandatory, especially when they are implemented as interventions and behaviour change mechanics. Such research needs to identify those cases, maintaining a balance between the ethical requirements of technology providers and the user experience.

REFERENCES

Adib, A. and Orji, R., 2021. A Systematic Review of Persuasive Strategies in Mobile E-Commerce Applications and Their Implementations. *International Conference on Persuasive Technology*. Springer. 217-230. DOI: 10.1007/978-3-030-79460-6_18.

Adolphe, A., Khatib, L., van Golde, C., Gainsbury, S. M. and Blaszczynski, A., 2019. Crime and gambling disorders: A systematic review. *Journal of Gambling Studies*, 35 (2), 395-414. DOI: 10.1007/s10899-018-9794-7.

Ainslie, G. and Monterosso, J., 2003. Chapter 2 - Hyperbolic Discounting as a Factor in Addiction: A critical Analysis. *In:* Vuchinich, R. E. and Heather, N., eds. *Choice, Behavioural Economics and Addiction.* Amsterdam: Pergamon, 35-69 DOI: 10.1016/B978-008044056-9/50043-9.

Ajzen, I., 1991. The theory of planned behavior. *Organizational behavior and human decision processes*, 50 (2), 179-211. DOI: 10.1016/0749-5978(91)90020-T.

Akers, R. L. and Cochran, J. K., 1985. Adolescent marijuana use: A test of three theories of deviant behavior. *Deviant Behavior*, 6 (4), 323-346. DOI: 10.1080/01639625.1985.9967683.

Akers, R. L., Krohn, M. D., Lanza-Kaduce, L. and Radosevich, M., 1995. Social Learning and Deviant Behavior: A Specific Test of a General Theory. *In:* McCord, J. and Laub, J. H., eds. *Contemporary Masters in Criminology.* Boston, MA: Springer US, 187-214 DOI: 10.1007/978-1-4757-9829-6_12.

Alavi, S. S., Ferdosi, M., Jannatifard, F., Eslami, M., Alaghemandan, H. and Setare, M., 2012. Behavioral addiction versus substance addiction: Correspondence of psychiatric and psychological views. *International journal of preventive medicine*, 3 (4), 290.

Alessi, S. and Petry, N. M., 2003. Pathological gambling severity is associated with impulsivity in a delay discounting procedure. *Behavioural processes*, 64 (3), 345-354. DOI: 10.1016/S0376-6357(03)00150-5.

Alhammad, M. M. and Gulliver, S. R., 2014. Online Persuasion for E-Commerce Websites. *Proceedings of the 28th International BCS Human Computer Interaction Conference on HCI 2014-Sand, Sea and Sky-Holiday HCI*. 264-269. DOI: 0.14236/ewic/HCI2014.42.

Ali, R., Jiang, N., Phalp, K., Muir, S. and McAlaney, J., 2015. The Emerging Requirement for Digital Addiction Labels. Cham. Springer International Publishing. 198-213. DOI: 10.1007/978-3-319-16101-3_13.

Allport, F. H., 1924. *Social psychology*. Boston, Houghton.

Alonso, V. and De La Puente, P., 2018. System transparency in shared autonomy: A mini review. *Frontiers in neurorobotics*, 12, 83. DOI: 10.3389/fnbot.2018.00083.

Alquist, J. L. and Baumeister, R. F., 2012. Self-control and addiction. DOI: 10.1037/13751-008.

Alrobai, A., Phalp, K. and Ali, R., 2014. Digital Addiction: A Requirements Engineering Perspective. *In:* Salinesi, C. and van de Weerd, I., eds. *Requirements Engineering: Foundation for Software Quality*, Cham 2014//. Springer International Publishing. 112-118. DOI: 10.1007/978-3-319-05843-6_9.

Alter, A., 2017. *Irresistible: The rise of addictive technology and the business of keeping us hooked*. Penguin.

Amazeen, M. A., 2020. Resisting covert persuasion in digital news: Comparing inoculation and reactance in the processing of native advertising disclosures and in article engagement intentions. *Journalism & Mass Communication Quarterly*, 1077699020952131. DOI: 10.1177/1077699020952131.

Amazeen, M. A. and Vargo, C. J., 2021. Sharing Native Advertising on Twitter: Content Analyses Examining Disclosure Practices and Their Inoculating Influence. *Journalism Studies*, 1-18. DOI: 10.1080/1461670X.2021.1906298.

Amazeen, M. A. and Wojdynski, B. W., 2019. Reducing native advertising deception: Revisiting the antecedents and consequences of persuasion knowledge in digital news contexts.

Mass Communication and Society, 22 (2), 222-247. DOI: 10.1080/15205436.2018.1530792.

Amazeen, M. A. and Wojdynski, B. W., 2020. The effects of disclosure format on native advertising recognition and audience perceptions of legacy and online news publishers. *Journalism*, 21 (12), 1965-1984. DOI: 10.1177/1464884918754829.

American Psychiatric Association, 2013. Diagnostic and statistical manual of mental disorders: DSM-5. *Arlington, VA*.

Amiribesheli, M., Hosseini, M. and Bouchachia, H., 2016. A principle-based transparency framework for intelligent environments. *Proceedings of the 30th International BCS Human Computer Interaction Conference 30*. 1-6. DOI: 10.14236/ewic/HCI2016.68.

Amsel, A., 1958. The role of frustrative nonreward in noncontinuous reward situations. *Psychological bulletin*, 55 (2), 102. DOI: 10.1037/h0043125.

Anderson, R. E., 1992. ACM code of ethics and professional conduct. *Communications of the ACM*, 35 (5), 94-99.

Anolli, L., Mantovani, F., Confalonieri, L., Ascolese, A. and Peveri, L., 2010. Emotions in serious games: From experience to assessment. *International Journal of Emerging Technologies in Learning (iJET)*, 5 (2010). DOI: 10.3991/ijet.v5iSI3.1496.

Anvari, F., Richards, D., Hitchens, M., Babar, M. A., Tran, H. M. T. and Busch, P., 2017. An empirical investigation of the influence of persona with personality traits on conceptual design. *Journal of Systems and Software*, 134, 324-339. DOI: 10.1016/j.jss.2017.09.020.

Arden-Close, E., Bolat, E., Vuillier, L. and Ali, R., 2022. Perceptions of Interactive, Real-Time Persuasive Technology for Managing Online Gambling. 28-42. DOI: 10.1007/978-3-030-98438-0_3.

Asch, S. E., 1956. Studies of independence and conformity: I. A minority of one against a unanimous majority. *Psychological Monographs: General and Applied*, 70 (9), 1-70. DOI: 10.1037/h0093718.

Atkinson, B. M. C., 2006. Captology: A Critical Review. *In:* Ijsselsteijn, W. A., de Kort, Y. A. W., Midden, C., Eggen, B. and van den Hoven, E., eds. *Persuasive Technology*, Berlin, Heidelberg 2006//. Springer Berlin Heidelberg. 171-182. DOI: 10.1007/11755494_25.

Auer, M. M. and Griffiths, M. D., 2016. Personalized behavioral feedback for online gamblers: A real world empirical study. *Frontiers in Psychology*, 1875. DOI: 10.3389/fpsyg.2016.01875.

Auger, N., Lo, E., Cantinotti, M. and O'Loughlin, J., 2010. Impulsivity and socio-economic status interact to increase the risk of gambling onset among youth. *Addiction*, 105 (12), 2176-2183. DOI: 10.1111/j.1360-0443.2010.03100.x.

Aydemir, F. B. and Dalpiaz, F., 2018. A roadmap for ethics-aware software engineering. *Proceedings of the International Workshop on Software Fairness*, Gothenburg, Sweden. Association for Computing Machinery. 15–21. DOI: 10.1145/3194770.3194778.

Back, K.-J., Lee, C.-K. and Stinchfield, R., 2011. Gambling motivation and passion: A comparison study of recreational and pathological gamblers. *Journal of Gambling Studies*, 27 (3), 355-370. DOI: 10.1007/s10899-010-9212-2.

Bada, M., Sasse, A. M. and Nurse, J. R., 2019. Cyber security awareness campaigns: Why do they fail to change behaviour? *arXiv preprint arXiv:1901.02672*. DOI: 10.48550/arXiv.1901.02672.

Bagby, R. M., Vachon, D. D., Bulmash, E. L., Toneatto, T., Quilty, L. C. and Costa, P. T., 2007. Pathological gambling and the five-factor model of personality. *Personality and Individual Differences*, 43 (4), 873-880. DOI: 10.1016/j.paid.2007.02.011.

Baker, T. B., Piper, M. E., McCarthy, D. E., Majeskie, M. R. and Fiore, M. C., 2004. Addiction motivation reformulated: an affective processing model of negative reinforcement. *Psychological review*, 111 (1), 33. DOI: 10.1037/0033-295X.111.1.33.

Banas, J. A. and Miller, G., 2013. Inducing resistance to conspiracy theory propaganda: Testing inoculation and metainoculation strategies. *Human Communication Research*, 39 (2), 184-207. DOI: 10.1111/hcre.12000.

Banas, J. A. and Rains, S. A., 2010. A meta-analysis of research on inoculation theory. *Communication Monographs*, 77 (3), 281-311. DOI: 10.1080/03637751003758193.

Bandura, A., 1977. *Social learning theory*. Prentice-hall.

Bandura, A., 1986. Social foundations of thought and action: A social cognitive theory. *Social foundations of thought and action: A social cognitive theory.* Englewood Cliffs, NJ, US: Prentice-Hall, Inc, xiii, 617-xiii, 617.

Bandura, A., 2001. Social cognitive theory: An agentic perspective. *Annual review of psychology*, 52 (1), 1-26. DOI: 10.1146/annurev.psych.52.1.1.

Bandura, A., Freeman, W. H. and Lightsey, R., 1999. Self-efficacy: The exercise of control. *Journal of Cognitive Psychotherapy*, 13 (2). DOI: 10.1891/0889-8391.13.2.158.

Bang, M., Torstensson, C. and Katzeff, C., 2006. The powerhhouse: A persuasive computer game designed to raise awareness of domestic energy consumption. *International conference on persuasive technology*. Springer. 123-132. DOI: 10.1007/11755494_33.

Barral, O., Aranyi, G., Kouider, S., Lindsay, A., Prins, H., Ahmed, I., Jacucci, G., Negri, P., Gamberini, L., Pizzi, D. and Cavazza, M., 2014. Covert Persuasive Technologies: Bringing Subliminal Cues to Human-Computer Interaction. *In:* Spagnolli, A., Chittaro, L. and Gamberini, L., eds. *Persuasive Technology*, Cham 2014//. Springer International Publishing. 1-12. DOI: 10.1007/978-3-319-07127-5_1.

Barton, B., Zlatevska, N. and Oppewal, H., 2022. Scarcity tactics in marketing: A meta-analysis of product scarcity effects on consumer purchase intentions. *Journal of Retailing*, 98 (4), 741-758. DOI: 10.1016/j.jretai.2022.06.003.

Barton, K., Yazdani, Y., Ayer, N., Kalvapalle, S., Brown, S., Stapleton, J., Brown, D. and Harrigan, K., 2017. The effect of losses disguised as wins and near misses in electronic gaming machines: A systematic review. *Journal of gambling studies*, 33 (4), 1241-1260. DOI: 10.1007/s10899-017-9688-0.

Baumeister, R. F. and Heatherton, T. F., 1996. Self-regulation failure: An overview. *Psychological inquiry*, 7 (1), 1-15. DOI: 10.1207/s15327965pli0701_1.

Baumeister, R. F. and Vonasch, A. J., 2015. Uses of self-regulation to facilitate and restrain addictive behavior. *Addictive behaviors*, 44, 3-8. DOI: 10.1016/j.addbeh.2014.09.011.

Becker, G. S. and Murphy, K. M., 1988. A theory of rational addiction. *Journal of political Economy*, 96 (4), 675-700. DOI: 10.1086/261558.

Benner, D., Schöbel, S. and Janson, A., 2021. It is only for your own good, or is it? Ethical Considerations for Designing Ethically Conscious Persuasive Information Systems. *Americas Conference on Information Systems (AMCIS)*. Association for Information Systems.

Berdichevsky, D. and Neuenschwander, E., 1999. Toward an ethics of persuasive technology. *Communications of the ACM*, 42 (5), 51-58. DOI: 10.1145/301353.301410.

Bergevin, T., Gupta, R., Derevensky, J. and Kaufman, F., 2006. Adolescent gambling: Understanding the role of stress and coping. *Journal of gambling studies*, 22 (2), 195-208. DOI: 10.1007/s10899-006-9010-z.

Bergmans, A. and Shahid, S., 2013. Reducing speeding behavior in young drivers using a persuasive mobile application. *International Conference on Human-Computer Interaction*. Springer. 541-550. DOI: 10.1007/978-3-642-39262-7_61.

Berthon, P., Pitt, L. and Campbell, C., 2019. Addictive De-Vices: A Public Policy Analysis of Sources and Solutions to Digital Addiction. *Journal of Public Policy & Marketing*, 38 (4), 451-468. DOI: 10.1177/0743915619859852.

Bickel, W. K. and Marsch, L. A., 2001. Toward a behavioral economic understanding of drug dependence: delay discounting processes. *Addiction*, 96 (1), 73-86. DOI: 10.1046/j.1360-0443.2001.961736.x.

Binde, P., 2009. Exploring the impact of gambling advertising: An interview study of problem gamblers. *International journal of mental health and addiction*, 7 (4), 541-554. DOI: 10.1007/s11469-008-9186-9.

Bjerg, O., 2010. Problem gambling in poker: Money, rationality and control in a skill-based social game. *International Gambling Studies*, 10 (3), 239-254. DOI: 10.1080/14459795.2010.520330.

Bjørseth, B., Simensen, J. O., Bjørnethun, A., Griffiths, M. D., Erevik, E. K., Leino, T. and Pallesen, S., 2021. The effects of responsible gambling pop-up messages on gambling behaviors and cognitions: A systematic review and meta-analysis. *Frontiers in Psychiatry*, 11, 601800. DOI: 10.3389/fpsyt.2020.601800.

Black, D. W., Monahan, P. O., Temkit, M. H. and Shaw, M., 2006. A family study of pathological gambling. *Psychiatry Research*, 141 (3), 295-303. DOI: 10.1016/j.psychres.2005.12.005.

Blaszczynski, A., Collins, P., Fong, D., Ladouceur, R., Nower, L., Shaffer, H. J., Tavares, H. and Venisse, J.-L., 2011. Responsible gambling: General principles and minimal requirements. *Journal of gambling Studies*, 27 (4), 565-573. DOI: 10.1007/s10899-010-9214-0.

Blaszczynski, A., Ladouceur, R., Nower, L. and Shaffer, H., 2008a. Informed choice and gambling: Principles for consumer protection. *The Journal of Gambling Business and Economics*, 2 (1), 103-118. DOI: 10.5750/jgbe.v2i1.527.

Blaszczynski, A., Ladouceur, R. and Shaffer, H. J., 2004. A science-based framework for responsible gambling: The Reno model. *Journal of Gambling studies*, 20 (3), 301-317. DOI: 10.1023/B:JOGS.0000040281.49444.e2.

Blaszczynski, A., McConaghy, N. and Frankova, A., 1990. Boredom proneness in pathological gambling. *Psychological reports*, 67 (1), 35-42. DOI: 10.2466/pr0.1990.67.1.3.

Blaszczynski, A. and Nower, L., 2002. A pathways model of problem and pathological gambling. *Addiction*, 97 (5), 487-499. DOI: 10.1046/j.1360-0443.2002.00015.x.

Blaszczynski, A., Walker, M., Sharpe, L. and Nower, L., 2008b. Withdrawal and tolerance phenomenon in problem gambling. *International Gambling Studies*, 8 (2), 179-192. DOI: 10.1080/14459790802140007.

Blum, K., Sheridan, P. J., Wood, R. C., Braverman, E. R., Chen, T. J. H., phd, J. G. C. and Comings, D. E., 1996. The D2 Dopamine Receptor Gene as a Determinant of Reward Deficiency Syndrome. *Journal of the Royal Society of Medicine*, 89 (7), 396-400. DOI: 10.1177/014107689608900711.

Blume, A. W. and Schmaling, K. B., 1996. Loss and readiness to change substance abuse. *Addictive Behaviors*, 21 (4), 527-530. DOI: 10.1016/0306-4603(95)00079-8.

Bolat, E., Arden-Close, E. and Ali, R., 2019. Building a responsible ecosystem: examining trust and responsibility in the gambling industry: Bournemouth: Bournemouth University Publishment.

Bongard-Blanchy, K., Rossi, A., Rivas, S., Doublet, S., Koenig, V. and Lenzini, G., 2021. ” I am Definitely Manipulated, Even When I am Aware of it. It's Ridiculous!”-Dark Patterns from the End-User Perspective. *Designing Interactive Systems Conference 2021*. 763-776. DOI: 10.1145/3461778.3462086.

Borg, J., 2013. *Persuasion 4th edn: The art of influencing people*. Pearson UK.

Borsari, B. and Carey, K. B., 2003. Descriptive and injunctive norms in college drinking: a meta-analytic integration. *Journal of studies on alcohol*, 64 (3), 331-341. DOI: 10.15288/jsa.2003.64.331.

Branch, C. C., Beaton, C. I., McQuaid, M. and Weeden, E., 2021. Perceptions of Ethics in Persuasive User Interfaces. *International Conference on Persuasive Technology*. Springer. 275-288. DOI: 10.1007/978-3-030-79460-6_22.

Braun, V. and Clarke, V., 2006. Using thematic analysis in psychology. *Qualitative research in psychology*, 3 (2), 77-101. DOI: 10.1191/1478088706qp063oa.

Breen, R. B. and Zuckerman, M., 1999. Chasing'in gambling behavior: Personality and cognitive determinants. *Personality and individual differences*, 27 (6), 1097-1111. DOI: 10.1016/S0191-8869(99)00052-5.

Brehm, J. W., 1966. *A theory of psychological reactance*. New York: Academic Press.

Brown, P., Levinson, S. C. and Levinson, S. C., 1987. *Politeness: Some universals in language usage*. Vol. 4. Cambridge university press.

Brown, R., 1987. Classical and operant paradigms in the management of gambling addictions. *Behavioural and Cognitive Psychotherapy*, 15 (2), 111-122. DOI: 10.1017/S0141347300011204.

Brown, T. J. and Dacin, P. A., 1997. The company and the product: Corporate associations and consumer product responses. *Journal of marketing*, 61 (1), 68-84. DOI: 10.1177/002224299706100106.

Bruinsma, J. and Crutzen, R., 2018. A longitudinal study on the stability of the need for cognition. *Personality and Individual Differences*, 127, 151-161. DOI: 10.1016/j.paid.2018.02.001.

Brunborg, G. S., Johnsen, B. H., Mentzoni, R. A., Myrseth, H., Molde, H., Lorvik, I. M., Bu, E. T. H. and Pallesen, S., 2012. Diminished aversive classical conditioning in pathological gamblers. *Addiction*, 107 (9), 1660-1666. DOI: 10.1111/j.1360-0443.2012.03891.x.

Brunborg, G. S., Johnsen, B. H., Pallesen, S., Molde, H., Mentzoni, R. A. and Myrseth, H., 2010. The relationship between aversive conditioning and risk-avoidance in gambling. *Journal of Gambling Studies*, 26 (4), 545-559. DOI: 10.1007/s10899-010-9178-0.

Burrell, G. and Morgan, G., 2017. *Sociological paradigms and organisational analysis: Elements of the sociology of corporate life*. Routledge.

Byrne, C. A. and Russell, A. M., 2020. Making EGMs accountable: Can an informative and dynamic interface help players self-regulate? *Journal of Gambling Studies*, 36 (4), 1229-1251. DOI: 10.1007/s10899-019-09889-2.

Cacioppo, J. T. and Petty, R. E., 1981. Social psychological procedures for cognitive response assessment: The thought-listing technique. *Cognitive assessment*, 309-342.

Cacioppo, J. T. and Petty, R. E., 1982. The need for cognition. *Journal of Personality and Social Psychology*, 42 (1), 116-131. DOI: 10.1037/0022-3514.42.1.116.

Cacioppo, J. T., Petty, R. E., Kao, C. F. and Rodriguez, R., 1986. Central and peripheral routes to persuasion: An individual difference perspective. *Journal of personality and social psychology*, 51 (5), 1032. DOI: 10.1037/0022-3514.51.5.1032.

Cacioppo, J. T., Petty, R. E. and Morris, K. J., 1983. Effects of need for cognition on message evaluation, recall, and persuasion. *Journal of personality and social psychology*, 45 (4), 805. DOI: 10.1037/0022-3514.45.4.805.

Cacioppo, J. T., Von Hippel, W. and Ernst, J. M., 1997. Mapping cognitive structures and processes through verbal content: The thought-listing technique. *Journal of consulting and clinical psychology*, 65 (6), 928. DOI: 10.1037/0022-006X.65.6.928.

Cades, D. M., Crump, C., Lester, B. D. and Young, D., 2017. Driver Distraction and Advanced Vehicle Assistive Systems (ADAS): Investigating Effects on Driver Behavior. *In:* Stanton, N. A., Landry, S., Di Bucchianico, G. and Vallicelli, A., eds. *Advances in Human Aspects of Transportation*, Cham 2017//. Springer International Publishing. 1015-1022. DOI: 10.1007/978-3-319-41682-3_83.

Caillon, J., Grall-Bronnec, M., Saillard, A., Leboucher, J., Péré, M. and Challet-Bouju, G., 2021. Impact of warning pop-up messages on the gambling behavior, craving, and Cognitions of online gamblers: A randomized controlled trial. *Frontiers in Psychiatry*, 12, 711431. DOI: 10.3389/fpsyt.2021.711431.

Calado, F., Alexandre, J. and Griffiths, M. D., 2017. Prevalence of Adolescent Problem Gambling: A Systematic Review of Recent Research. *Journal of Gambling Studies*, 33 (2), 397-424. DOI: 10.1007/s10899-016-9627-5.

Calado, F. and Griffiths, M. D., 2016. Problem gambling worldwide: An update and systematic review of empirical research (2000–2015). *Journal of behavioral addictions*, 5 (4), 592-613.

Cameron, K. A., 2009. A practitioner's guide to persuasion: An overview of 15 selected persuasion theories, models and frameworks. *Patient education and counseling*, 74 (3), 309-317. DOI: 10.1016/j.pec.2008.12.003.

Cantinotti, M., Ladouceur, R. and Jacques, C., 2004. Sports betting: Can gamblers beat randomness? *Psychology of addictive behaviors*, 18 (2), 143. DOI: 10.1037/0893-164X.18.2.143.

Caraban, A., Karapanos, E., Gonçalves, D. and Campos, P., 2019. 23 ways to nudge: A review of technology-mediated nudging in human-computer interaction. *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*. 1-15. DOI: 10.1145/3290605.3300733.

Carroll, A. B., 1991. The pyramid of corporate social responsibility: Toward the moral management of organizational stakeholders. *Business horizons*, 34 (4), 39-48. DOI: 10.1016/0007-6813(91)90005-g.

Carroll, A. B. and Shabana, K. M., 2010. The business case for corporate social responsibility: A review of concepts, research and practice. *International journal of management reviews*, 12 (1), 85-105. DOI: 10.1111/j.1468-2370.2009.00275.x.

Carter, B. L. and Tiffany, S. T., 1999. Meta-analysis of cue-reactivity in addiction research. *Addiction*, 94 (3), 327-340. DOI: 10.1046/j.1360-0443.1999.9433273.x.

Carver, C. S. and Scheier, M. F., 2001. *On the self-regulation of behavior*. Cambridge University Press.

Cemiloglu, D., Arden-Close, E., Hodge, S., Kostoulas, T., Ali, R. and Catania, M., 2020. Towards Ethical Requirements for Addictive Technology: The Case of Online Gambling. *2020 1st Workshop on Ethics in Requirements Engineering Research and Practice (REthics)*. IEEE. 1-10. DOI: 10.1109/REthics51204.2020.00007.

Cemiloglu, D., Arden-Close, E., Hodge, S. E. and Ali, R., 2023a. Explainable persuasion for interactive design: The case of online gambling. *Journal of Systems and Software*, 195, 111517. DOI: 10.1016/j.jss.2022.111517.

Cemiloglu, D., Arden-Close, E., Hodge, S. E. and Ali, R., 2023b. Me versus them: exploring the perception of susceptibility to persuasion in oneself and others in online gambling. *Persuasive Technology: 18th International Conference, PERSUASIVE 2023*, Eindhoven, The Netherlands, 19-21 April.

Cemiloglu, D., Catania, M. and Ali, R., 2021a. Explainable Persuasion in Interactive Design. *2021 IEEE 29th International Requirements Engineering Conference Workshops (REW)*. IEEE. 377-382. DOI: 10.1109/REW53955.2021.00066.

Cemiloglu, D., Naiseh, M., Catania, M., Oinas-Kukkonen, H. and Ali, R., 2021b. The Fine Line Between Persuasion and Digital Addiction. *In:* Ali, R., Lugrin, B. and Charles, F., eds. *Persuasive Technology*, Cham 2021//. Springer International Publishing. 289-307. DOI: 10.1007/978-3-030-79460-6_23.

Chaloupka, F. J., 2003. Contextual factors and youth tobacco use: policy linkages. *Addiction*, 98, 147-149. DOI: 10.1046/j.1360-0443.98.s1.10.x.

Chang, C., 2017. A metacognitive model of the effects of susceptibility to persuasion self-beliefs on advertising effects. *Journal of Advertising*, 46 (4), 487-502. DOI: 10.1080/00913367.2017.1392911.

Chazette, L. and Schneider, K., 2020. Explainability as a non-functional requirement: challenges and recommendations. *Requirements Engineering*, 25 (4), 493-514. DOI: 10.1007/s00766-020-00333-1.

Chen, J. Y., Procci, K., Boyce, M., Wright, J. L., Garcia, A. and Barnes, M., 2014. *Situation awareness-based agent transparency*. Army Research Laboratory: Aberdeen Proving Ground, MD

Chen, S.-H., Lee, K.-P. J. S. B. and journal, P. a. i., 2008. The role of personality traits and perceived values in persuasion: An elaboration likelihood model perspective on online shopping. 36 (10), 1379-1399. DOI: 10.2224/sbp.2008.36.10.1379.

Chóliz, M., 2010. Cognitive biases and decision making in gambling. *Psychological reports*, 107 (1), 15-24. DOI: 10.2466/02.09.18.22.PR0.107.4.15-2.

Chóliz, M., 2016. The challenge of online gambling: the effect of legalization on the increase in online gambling addiction. *Journal of Gambling Studies*, 32 (2), 749-756. DOI: 10.1007/s10899-015-9558-6.

Chou, T.-J. and Ting, C.-C., 2003. The role of flow experience in cyber-game addiction. *CyberPsychology & Behavior* 6(6), 663-675. DOI: 10.1089/109493103322725469.

Chung, L. and Nixon, B. A., 1995. Dealing with non-functional requirements: three experimental studies of a process-oriented approach. *1995 17th international conference on software engineering*. IEEE. 25-25. DOI: 10.1145/225014.225017.

Chung, T., Pedersen, S. L., Kim, K. H., Hipwell, A. E. and Stepp, S. D., 2014. Racial Differences in Type of Alcoholic Beverage Consumed During Adolescence in the Pittsburgh Girls Study. *Alcoholism: clinical and experimental research*, 38 (1), 285-293. DOI: 10.1111/acer.12222.

Cialdini, R. B., 2001. Harnessing the science of persuasion. *Harvard business review*, 79 (9), 72-81.

Cialdini, R. B., 2008. *Influence : science and practice*. 5th ed. edition. Harlow: Pearson Education.

Cialdini, R. B. and Cialdini, R. B., 2007. *Influence: The psychology of persuasion*. Vol. 55. Collins New York.

Cialdini, R. B., Reno, R. R. and Kallgren, C. A., 1990. A focus theory of normative conduct: recycling the concept of norms to reduce littering in public places. *Journal of personality and social psychology*, 58 (6), 1015. DOI: 10.1037/0022-3514.58.6.1015.

Cialdini, R. B. and Trost, M. R., 1998. Social influence: Social norms, conformity and compliance. *The handbook of social psychology, Vols. 1-2, 4th ed.* New York, NY, US: McGraw-Hill, 151-192.

Cockton, G. and Gram, C., 1996. *Design principles for interactive software*. Springer Science & Business Media.

Collins, P., Blaszczynski, A., Ladouceur, R., Shaffer, J., Fong, D. and Venisse, J.-L., 2015. Responsible gambling: Conceptual considerations. *Gaming Law Review and Economics*, 19 (8), 594-599. DOI: 10.1089/glre.2015.1985.

Cohen, J., 2013. *Statistical power analysis for the behavioral sciences*. Academic press.

Compton, J., 2013. Inoculation theory. *The SAGE handbook of persuasion: Developments in theory and practice.* 220-237.

Compton, J., 2020. Prophylactic versus therapeutic inoculation treatments for resistance to influence. *Communication Theory*, 30 (3), 330-343. DOI: 10.1093/ct/qtz004.

Compton, J. and Ivanov, B., 2012. Untangling threat during inoculation-conferred resistance to influence. *Communication Reports*, 25 (1), 1-13. DOI: 10.1080/08934215.2012.661018.

Compton, J. and Ivanov, B., 2013. Vaccinating voters: Surveying political campaign inoculation scholarship. *Annals of the International Communication Association*, 37 (1), 251-283. DOI: 10.1080/23808985.2013.11679152.

Compton, J. and Pfau, M., 2004. Use of inoculation to foster resistance to credit card marketing targeting college students. *Journal of Applied Communication Research*, 32 (4), 343-364. DOI: 10.1080/0090988042000276014.

Compton, J. and Pfau, M., 2008. Inoculating against pro-plagiarism justifications: Rational and affective strategies. *Journal of Applied Communication Research*, 36 (1), 98-119. DOI: 10.1080/00909880701799329.

Compton, J. and Pfau, M., 2009. Spreading inoculation: Inoculation, resistance to influence, and word-of-mouth communication. *Communication Theory*, 19 (1), 9-28. DOI: 10.1111/j.1468-2885.2008.01330.x.

Conati, C., Barral, O., Putnam, V. and Rieger, L., 2021. Toward personalized XAI: A case study in intelligent tutoring systems. *Artificial Intelligence*, 298, 103503. DOI: 10.1016/j.artint.2021.103503.

Cooper, M. L., Frone, M. R., Russell, M. and Mudar, P., 1995. Drinking to regulate positive and negative emotions: a motivational model of alcohol use. *Journal of personality and social psychology*, 69 (5), 990. DOI: 10.1037/0022-3514.69.5.990.

Cooper, S., Robison, A. and Mazei-Robison, M. S., 2017. Reward circuitry in addiction. *Neurotherapeutics*, 14 (3), 687-697. DOI: 10.1007/s13311-017-0525-z.

Côté, D., Caron, A., Aubert, J., Desrochers, V. and Ladouceur, R., 2003. Near wins prolong gambling on a video lottery terminal. *Journal of Gambling Studies*, 19 (4), 433-438. DOI: 10.1023/A:1026384011003.

Creswell, J. W. and Clark, V. L. P., 2017. *Designing and conducting mixed methods research*. Sage publications.

Croskerry, P., 2012. Cognition: any decision by anyone at any time. ED administration series. *CJEM*, 10 (8000.2013), 131053.

Crotty, M. J., 1998. The foundations of social research: Meaning and perspective in the research process. *The foundations of social research*, 1-256.

Csikszentmihalyi, M., 2013. *Flow: The psychology of happiness*. Random House.

Csikszentmihalyi, M. and Csikzentmihaly, M., 1990. *Flow: The psychology of optimal experience*. Vol. 1990. Harper & Row New York.

Currie, S. R., Hodgins, D. C. and Casey, D. M., 2013. Validity of the problem gambling severity index interpretive categories. *Journal of gambling studies*, 29 (2), 311-327. DOI: 10.1007/s10899-012-9300-6.

Curry, S., Marlatt, G. A. and Gordon, J. R., 1987. Abstinence violation effect: Validation of an attributional construct with smoking cessation. *Journal of Consulting and Clinical Psychology*, 55 (2), 145. DOI: 10.1037/0022-006X.55.2.145.

Cyr, D., Head, M., Lim, E. and Stibe, A., 2018. Using the elaboration likelihood model to examine online persuasion through website design. *Information & Management*, 55 (7), 807-821. DOI: 10.1016/j.im.2018.03.009.

Darke, P. R. and Ritchie, R. J., 2007. The defensive consumer: Advertising deception, defensive processing, and distrust. *Journal of Marketing research*, 44 (1), 114-127. DOI: 10.1509/jmkr.44.1.114.

Davey, B. and Cummins, R., 2018. Testing an Incentive-Sensitisation Approach to Understanding Problem Slot-Machine Gambling Using an Online Slot-Machine Simulation. *Journal of gambling studies*, 34 (3), 773-784. DOI: 10.1007/s10899-017-9718-y.

Davis, F. D., 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340. DOI: 10.2307/249008.

Davis, F. D., Bagozzi, R. P. and Warshaw, P. R., 1992. Extrinsic and intrinsic motivation to use computers in the workplace. *Journal of applied social psychology*, 22 (14), 1111-1132. DOI: 10.1111/j.1559-1816.1992.tb00945.x.

Davis, J., 2009. Design methods for ethical persuasive computing. *Proceedings of the 4th International Conference on Persuasive Technology*. 1-8. DOI: 10.1145/1541948.1541957.

De Bellis, M. D. and Zisk, A., 2014. The biological effects of childhood trauma. *Child and Adolescent Psychiatric Clinics*, 23 (2), 185-222. DOI: 10.1016/j.chc.2014.01.002.

De Pelsmacker, P. and Neijens, P. C., 2012. New advertising formats: How persuasion knowledge affects consumer responses. *Journal of Marketing Communications*, 18 (1), 1-4. DOI: 10.1080/13527266.2011.620762.

De Ridder, D. T. D., Lensvelt-Mulders, G., Finkenauer, C., Stok, F. M. and Baumeister, R. F., 2012. Taking stock of self-control: A meta-analysis of how trait self-control relates to a wide range of behaviors. *Personality and Social Psychology Review*, 16 (1), 76-99. DOI: 10.1177/1088868311418749.

Denzin, N. K. and Lincoln, Y. S., 2011. *The Sage handbook of qualitative research*. sage.

Devlin, M. E. and Walton, D., 2012. The prevalence of problem gambling in New Zealand as measured by the PGSI: Adjusting prevalence estimates using meta-analysis. *International Gambling Studies*, 12 (2), 177-197. DOI: 10.1080/14459795.2011.653384.

Dhillon, J., Horch, J. D. and Hodgins, D. C., 2011. Cultural influences on stigmatization of problem gambling: East Asian and Caucasian Canadians. *Journal of Gambling Studies*, 27 (4), 633-647. DOI: 10.1007/s10899-010-9233-x.

Dillard, J. P. and Shen, L., 2005. On the nature of reactance and its role in persuasive health communication. *Communication monographs*, 72 (2), 144-168. DOI: 10.1080/03637750500111815.

Dillon, A., 2001. User acceptance of information technology. *Encyclopedia of human factors and ergonomics*, 1, 1105-1109.

Dingle, G. A., Cruwys, T. and Frings, D., 2015. Social identities as pathways into and out of addiction. *Frontiers in psychology*, 6, 1795. DOI: 10.3389/fpsyg.2015.01795.

Dixon, M. R., 2000. Manipulating the illusion of control: Variations in gambling as a function of perceived control over chance outcomes. *The Psychological Record*, 50 (4), 705-719. DOI: 10.1007/BF03395379.

Dixon, M. R., Marley, J. and Jacobs, E. A., 2003. Delay discounting by pathological gamblers. *Journal of applied behavior analysis*, 36 (4), 449-458. DOI: 10.1901/jaba.2003.36-449.

Doran, D., Schulz, S. and Besold, T. R., 2017. What does explainable AI really mean? A new conceptualization of perspectives. *arXiv preprint arXiv:1710.00794*. DOI: 10.48550/arXiv.1710.00794.

Dowling, N. A., Shandley, K., Oldenhof, E., Youssef, G., Thomas, S., Frydenberg, E. and Jackson, A., 2016. The intergenerational transmission of problem gambling: The mediating role of parental psychopathology. *Addictive behaviors*, 59, 12-17. DOI: 10.1016/j.addbeh.2016.03.002.

Drosatos, G., Arden-Close, E., Bolat, E. and Ali, R., 2020. Gambling data and modalities of interaction for responsible online gambling: A qualitative study. *Journal of Gambling Issues*, 44 (Spring), 139-169.

Du, J., Kerkhof, P. and van Koningsbruggen, G. M., 2019. Predictors of social media self-control failure: Immediate gratifications, habitual checking, ubiquity, and notifications. *Cyberpsychology, Behavior, and Social Networking*, 22 (7), 477-485. DOI: 10.1089/cyber.2018.0730.

Eiband, M., Schneider, H., Bilandzic, M., Fazekas-Con, J., Haug, M. and Hussmann, H., 2018. Bringing transparency design into practice. *23rd international conference on intelligent user interfaces*. 211-223. DOI: 10.1145/3172944.3172961.

Elster, J. and Skog, O.-J., 1999. *Getting hooked: Rationality and addiction*. Cambridge University Press.

Encyclopædia Britannica, 1998. *slot machine* [online]. Encyclopædia Britannica: Available from: https://www.britannica.com/topic/slot-machine [Accessed 15 May].

Endsley, M. R., Bolté, B. and Jones, D. G., 2003. *Designing for situation awareness: An approach to user-centered design*. CRC press.

Engebø, J., Torsheim, T., Mentzoni, R. A., Molde, H. and Pallesen, S., 2019. Predictors of gamblers beliefs about responsible gambling measures. *Journal of gambling studies*, 35 (4), 1375-1396. DOI: 10.1007/s10899-019-09835-2.

Eslami, M., Kumaran, S. R. K., Sandvig, C. and Karahalios, K., 2018. Communicating Algorithmic Process in Online Behavioral Advertising. *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*, Montreal QC, Canada. 1-13.

European Parliament and Council, 2016. *Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) (Text with EEA relevance)," May 2016. [Online]*

Evans, J. S. B. T., 2008. Dual-processing accounts of reasoning, judgment, and social cognition. *Annu. Rev. Psychol.*, 59, 255-278. DOI: 10.1146/annurev.psych.59.103006.093629.

Everitt, B. J. and Robbins, T. W., 2005. Neural systems of reinforcement for drug addiction: from actions to habits to compulsion. *Nature neuroscience*, 8 (11), 1481-1489. DOI: 10.1038/nn1579.

Faden, R. R. and Beauchamp, T. L., 1986. *A history and theory of informed consent*. Oxford University Press.

Faul, F., Erdfelder, E., Lang, A.-G. and Buchner, A., 2007. G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior research methods*, 39 (2), 175-191. DOI: 10.3758/BF03193146.

Federal Trade Commission, 2015. Enforcement policy statement on deceptively formatted advertisements. *news release*.

Fein, S. and Spencer, S. J., 1997. Prejudice as self-image maintenance: Affirming the self through derogating others. *Journal of personality and Social Psychology*, 73 (1), 31. DOI: 10.1037/0022-3514.73.1.31.

Ferris, J. A. and Wynne, H. J., 2001a. *The Canadian problem gambling index*. Canadian Centre on Substance Abuse Ottawa, ON.

Ferris, J. A. and Wynne, H. J., 2001b. *The Canadian problem gambling index: User manual*. Canadian Centre on Substance Abuse.

Festinger, L., 1954. A theory of social comparison processes. *Human relations*, 7 (2), 117-140. DOI: 10.1177/001872675400700202.

Festinger, L., 1957. *A theory of cognitive dissonance*. Vol. 2. Stanford university press.

Field, M., Mogg, K. and Bradley, B. P., 2004. Cognitive bias and drug craving in recreational cannabis users. *Drug and alcohol dependence*, 74 (1), 105-111. DOI: 10.1016/j.drugalcdep.2003.12.005.

Fiorillo, C. D., Tobler, P. N. and Schultz, W., 2003. Discrete coding of reward probability and uncertainty by dopamine neurons. *Science*, 299 (5614), 1898-1902. DOI: 10.1126/science.1077349.

Fitch, H. G., 1976. Achieving corporate social responsibility. *Academy of management review*, 1 (1), 38-46. DOI: 10.5465/amr.1976.4408754.

Flores, P. J., 2004. *Addiction as an attachment disorder*. Jason Aronson.

Floyd, K., Whelan, J. P. and Meyers, A. W., 2006. Use of warning messages to modify gambling beliefs and behavior in a laboratory investigation. *Psychology of Addictive Behaviors*, 20 (1), 69. DOI: 10.1037/0893-164X.20.1.69.

Fogg, B., 2009. A behavior model for persuasive design. *Proceedings of the 4th International Conference on Persuasive Technology*, Claremont, California, USA. Association for Computing Machinery. Article 40. DOI: 10.1145/1541948.1541999.

Fogg, B. J., 2003. *Persuasive technology: using computers to change what we think and do*. Morgan Kaufmann.

Fong, M., Zhao, K. and Smillie, L. D., 2021. Personality and competitiveness: Extraversion, agreeableness, and their aspects, predict self-reported competitiveness and competitive bidding in experimental auctions. *Personality and individual differences*, 169, 109907. DOI: 10.1016/j.paid.2020.109907.

Foster, D. W., Neighbors, C., Rodriguez, L. M., Lazorwitz, B. and Gonzales, R., 2014. Self-identification as a moderator of the relationship between gambling-related perceived norms and gambling behavior. *Journal of Gambling Studies*, 30 (1), 125-140. DOI: 10.1007/s10899-012-9346-5.

Fotuhi, O., Fong, G. T., Zanna, M. P., Borland, R., Yong, H.-H. and Cummings, K. M., 2013. Patterns of cognitive dissonance-reducing beliefs among smokers: a longitudinal analysis from the International Tobacco Control (ITC) Four Country Survey. *Tobacco control*, 22 (1), 52-58. DOI: 10.1136/tobaccocontrol-2011-050139.

Franklin, A. E. and Lee, C. S., 2014. Effectiveness of simulation for improvement in self-efficacy among novice nurses: A meta-analysis. *Journal of Nursing Education*, 53 (11), 607-614. DOI: 10.3928/01484834-20141023-03.

Fransen, M. L., Smit, E. G. and Verlegh, P. W., 2015a. Strategies and motives for resistance to persuasion: An integrative framework. *Frontiers in psychology*, 6, 1201. DOI: 10.3389/fpsyg.2015.01201.

Fransen, M. L., Verlegh, P. W., Kirmani, A. and Smit, E. G., 2015b. A typology of consumer strategies for resisting advertising, and a review of mechanisms for countering them. *International Journal of Advertising*, 34 (1), 6-16. DOI: 10.1080/02650487.2014.995284.

Friedman, B., Kahn, P. H. and Borning, A., 2006. Value sensitive design and information systems. *In: Zhang, P., Galletta, D. (eds.) Human-Computer Interaction and Management Information Systems: Foundations*, New York. 348–372. DOI: 10.1007/978-94-007-7844-3_4.

Friestad, M. and Wright, P., 1994. The Persuasion Knowledge Model: How People Cope with Persuasion Attempts. *Journal of Consumer Research*, 21 (1), 1-31. DOI: 10.1086/209380.

Furby, L. and Beyth-Marom, R., 1992. Risk taking in adolescence: A decision-making perspective. *Developmental review*, 12 (1), 1-44. DOI: 10.1016/0273-2297(92)90002-J.

Gable, R. A., Hester, P. H., Rock, M. L. and Hughes, K. G., 2009. Back to basics: Rules, praise, ignoring, and reprimands revisited. *Intervention in School and Clinic*, 44 (4), 195-205. DOI: 10.1177/1053451208328831.

Gainsbury, S., Parke, J. and Suhonen, N., 2013. Consumer attitudes towards Internet gambling: Perceptions of responsible gambling policies, consumer protection, and regulation of online gambling sites. *Computers in Human Behavior*, 29 (1), 235-245. DOI: 10.1016/j.chb.2012.08.010.

Gainsbury, S. M., Russell, A., Wood, R., Hing, N. and Blaszczynski, A., 2015. How risky is Internet gambling? A comparison of subgroups of Internet gamblers based on problem gambling status. *New media & society*, 17 (6), 861-879. DOI: 10.1177/1461444813518185.

Gallagher, D. A., O'Sullivan, S. S., Evans, A. H., Lees, A. J. and Schrag, A., 2007. Pathological gambling in Parkinson's disease: risk factors and differences from dopamine dysregulation. An analysis of published case series. *Movement disorders: official journal of the Movement Disorder Society*, 22 (12), 1757-1763. DOI: 10.1002/mds.21611.

Gambling Commission, 2019. Gambling Participation in 2019: Behaviour, Awareness and Attitudes: Questionnaire Document.

Gambling Commission, 2021. Taking a more in-depth look at online gambling: Publication of online survey looking at online gambling behaviour in 2020.

Gaumer, C. J. and LaFief, W. C., 2005. Social facilitation: affect and application in consumer buying situations. *Journal of Food Products Marketing*, 11 (1), 75-82. DOI: 10.1300/J038v11n01_05.

Gerrard, M., Gibbons, F. X., Lane, D. J. and Stock, M. L., 2005. Smoking cessation: social comparison level predicts success for adult smokers. *Health psychology*, 24 (6), 623. DOI: 10.1037/0278-6133.24.6.623.

Gibbons, F. X. and Gerrard, M., 1995. Predicting young adults' health risk behavior. *Journal of personality and social psychology*, 69 (3), 505. DOI: 10.1037/0022-3514.69.3.505.

Gidron, Y., Levy, E., Farchi, M. and Rapaport, C., 2023. Effects of an automatized psychological inoculation (PI) intervention on anxiety, resilience and adherence to COVID-19 recommendations. *Psychology & Health*, 38 (5), 541-554. DOI: 10.1080/08870446.2021.1984485.

Godbold, L. C. and Pfau, M., 2000. Conferring resistance to peer pressure among adolescents: Using inoculation theory to discourage alcohol use. *Communication research*, 27 (4), 411-437.

Goldhaber, M. H., 1997. The attention economy and the net. *First Monday*, 2 (4). DOI: 10.5210/fm.v2i4.519.

Goldstein, R. Z. and Volkow, N. D., 2002. Drug addiction and its underlying neurobiological basis: neuroimaging evidence for the involvement of the frontal cortex. *American Journal of Psychiatry*, 159 (10), 1642-1652. DOI: 10.1176/appi.ajp.159.10.1642.

Gollwitzer, P. M., 1999. Implementation intentions: Strong effects of simple plans. *American psychologist*, 54 (7), 493. DOI: 10.1037/0003-066X.54.7.493.

Gollwitzer, P. M. and Bargh, J. A., 1996. *The psychology of action: Linking cognition and motivation to behavior*. Guilford Press.

Gomez-Uribe, C. A. and Hunt, N., 2015. The netflix recommender system: Algorithms, business value, and innovation. *ACM Transactions on Management Information Systems (TMIS)*, 6 (4), 1-19. DOI: 10.1145/2843948.

Goodie, A. S. and Fortune, E. E., 2013. Measuring cognitive distortions in pathological gambling: review and meta-analyses. *Psychology of Addictive Behaviors*, 27 (3), 730. DOI: 10.1037/a0031892.

Goodman, A., 2008. Neurobiology of addiction: An integrative review. *Biochemical pharmacology*, 75 (1), 266-322. DOI: 10.1016/j.bcp.2007.07.030.

Goodman, B. and Flaxman, S. J. A. m., 2017. European Union regulations on algorithmic decision-making and a "right to explanation". *AI magazine*, 38 (3), 50-57. DOI: 10.1609/aimag.v38i3.2741.

Goodwin, B. C., Browne, M., Rockloff, M. and Rose, J., 2017. A typical problem gambler affects six others. *International Gambling Studies*, 17 (2), 276-289. DOI: 10.1080/14459795.2017.1331252.

Gorski, T. T., 2000. *Denial Management Counseling Professional Guide: Advanced Clinical Skills for Motivating Substance Abusers to Recover*. Herald House/Independence Press.

Gram-Hansen, S. B., 2009. Towards an approach to ethics and HCI development based on Løgstrup's ideas. *Human-Computer Interaction–INTERACT 2009: 12th IFIP TC 13 International Conference, Uppsala, Sweden, August 24-28, 2009, Proceedings, Part I 12*. Springer Berlin Heidelberg. 200-203. DOI: 10.1007/978-3-642-03655-2_24.

Graml, T., Loock, C.-M., Baeriswyl, M. and Staake, T., 2011. Improving residential energy consumption at large using persuasive systems.

Granero, R., Jiménez-Murcia, S., Fernández-Aranda, F., del Pino-Gutiérrez, A., Mena-Moreno, T., Mestre-Bach, G., Gómez-Peña, M., Moragas, L., Aymamí, N. and Giroux, I., 2020. Contribution of stressful life events to gambling activity in older age. *Ageing & Society*, 1-25. DOI: 10.1017/S0144686X20001592.

Grant, J. E. and Chamberlain, S. R., 2020. Gambling and substance use: Comorbidity and treatment implications. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, 99, 109852. DOI: 10.1016/j.pnpbp.2019.109852.

Grant, J. E., Odlaug, B. L. and Chamberlain, S. R., 2016. Neural and psychological underpinnings of gambling disorder: A review. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, 65, 188-193. DOI: 10.1016/j.pnpbp.2015.10.007.

Griffiths, M., 1993. Fruit machine gambling: The importance of structural characteristics. *Journal of gambling studies*, 9 (2), 101-120. DOI: 10.1007/BF01014863.

Griffiths, M., 1995. *Adolescent Gambling*. Routledge.

Griffiths, M. and Barnes, A., 2008. Internet gambling: An online empirical study among student gamblers. *International Journal of Mental Health and Addiction*, 6 (2), 194-204. DOI: 10.1007/s11469-007-9083-7.

Griffiths, M. D., 1990. The cognitive psychology of gambling. *Journal of gambling studies*, 6 (1), 31-42. DOI: 10.1007/BF01015747.

Gupta, R. and Derevensky, J., 1997. Familial and social influences on juvenile gambling behavior. *Journal of gambling studies*, 13 (3), 179-192. DOI: 10.1023/A:1024915231379.

Hagen, B., Kalishuk, R. G., Currie, C., Solowoniuk, J. and Nixon, G., 2013. A big hole with the wind blowing through it: Aboriginal women's experiences of trauma and problem gambling. *International Gambling Studies*, 13 (3), 356-370. DOI: 10.1080/14459795.2013.819934.

Hahmann, T., Hamilton-Wright, S., Ziegler, C. and Matheson, F. I., 2020. Problem gambling within the context of poverty: a scoping review. *International Gambling Studies*, 1-37. DOI: 10.1080/14459795.2020.1819365.

Hahmann, T. and Monson, E., 2021. Rationalization as a Dissonance Management Strategy among Electronic Gambling Machine Players. *Critical Gambling Studies*, 2 (1), 76-86. DOI: 10.29173/cgs32.

Halevi, T., Lewis, J. and Memon, N., 2013. A pilot study of cyber security and privacy related behavior and personality traits. *Proceedings of the 22nd international conference on world wide web*. 737-744. DOI: 10.1145/2487788.2488034.

Ham, C.-D., Nelson, M. R. and Das, S., 2015. How to measure persuasion knowledge. *International Journal of Advertising*, 34 (1), 17-53. DOI: 10.1080/02650487.2014.994730.

Hammond, M. and Wellington, J., 2020. *Research Methods : The Key Concepts*. Milton, United Kingdom: Taylor & Francis Group.

Harris, A. and Griffiths, M. D., 2017. A critical review of the harm-minimisation tools available for electronic gambling. *Journal of Gambling Studies*, 33 (1), 187-221. DOI: 10.1007/s10899-016-9624-8.

Hassan, L. and Hamari, J., 2020. Gameful civic engagement: A review of the literature on gamification of e-participation. *Government Information Quarterly*, 37 (3), 101461. DOI: 10.1016/j.giq.2020.101461.

Haugtvedt, C. P. and Petty, R. E., 1989. Need for cognition and attitude persistence. *ACR North American Advances*.

Hing, N., 2010. The evolution of responsible gambling policy and practice: Insights for Asia from Australia. *Asian Journal of gambling issues and Public Health*, 1 (1), 19-33. DOI: 10.1186/BF03342116.

Hing, N., Browne, M., Russell, A. M., Greer, N., Thomas, A., Jenkinson, R. and Rockloff, M., 2019. Where's the bonus in bonus bets? Assessing sports bettors' comprehension of their true cost. *Journal of Gambling Studies*, 35 (2), 587-599. DOI: 10.1007/s10899-018-9800-0.

Hing, N., Cherney, L., Blaszczynski, A., Gainsbury, S. M. and Lubman, D. I., 2014a. Do advertising and promotions for online gambling increase gambling consumption? An exploratory study. *International Gambling Studies*, 14 (3), 394-409. DOI: 10.1080/14459795.2014.903989.

Hing, N., Cherney, L., Gainsbury, S. M., Lubman, D. I., Wood, R. T. and Blaszczynski, A., 2015. Maintaining and losing control during Internet gambling: A qualitative study of gamblers' experiences. *New Media & Society*, 17 (7), 1075-1095. DOI: 10.1177/1461444814521140.

Hing, N., Holdsworth, L., Tiyce, M. and Breen, H., 2014b. Stigma and problem gambling: Current knowledge and future research directions. *International Gambling Studies*, 14 (1), 64-81. DOI: 10.1080/14459795.2013.841722.

Hing, N., Russell, A. M., Black, A., Rockloff, M., Browne, M., Rawat, V., Greer, N., Stevens, M., Dowling, N. A. and Merkouris, S., 2022. Gambling prevalence and gambling problems amongst land-based-only, online-only and mixed-mode gamblers in Australia: A national study. *Computers in Human Behavior*, 132, 107269. DOI: 10.1016/j.chb.2022.107269.

Hinson, J. M., Whitney, P., Holben, H. and Wirick, A. K., 2006. Affective biasing of choices in gambling task decision making. *Cognitive, Affective, & Behavioral Neuroscience*, 6 (3), 190-200. DOI: 10.3758/CABN.6.3.190.

Hira, T. K. and Monson, K. W., 2000. A social learning perspective of gambling behaviour among college students at Iowa State University, USA. *Journal of Consumer Studies & Home Economics*, 24 (1), 1-8. DOI: 10.1046/j.1365-2737.2000.00111.x.

Hirschman, E. C., 1992. The consciousness of addiction: Toward a general theory of compulsive consumption. *Journal of Consumer Research*, 19 (2), 155-179. DOI: 10.1086/209294.

Ho, K.-w., 2017. Risk factors of adolescent pathological gambling: Permissive gambling culture and individual factors. *Deviant behavior*, 38 (5), 533-548. DOI: 10.1080/01639625.2016.1197031.

Hodgins, D. C., Stea, J. N. and Grant, J. E., 2011. Gambling disorders. *The Lancet*, 378 (9806), 1874-1884. DOI: 10.1016/S0140-6736(10)62185-X.

Hoffman, B. R., Monge, P. R., Chou, C.-P. and Valente, T. W., 2007. Perceived peer influence and peer selection on adolescent smoking. *Addictive behaviors*, 32 (8), 1546-1554. DOI: 10.1016/j.addbeh.2006.11.016.

Hogan, E. A., 2001. The Attention Economy: Understanding the New Currency of Business. *The Academy of Management Perspectives*, 15 (4). DOI: 10.5465/ame.2001.5898765.

Holdsworth, L., Nuske, E., Tiyce, M. and Hing, N., 2013. Impacts of gambling problems on partners: Partners' interpretations. *Asian Journal of Gambling Issues and Public Health*, 3 (1), 1-14. DOI: 10.1186/2195-3007-3-11.

Holtgraves, T., 2009. Evaluating the problem gambling severity index. *Journal of gambling studies*, 25 (1), 105-120. DOI: 10.1007/s10899-008-9107-7.

Hønsi, A., Mentzoni, R. A., Molde, H. and Pallesen, S., 2013. Attentional bias in problem gambling: A systematic review. *Journal of Gambling Studies*, 29 (3), 359-375. DOI: 10.1007/s10899-012-9315-z.

Hoorens, V., 1995. Self-favoring biases, self-presentation, and the self-other asymmetry in social comparison. *Journal of Personality*, 63 (4), 793-817. DOI: 10.1111/j.1467-6494.1995.tb00317.x.

Hosseini, M., Shahri, A., Phalp, K. and Ali, R., 2015. Towards engineering transparency as a requirement in socio-technical systems. *2015 IEEE 23rd International Requirements Engineering Conference (RE)*. IEEE. 268-273. DOI: 10.1109/RE.2015.7320435.

Hosseini, M., Shahri, A., Phalp, K. and Ali, R., 2018. Four reference models for transparency requirements in information systems. *Requirements Engineering*, 23 (2), 251-275. DOI: 10.1007/s00766-017-0265-y.

Hovland, C. I. and Janis, I. L., 1959. Personality and persuasibility.

Hudlicka, E., 2008. Affective computing for game design. *Proceedings of the 4th Intl. North American Conference on Intelligent Games and Simulation*. McGill University Montreal. 5-12.

Humlung, O. and Haddara, M., 2019. The hero's journey to innovation: Gamification in enterprise systems. *Procedia Computer Science*, 164, 86-95. DOI: 10.1016/j.procs.2019.12.158.

Ibanez, M.-B., Di-Serio, A. and Delgado-Kloos, C., 2014. Gamification for engaging computer science students in learning activities: A case study. *IEEE Transactions on learning technologies*, 7 (3), 291-301. DOI: 10.1109/TLT.2014.2329293.

Insko, C. A., 1967. *Theories of attitude change*.

Iqbal, S. T. and Horvitz, E., 2010. Notifications and awareness: a field study of alert usage and preferences. *Proceedings of the 2010 ACM conference on Computer supported cooperative work*. 27-30. DOI: 10.1145/1718918.1718926.

ISO 9241-11, 2018. Ergonomics of human-system interaction - Part 11: Usability: Definitions and concepts. doi: https://www.iso.org/obp/ui/#iso:std:iso:9241:-11:ed2:v1:en.

Ivanov, B., Parker, K. A. and Dillingham, L. L., 2018. Testing the limits of inoculation-generated resistance. *Western Journal of Communication*, 82 (5), 648-665. DOI: 10.1080/10570314.2018.1454600.

Ivanov, B., Pfau, M. and Parker, K. A., 2009. The attitude base as a moderator of the effectiveness of inoculation strategy. *Communication Monographs*, 76 (1), 47-72. DOI: 10.1080/03637750802682471.

Ivanova, E., Rafi, J., Lindner, P. and Carlbring, P., 2019. Experiences of responsible gambling tools among non-problem gamblers: A survey of active customers of an online gambling platform. *Addictive behaviors reports*, 9, 100161. DOI: 10.1016/j.abrep.2019.100161.

Jacobsen, L. H., Knudsen, A. K., Krogh, E., Pallesen, S. and Molde, H., 2007. An overview of cognitive mechanisms in pathological gambling. *Nordic Psychology*, 59 (4), 347-361. DOI: 10.1027/1901-2276.59.4.347.

Jhangiani, R. S., Cuttler, C., Leighton, D. C. and Open Textbook, L., 2019. *Research Methods in Psychology* [online]. 4th American Edition. edition. British Columbia: Kwantlen Polytechnic University.

Jones, J. G. and Simons, H. W., 2017. *Persuasion in society*. Routledge.

Jones, P., Hillier, D. and Comfort, D., 2009. Corporate social responsibility in the UK gambling industry. *Corporate Governance: The international journal of business in society*.

Jonsen, A. R., Siegler, M. and Winslade, W. J., 1982. *Clinical ethics a practical approach to ethical decisions in clinical medicine*. McGraw-Hill Education.

Joukhador, J., Maccallum, F. and Blaszczynski, A., 2003. Differences in cognitive distortions between problem and social gamblers. *Psychological reports*, 92 (3_suppl), 1203-1214. DOI: 10.2466/pr0.2003.92.3c.1203

Joutsa, J., Johansson, J., Niemelä, S., Ollikainen, A., Hirvonen, M. M., Piepponen, P., Arponen, E., Alho, H., Voon, V. and Rinne, J. O., 2012. Mesolimbic dopamine release is linked to symptom severity in pathological gambling. *Neuroimage*, 60 (4), 1992-1999. DOI: 10.1016/j.neuroimage.2012.02.006.

Kahn, B. K., Strong, D. M. and Wang, R. Y., 2002. Information quality benchmarks: product and service performance. *Communications of the ACM*, 45 (4), 184-192. DOI: 10.1145/505248.506007.

Kahneman, D., 2011. *Thinking, fast and slow*. Macmillan.

Kahneman, D. and Tversky, A., 1982. The psychology of preferences. *Scientific American.* 160-173.

Kairouz, S., Paradis, C. and Nadeau, L., 2012. Are online gamblers more at risk than offline gamblers? *Cyberpsychology, Behavior, and Social Networking*, 15 (3), 175-180. DOI: 10.1089/cyber.2011.0260.

Kaptein, M. and Eckles, D., 2010. Selecting effective means to any end: Futures and ethics of persuasion profiling. *International conference on persuasive technology*. Springer. 82-93. DOI: 10.1007/978-3-642-13226-1_10.

Karppinen, P. and Oinas-Kukkonen, H., 2013. Three approaches to ethical considerations in the design of behavior change support systems. *International Conference on Persuasive Technology*. Springer. 87-98. DOI: 10.1007/978-3-642-37157-8_12.

Kelley, A. E. and Berridge, K. C., 2002. The neuroscience of natural rewards: relevance to addictive drugs. *Journal of neuroscience*, 22 (9), 3306-3311. DOI: 10.1523/JNEUROSCI.22-09-03306.2002.

Kendler, K. S., Prescott, C. A., Myers, J. and Neale, M. C., 2003. The structure of genetic and environmental risk factors for common psychiatric and substance use disorders in men and women. *Archives of general psychiatry*, 60 (9), 929-937. DOI: 10.1001/archpsyc.60.9.929.

Kennedy, B. L., 2018. The SAGE Handbook of Qualitative Data Collection. 2023/01/10. London: SAGE Publications Ltd. DOI: 10.4135/9781526416070.

Kessler, R. C., Hwang, I., LaBrie, R., Petukhova, M., Sampson, N. A., Winters, K. C. and Shaffer, H. J., 2008. DSM-IV pathological gambling in the National Comorbidity Survey Replication. *Psychological medicine*, 38 (9), 1351-1360. DOI: 10.1017/S0033291708002900.

Ketokivi, M. and Mantere, S., 2010. Two strategies for inductive reasoning in organizational research. *Academy of management review*, 35 (2), 315-333. DOI: 10.5465/amr.35.2.zok315.

Keyes, K. M., Hatzenbuehler, M. L. and Hasin, D. S., 2011. Stressful life experiences, alcohol consumption, and alcohol use disorders: the epidemiologic evidence for four main types of stressors. *Psychopharmacology*, 218 (1), 1-17. DOI: 10.1007/s00213-011-2236-1.

Khang, H., Kim, J. K. and Kim, Y., 2013. Self-traits and motivations as antecedents of digital media flow and addiction: The Internet, mobile phones, and video games. *Computers in Human Behavior*, 29 (6), 2416-2424. DOI: 10.1016/j.chb.2013.05.027.

Khantzian, E. J., 1997. The self-medication hypothesis of substance use disorders: A reconsideration and recent applications. *Harvard review of psychiatry*, 4 (5), 231-244. DOI: 10.3109/10673229709030550.

Khechine, H., Lakhal, S. and Ndjambou, P., 2016. A meta-analysis of the UTAUT model: Eleven years later. *Canadian Journal of Administrative Sciences/Revue Canadienne des Sciences de l'Administration*, 33 (2), 138-152. DOI: 10.1002/cjas.1381.

Kiesler, C. A. and Kiesler, S. B., 1964. Role of forewarning in persuasive communications. *The Journal of Abnormal and Social Psychology*, 68 (5), 547. DOI: 10.1037/h0042145.

Kim, S. and Wogalter, M. S., 2009. Habituation, dishabituation, and recovery effects in visual warnings. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*. SAGE Publications Sage CA: Los Angeles, CA. 1612-1616. DOI: 10.1177/154193120905302015.

Kim, T. W. and Werbach, K., 2016. More than just a game: ethical issues in gamification. *Ethics and Information Technology*, 18 (2), 157-173. DOI: 10.1007/s10676-016-9401-5.

Kinneavy, J. L., 1986. Kairos: A neglected concept in classical rhetoric. *Rhetoric praxis: The contribution of classical rhetoric to practical reasoning*, 79-105.

Knobloch-Westerwick, S. and Meng, J., 2009. Looking the other way: Selective exposure to attitude-consistent and counterattitudinal political information. *Communication Research*, 36 (3), 426-448. DOI: 10.1177/0093650209333030.

Knowles, E. S. and Linn, J. A., 2004. *Resistance and persuasion*. Taylor & Francis Inc.

Kobus, K., 2003. Peers and adolescent smoking. *Addiction*, 98, 37-55. DOI: 10.1046/j.1360-0443.98.s1.4.x.

Kokkalis, N., Huebner, J., Diamond, S., Becker, D., Chang, M., Lee, M., Schulze, F., Koehn, T. and Klemmer, S. R., 2012. *Automatically providing action plans helps people complete tasks*.

Köpetz, C. E., Lejuez, C. W., Wiers, R. W. and Kruglanski, A. W., 2013. Motivation and self-regulation in addiction: a call for convergence. *Perspectives on Psychological Science*, 8 (1), 3-24. DOI: 10.1177/1745691612457575.

Korn, D. A. and Shaffer, H. J., 1999. Gambling and the health of the public: Adopting a public health perspective. *Journal of gambling studies*, 15 (4), 289-365. DOI: 10.1023/A:1023005115932.

Kou, Y. and Gui, X., 2020. Emotion regulation in eSports gaming: a qualitative study of league of legends. *Proceedings of the ACM on Human-Computer Interaction*, 4 (CSCW2), 1-25. DOI: 10.1145/3415229.

Kovac, V. B., 2013. The more the 'Merrier': A multi-sourced model of addiction. *Addiction Research & Theory*, 21 (1), 19-32. DOI: 10.3109/16066359.2012.691581.

Kubiak, J., Rother, S. and Egloff, B., 2019. Keep your cool and win the game: Emotion regulation and performance in table tennis. *Journal of Personality*, 87 (5), 996-1008. DOI: 10.1111/jopy.12451.

Kuonanoja, L. and Oinas-Kukkonen, H., 2018. Recognizing and Mitigating the Negative Effects of Information Technology Use: A Systematic Review of Persuasive Characteristics in Information Systems. *In:* Müller, S. D. and Nielsen, J. A., eds. *Nordic Contributions in IS Research*, Cham 2018//. Springer International Publishing. 14-25. Available from: 10.1145/3290605.3300616 [Accessed DOI: 10.1007/978-3-319-96367-9_2.

Kyonka, E. G. and Schutte, N. S., 2018. Probability discounting and gambling: A meta-analysis. *Addiction*, 113 (12), 2173-2181. DOI: 10.1111/add.14397.

Ladouceur, R. and Sevigny, S., 2003. Interactive messages on video lottery terminals and persistence in gambling. *Gambling Research: Journal of the National Association for Gambling Studies (Australia)*, 15 (1), 45-50.

Ladouceur, R. and Sévigny, S., 2005. Structural characteristics of video lotteries: Effects of a stopping device on illusion of control and gambling persistence. *Journal of gambling studies*, 21 (2), 117-131. DOI: 10.1007/s10899-005-3028-5.

Ladouceur, R., Shaffer, P., Blaszczynski, A. and Shaffer, H. J., 2017. Responsible gambling: a synthesis of the empirical evidence. *Addiction Research & Theory*, 25 (3), 225-235. DOI: 10.1080/16066359.2016.1245294.

Ladouceur, R., Sylvain, C., Boutin, C., Lachance, S., Doucet, C. and Leblond, J., 2003. Group therapy for pathological gamblers: A cognitive approach. *Behaviour research and therapy*, 41 (5), 587-596. DOI: 10.1016/S0005-7967(02)00036-0.

Langer, E. J., 1975. The illusion of control. *Journal of personality and social psychology*, 32 (2), 311. DOI: 10.1037/0022-3514.32.2.311.

Langham, E., Thorne, H., Browne, M., Donaldson, P., Rose, J. and Rockloff, M., 2015. Understanding gambling related harm: A proposed definition, conceptual framework, and taxonomy of harms. *BMC public health*, 16 (1), 1-23. DOI: 10.1186/s12889-016-2747-0.

Langrial, S., Lehto, T., Oinas-Kukkonen, H., Harjumaa, M. and Karppinen, P., 2012. Native mobile applications for personal well-being: a persuasive systems design evaluation. *PACIS 2012 Proceeding*.

Larimer, M. E. and Neighbors, C., 2003. Normative misperception and the impact of descriptive and injunctive norms on college student gambling. *Psychology of Addictive Behaviors*, 17 (3), 235. DOI: 10.1037/0893-164X.17.3.235.

Lee, C. and Coughlin, J. F., 2015. PERSPECTIVE: Older adults' adoption of technology: an integrated approach to identifying determinants and barriers. *Journal of Product Innovation Management*, 32 (5), 747-759. DOI: 10.1111/jpim.12176.

Leeman, R. F. and Potenza, M. N., 2012. Similarities and differences between pathological gambling and substance use disorders: a focus on impulsivity and compulsivity. *Psychopharmacology*, 219 (2), 469-490. DOI: 10.1007/s00213-011-2550-7.

Leino, T., Torsheim, T., Blaszczynski, A., Griffiths, M., Mentzoni, R., Pallesen, S. and Molde, H., 2015. The Relationship Between Structural Game Characteristics and Gambling Behavior: A Population-Level Study. *Journal of Gambling Studies*, 31 (4), 1297-1315. DOI: 10.1007/s10899-014-9477-y.

Lesieur, H. R. and Blume, S. B., 1991. When lady luck loses: Women and compulsive gambling. *Feminist perspectives on addictions.* New York, NY, US: Springer Publishing Company, 181-197.

Leth Jespersen, J., Albrechtslund, A., Øhrstrøm, P., Hasle, P. and Albretsen, J., 2007. Surveillance, persuasion, and panopticon. *Persuasive Technology: Second International Conference on Persuasive Technology, PERSUASIVE 2007, Palo Alto, CA, USA, April 26-27, 2007, Revised Selected Papers 2*. Springer. 109-120. DOI: 10.1007/978-3-540-77006-0_15.

Levy, E., Gidron, Y., Deschepper, R., Olley, B. O. and Ponnet, K., 2019. Effects of a computerized psychological inoculation intervention on condom use tendencies in sub Saharan and Caucasian students: two feasibility trials. *Health Psychology and Behavioral Medicine*, 7 (1), 160-178. DOI: 10.1080/21642850.2019.1614928.

Lewis, J. R., 2014. Usability: Lessons Learned … and Yet to Be Learned. *International Journal of Human–Computer Interaction*, 30 (9), 663-684. DOI: 10.1080/10447318.2014.930311.

Li, E., Browne, M., Rawat, V., Langham, E. and Rockloff, M., 2017. Breaking bad: Comparing gambling harms among gamblers and affected others. *Journal of Gambling Studies*, 33 (1), 223-248. DOI: 10.1007/s10899-016-9632-8.

Li, E., Rockloff, M. J., Browne, M. and Donaldson, P., 2016. Jackpot structural features: Rollover effect and goal-gradient effect in EGM gambling. *Journal of gambling studies*, 32, 707-720. DOI: 10.1007/s10899-015-9557-7.

Liang, L., Chaloupka, F., Nichter, M. and Clayton, R., 2003. Prices, policies and youth smoking, May 2001. *Addiction*, 98, 105-122. DOI: 10.1046/j.1360-0443.98.s1.7.x.

Limayem, M., Hirt, S. G. and Cheung, C. M. K., 2007. How habit limits the predictive power of intention: The case of information systems continuance. *MIS quarterly*, 705-737. DOI: 10.2307/25148817.

Lindegren, D., Karegar, F., Kane, B. and Pettersson, J. S., 2021. An evaluation of three designs to engage users when providing their consent on smartphones. *Behaviour & Information Technology*, 40 (4), 398-414. DOI: 10.1080/0144929X.2019.1697898.

Lister, J. J., Nower, L. and Wohl, M. J., 2016. Gambling goals predict chasing behavior during slot machine play. *Addictive behaviors*, 62, 129-134. DOI: 10.1016/j.addbeh.2016.06.018.

Litt, D. M., Lewis, M. A., Stahlbrandt, H., Firth, P. and Neighbors, C., 2012. Social comparison as a moderator of the association between perceived norms and alcohol use and negative consequences among college students. *Journal of studies on alcohol and drugs*, 73 (6), 961-967. DOI: 10.15288/jsad.2012.73.961.

Livingstone, C. and Rintoul, A., 2020. Moving on from responsible gambling: a new discourse is needed to prevent and minimise harm from gambling. *Public Health*, 184, 107-112. DOI: 10.1016/j.puhe.2020.03.018.

Livingstone, S. and Helsper, E. J., 2006. Does advertising literacy mediate the effects of advertising on children? A critical examination of two linked research literatures in relation to obesity and food choice. *Journal of communication*, 56 (3), 560-584. DOI: 10.1111/j.1460-2466.2006.00301.x.

Lobo, D. S. and Kennedy, J. L., 2009. Genetic aspects of pathological gambling: a complex disorder with shared genetic vulnerabilities. *Addiction*, 104 (9), 1454-1465. DOI: 10.1111/j.1360-0443.2009.02671.x.

Loo, J. M., Kraus, S. W. and Potenza, M. N., 2019. A systematic review of gambling-related findings from the National Epidemiologic Survey on Alcohol and Related Conditions. *Journal of behavioral addictions*, 8 (4), 625-648. DOI: 10.1556/2006.8.2019.64.

Lopez-Gonzalez, H., Estévez, A. and Griffiths, M. D., 2018. Spanish validation of the Problem Gambling Severity Index: A confirmatory factor analysis with sports bettors. *Journal of Behavioral Addictions*, 7 (3), 814-820. DOI: 10.1556/2006.7.2018.84.

Lopez-Gonzalez, H. and Griffiths, M. D., 2018. Betting, forex trading, and fantasy gaming sponsorships—a responsible marketing inquiry into the 'gamblification'of English football. *International Journal of Mental Health and Addiction*, 16, 404-419. DOI: 10.1007/s11469-.

Lorains, F. K., Cowlishaw, S. and Thomas, S. A., 2011. Prevalence of comorbid disorders in problem and pathological gambling: Systematic review and meta-analysis of population surveys. *Addiction*, 106 (3), 490-498. DOI: 10.1111/j.1360-0443.2010.03300.x.

Luchner, A. F., Houston, J. M., Walker, C. and Houston, M. A., 2011. Exploring the relationship between two forms of narcissism and competitiveness. *Personality and Individual Differences*, 51 (6), 779-782. DOI: 10.1016/j.paid.2011.06.033.

Lumsdaine, A. A. and Janis, I. L., 1953. Resistance to "counterpropaganda" produced by one-sided and two-sided "propaganda" presentations. *Public Opinion Quarterly*, 17 (3), 311-318. DOI: 10.1086/266464.

Lynn, M., 1991. Scarcity effects on value: A quantitative review of the commodity theory literature. *Psychology & Marketing*, 8 (1), 43-57. DOI: 10.1002/mar.4220080105.

Macey, J. and Hamari, J., 2020. GamCog: A measurement instrument for miscognitions related to gamblification, gambling, and video gaming. *Psychology of addictive behaviors: journal of the Society of Psychologists in Addictive Behaviors*, 34 (1), 242-256. DOI: 10.1037/adb0000526.

MacKay, T.-L. and Hodgins, D. C., 2012. Cognitive distortions as a problem gambling risk factor in Internet gambling. *International Gambling Studies*, 12 (2), 163-175. DOI: 10.1080/14459795.2011.648652.

Maddux, J. E. and Rogers, R. W., 1983. Protection motivation and self-efficacy: A revised theory of fear appeals and attitude change. *Journal of experimental social psychology*, 19 (5), 469-479. DOI: 10.1016/0022-1031(83)90023-9.

Mantler, T., 2013. A systematic review of smoking Youths' perceptions of addiction and health risks associated with smoking: Utilizing the framework of the health belief model. *Addiction Research & Theory*, 21 (4), 306-317. DOI: 10.3109/16066359.2012.727505.

Martin, I. M., Kamins, M. A., Pirouz, D. M., Davis, S. W., Haws, K. L., Mirabito, A. M., Mukherjee, S., Rapp, J. M. and Grover, A., 2013. On the road to addiction: The facilitative and preventive roles of marketing cues. *Journal of Business Research*, 66 (8), 1219-1226. DOI: 10.1016/j.jbusres.2012.08.015.

Mason, A. M. and Miller, C. H., 2013. Inoculation message treatments for curbing noncommunicable disease development. *Revista Panamericana de Salud Pública*, 34, 29-35.

Matthews, J., Win, K. T., Oinas-Kukkonen, H. and Freeman, M., 2016. Persuasive technology in mobile applications promoting physical activity: a systematic review. *Journal of medical systems*, 40 (3), 1-13. DOI: 10.1007/s10916-015-0425-x.

May, R. K., Whelan, J. P., Steenbergh, T. A. and Meyers, A. W., 2003. The gambling self-efficacy questionnaire: An initial psychometric evaluation. *Journal of Gambling Studies*, 19 (4), 339-357. DOI: 10.1023/A:1026379125116.

Mays, N., Roberts, E. and Popay, J., 2004. Synthesising research evidence. *Studying the organisation and delivery of health services.* Routledge, 200-232.

McAlaney, J. and McMahon, J., 2007. Normative beliefs, misperceptions, and heavy episodic drinking in a British student sample. *Journal of studies on alcohol and drugs*, 68 (3), 385-392. DOI: 10.15288/jsad.2007.68.385.

McComb, J. L. and Sabiston, C. M., 2010. Family influences on adolescent gambling behavior: A review of the literature. *Journal of gambling studies*, 26 (4), 503-520. DOI: 10.1007/s10899-010-9181-5.

McCormack, A. and Griffiths, M., 2011. The effects of problem gambling on quality of life and wellbeing: A qualitative comparison of online and offline problem gamblers. *Gambling Research: Journal of the National Association for Gambling Studies (Australia)*, 23 (1), 63-81.

McCormack, A. and Griffiths, M. D., 2013. A scoping study of the structural and situational characteristics of internet gambling. *International Journal of Cyber Behavior, Psychology and Learning (IJCBPL)*, 3 (1), 29-49.

McCormick, R. A., 1994. The importance of coping skill enhancement in the treatment of the pathological gambler. *Journal of Gambling Studies*, 10 (1), 77-86. DOI: 10.1007/BF02109780.

McCusker, C. G., 2001. Cognitive biases and addiction: an evolution in theory and method. *Addiction*, 96 (1), 47-56. DOI: 10.1046/j.1360-0443.2001.961474.x.

McGuier, W., 1962. Persistence of the resistance to persuasion induced by various types of prior belief defenses. *The Journal of Abnormal and Social Psychology*, 64 (4), 241. DOI: 10.1037/h0044167.

McGuire, W. J., 1961. Resistance to persuasion conferred by active and passive prior refutation of the same and alternative counterarguments. *The Journal of Abnormal and Social Psychology*, 63 (2), 326. DOI: 10.1037/h0048344.

McGuire, W. J., 1964. Inducing resistance to persuasion. Some contemporary approaches. *CC Haaland and WO Kaelber (Eds.), Self and Society. An Anthology of Readings, Lexington, Mass.(Ginn Custom Publishing) 1981, pp. 192-230.*

McGuire, W. J., 1968. Personality and attitude change: An information-processing theory. *Psychological foundations of attitudes.* Academic Press, 196.

McGuire, W. J. and Papageorgis, D., 1962. Effectiveness of forewarning in developing resistance to persuasion. *Public Opinion Quarterly*, 26 (1), 24-34. DOI: 10.1086/267068.

McMillen, J., Marshall, D., Murphy, L., Lorenzen, S. and Waugh, B., 2007. *Help-seeking by problem gamblers, friends and families: A focus on gender and cultural groups*. Centre for Gambling Research (CGR), ANU.

Mei, S., Yau, Y. H. C., Chai, J., Guo, J. and Potenza, M. N., 2016. Problematic Internet use, well-being, self-esteem and self-control: Data from a high-school survey in China. *Addictive behaviors*, 61, 74-79. DOI: 10.1016/j.addbeh.2016.05.009.

Mercer, K. B. and Eastwood, J. D., 2010. Is boredom associated with problem gambling behaviour? It depends on what you mean by 'boredom'. *International Gambling Studies*, 10 (1), 91-104. DOI: 10.1080/14459791003754414.

Milgram, S., 1963. Behavioral study of obedience. *The Journal of abnormal and social psychology*, 67 (4), 371. DOI: 10.1037/h0040525.

Millecamp, M., Htun, N. N., Conati, C. and Verbert, K., 2019. To explain or not to explain: the effects of personal characteristics when explaining music recommendations. *The 24th International Conference on Intelligent User Interfaces* 2019. 397-407. DOI: 10.1145/3301275.3302313.

Mintel Report, 2019. *Online Gambling and Betting-UK-December 2019.*

Mishra, S., Lalumière, M. L. and Williams, R. J., 2010. Gambling as a form of risk-taking: Individual differences in personality, risk-accepting attitudes, and behavioral preferences

for risk. *Personality and Individual Differences*, 49 (6), 616-621. DOI: 10.1016/j.paid.2010.05.032.

Mittone, L. and Savadori, L., 2009. The scarcity bias. *Applied Psychology*, 58 (3), 453-468. DOI: 10.1111/j.1464-0597.2009.00401.x.

Molet, M. and Miller, R. R., 2014. Timing: An attribute of associative learning. *Behavioural processes*, 101, 4-14. DOI: 10.1016/j.beproc.2013.05.015.

Monaghan, S., 2009. Responsible gambling strategies for Internet gambling: The theoretical and empirical base of using pop-up messages to encourage self-awareness. *Computers in Human Behavior*, 25 (1), 202-207. DOI: 10.1016/j.chb.2008.08.008.

Monaghan, S. and Blaszczynski, A., 2009. Electronic gaming machine warning messages: Information versus self-evaluation. *The Journal of Psychology*, 144 (1), 83-96. DOI: 10.1080/00223980903356081.

Monaghan, S. and Blaszczynski, A., 2010. Impact of mode of display and message content of responsible gambling signs for electronic gaming machines on regular gamblers. *Journal of Gambling Studies*, 26 (1), 67-88. DOI: 10.1007/s10899-009-9150-z.

Montag, C., Lachmann, B., Herrlich, M. and Zweig, K., 2019. Addictive features of social media/messenger platforms and freemium games against the background of psychological and economic theories. *International journal of environmental research and public health*, 16 (14), 2612. DOI: 10.3390/ijerph16142612.

Moore, S. M., Thomas, A. C., Kyrios, M. and Bates, G., 2012. The self-regulation of gambling. *Journal of Gambling Studies*, 28 (3), 405-420. DOI: 10.1007/s10899-011-9265-x.

Munafo, M. R., Zetteler, J. I. and Clark, T. G., 2007. Personality and smoking status: A meta-analysis. *Nicotine & Tobacco Research*, 9 (3), 405-413. DOI: 10.1080/14622200701188851.

Munn, Z., Peters, M. D., Stern, C., Tufanaru, C., McArthur, A. and Aromataris, E., 2018. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC medical research methodology*, 18 (1), 1-7. DOI: 10.1186/s12874-018-0611-x.

Munoz, Y., Chebat, J.-C. and Suissa, J. A., 2010. Using fear appeals in warning labels to promote responsible gambling among VLT players: The key role of depth of information processing. *Journal of Gambling Studies*, 26 (4), 593-609. DOI: 10.1007/s10899-010-9182-4.

Murch, W. S., Limbrick-Oldfield, E. H., Ferrari, M. A., MacDonald, K. I., Fooken, J., Cherkasova, M. V., Spering, M. and Clark, L., 2020. Zoned in or zoned out? Investigating immersion in slot machine gambling using mobile eye-tracking. *Addiction*, 115 (6), 1127-1138. DOI: 10.1111/add.14899.

Myrseth, H., Pallesen, S., Molde, H., Johnsen, B. H. and Lorvik, I. M., 2009. Personality factors as predictors of pathological gambling. *Personality and individual differences*, 47 (8), 933-937. DOI: 10.1016/j.paid.2009.07.018.

Naiseh, M., Cemiloglu, D., Thani, D. A., Jiang, N. and Ali, R., 2021. Explainable Recommendations and Calibrated Trust: Two Systematic User Errors. *Computer*, 54 (10), 28-37. DOI: 10.1109/MC.2021.3076131.

Naiseh, M., Jiang, N., Ma, J. and Ali, R., 2020a. Explainable Recommendations in Intelligent Systems: Delivery Methods, Modalities and Risks. *Research Challenges in Information Science. RCIS 2020. Lecture Notes in Business Information Processing*, Cham. Springer International Publishing. 212-228. DOI: 10.1007/978-3-030-50316-1_13.

Naiseh, M., Jiang, N., Ma, J. and Ali, R., 2020b. Personalising Explainable Recommendations: Literature and Conceptualisation. *In:* Rocha, Á., Adeli, H., Reis, L. P., Costanzo, S., Orovic, I. and Moreira, F., eds. *Trends and Innovations in Information Systems and Technologies*, Cham 2020//. Springer International Publishing. 518-533. DOI: 10.1007/978-3-030-45691-7_49.

Narayanan, A., Mathur, A., Chetty, M. and Kshirsagar, M., 2020. Dark Patterns: Past, Present, and Future: The evolution of tricky user interfaces. *Queue*, 18 (2), 67-92. DOI: 10.1145/3400899.3400901.

Navazio, R., 1977. An Experimental Approach to Bandwagon Research. *Public Opinion Quarterly*, 41 (2), 217-225. DOI: 10.1086/268376.

Neal, P. N., Delfabbro, P. H. and O'Neil, M. G., 2005. *Problem gambling and harm: Towards a national definition*. Office of Gaming and Racing, Victorian Government Department of Justice.

Newcomb, M. D. and Bentler, P. M., 1989. Substance use and abuse among children and teenagers. *American psychologist*, 44 (2), 242. DOI: 10.1037/0003-066X.44.2.242.

Nielsen, J., 1994. *Usability engineering*. Morgan Kaufmann.

Nielsen, J., 2005. *Ten usability heuristics* [online]. Available from: https://www.nngroup.com/articles/ten-usability-heuristics/ [Accessed 20 March].

Nisbett, R. E. and Wilson, T. D., 1977. The halo effect: Evidence for unconscious alteration of judgments. *Journal of Personality and Social Psychology*, 35 (4), 250-256. DOI: 10.1037/0022-3514.35.4.250.

Norman, D. A., 1998. *The invisible computer: why good products can fail, the personal computer is so complex, and information appliances are the solution*. MIT press.

Nower, L. and Blaszczynski, A., 2010. Gambling motivations, money-limiting strategies, and precommitment preferences of problem versus non-problem gamblers. *Journal of Gambling Studies*, 26 (3), 361-372. DOI: 10.1007/s10899-009-9170-8.

Nunes, I. and Jannach, D., 2017. A systematic review and taxonomy of explanations in decision support and recommender systems. *User Modeling and User-Adapted Interaction*, 27 (3), 393-444. DOI: 10.1007/s11257-017-9195-0.

O'keefe, D. J., 2015. *Persuasion: Theory and research*. Sage Publications.

O'Shaugnessy, J. and O'Shaughnessy, N., 2003. *Persuasion in advertising*. Routledge.

Ockene, J. K., Mermelstein, R. J., Bonollo, D. S., Emmons, K. M., Perkins, K. A., Voorhees, C. C. and Hollis, J. F., 2000. Relapse and maintenance issues for smoking cessation. *Health Psychology*, 19 (1S), 17.

Oei, T. P. and Baldwin, A. R., 1994. Expectancy theory: a two-process model of alcohol use and abuse. *Journal of studies on alcohol*, 55 (5), 525-534. DOI: 10.15288/jsa.1994.55.525.

Oinas-Kukkonen, H., 2010. Requirements for measuring the success of persuasive technology applications. *Proceedings of the 7th international conference on methods and techniques in behavioral research*. 1-4. DOI: 10.1145/1931344.1931355.

Oinas-Kukkonen, H., 2013. A foundation for the study of behavior change support systems. *Personal and ubiquitous computing*, 17 (6), 1223-1235. DOI: 10.1007/s00779-012-0591-5.

Oinas-Kukkonen, H. and Harjumaa, M., 2009. Persuasive systems design: Key issues, process model, and system features. *Communications of the Association for Information Systems*, 24 (1), 28. DOI: 10.17705/1CAIS.02428.

Orji, R., 2014. Exploring the Persuasiveness of Behavior Change Support Strategies and Possible Gender Differences. *BCSS@ PERSUASIVE*, 1153, 41-57.

Orphanides, A. and Zervos, D., 1995. Rational addiction with learning and regret. *Journal of Political Economy*, 103 (4), 739-758.

Osatuyi, B. and Turel, O., 2018. Tug of war between social self-regulation and habit: Explaining the experience of momentary social media addiction symptoms. *Computers in Human Behavior*, 85, 95-105. DOI: 10.1016/j.chb.2018.03.037.

Oyama, Y., Manalo, E. and Nakatani, Y., 2018. The Hemingway effect: How failing to finish a task can have a positive effect on motivation. *Thinking Skills and Creativity*, 30, 7-18. DOI: 10.1016/j.tsc.2018.01.001.

Oyebode, O., Ndulue, C., Alhasani, M. and Orji, R., 2020. Persuasive mobile apps for health and wellness: a comparative systematic review. *International Conference on Persuasive Technology*. Springer. 163-181. DOI: 10.1007/978-3-030-45712-9_13.

Oyibo, K., Orji, R. and Vassileva, J., 2017. The influence of culture in the effect of age and gender on social influence in persuasive technology. *Adjunct publication of the 25th conference on user modeling, adaptation and personalization*. 47-52. DOI: 10.1145/3099023.3099071.

Page, R. E. and Kray, C., 2010. Ethics and persuasive technology: an exploratory study in the context of healthy living. *1st int. Workshop on Nudge & Influence Through Mobile Devices Mobile HCI 2010*, Lisboa, Portugal. September 7-10.

Panic, K., Cauberghe, V. and De Pelsmacker, P., 2013. Comparing TV ads and advergames targeting children: the impact of persuasion knowledge on behavioral responses. *Journal of Advertising*, 42 (2-3), 264-273. DOI: 10.1080/00913367.2013.774605.

Papacharisis, V., Simou, K. and Goudas, M., 2003. The relationship between intrinsic motivation and intention towards exercise. *Journal of Human Movement Studies*, 45 (4), 377.

Parke, A., Griffiths, M. and Irwing, P., 2004. Personality traits in pathological gambling: Sensation seeking, deferment of gratification and competitiveness as risk factors. *Addiction Research & Theory*, 12 (3), 201-212. DOI: 10.1080/1606635310001634500.

Parke, J. and Griffiths, M. D., 2007. The role of structural characteristics in gambling. *Research and measurement issues in gambling studies.* New York: Elsevier, 211-243.

Parke, J., Griffiths, M. D. and Parke, A., 2007. Positive thinking among slot machine gamblers: A case of maladaptive coping. *International Journal of Mental Health and Addiction*, 5 (1), 39-52. DOI: 10.1007/s11469-006-9049-1.

Parker, K. A., Ivanov, B. and Compton, J., 2012. Inoculation's efficacy with young adults' risky behaviors: can inoculation confer cross-protection over related but untreated issues? *Health Communication*, 27 (3), 223-233. DOI: 10.1080/10410236.2011.575541.

Parrado-González, A. and León-Jariego, J. C., 2020. Exposure to gambling advertising and adolescent gambling behaviour. Moderating effects of perceived family support. *International gambling studies*, 20 (2), 214-230. DOI: 10.1080/14459795.2020.1712737.

Patten, M., 2016. *Questionnaire research: A practical guide*. Routledge.

Pavlov, I. P., 1902. *The work of the digestive glands*. Charles Griffin.

Pelclová, J. and Lu, W.-l., 2018. *Persuasion in Public Discourse: Cognitive and functional perspectives (Volume 79)*. John Benjamins Publishing Company.

Pennanen, M., Broms, U., Korhonen, T., Haukkala, A., Partonen, T., Tuulio-Henriksson, A., Laatikainen, T., Patja, K. and Kaprio, J., 2014. Smoking, nicotine dependence and nicotine intake by socio-economic status and marital status. *Addictive Behaviors*, 39 (7), 1145-1151. DOI: 10.1016/j.addbeh.2014.03.005.

Petry, N. M., 2001. Pathological gamblers, with and without substance use disorders, discount delayed rewards at high rates. *Journal of abnormal psychology*, 110 (3), 482. DOI: 10.1037/0021-843X.110.3.482.

Petry, N. M., Stinson, F. S. and Grant, B. F., 2005. Comorbidity of DSM-IV pathological gambling and other psychiatric disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Journal of clinical psychiatry*, 66 (5), 564-574.

Petty, R. E., 2018. *Attitudes and persuasion: Classic and contemporary approaches*. Routledge.

Petty, R. E. and Cacioppo, J. T., 1979. Effects of forwarning of persuasive intent and involvement on cognitive responses and persuasion. *Personality and Social Psychology Bulletin*, 5 (2), 173-176. DOI: 10.1177/014616727900500209.

Petty, R. E. and Cacioppo, J. T., 1983. Central and peripheral routes to persuasion: Application to advertising. *Advertising and consumer psychology*, 1, 3-23.

Petty, R. E. and Cacioppo, J. T., 1986. The elaboration likelihood model of persuasion. *Communication and persuasion.* Springer, 1-24 DOI: 10.1007/978-1-4612-4964-1_1.

Petty, R. E. and Cacioppo, J. T., 2012. *Communication and persuasion: Central and peripheral routes to attitude change*. Springer Science & Business Media.

Pfau, M., 1992. The potential of inoculation in promoting resistance to the effectiveness of comparative advertising messages. *Communication Quarterly*, 40 (1), 26-44. DOI: 10.1080/01463379209369818.

Pfau, M., Bockern, S. V. and Kang, J. G., 1992. Use of inoculation to promote resistance to smoking initiation among adolescents. *Communications Monographs*, 59 (3), 213-230. DOI: 10.1080/03637759209376266.

Pfau, M. and Burgoon, M., 1988. Inoculation in political campaign communication. *Human Communication Research*, 15 (1), 91-111. DOI: 10.1111/j.1468-2958.1988.tb00172.x.

Pfau, M., Compton, J., Parker, K., Wittenberg, E., An, C., Ferguson, M. and Malyshev, Y., 2004. The traditional explanation for resistance based on the core elements of threat and counterarguing and an alternative rationale based on attitude accessibility: Do these mechanisms trigger distinct or overlapping process of resistance. *Human Communication Research*, 30, 329-360.

Pfau, M., Haigh, M., Fifrick, A., Holl, D., Tedesco, A., Cope, J., Nunnally, D., Schiess, A., Preston, D. and Roszkowski, P., 2006. The effects of print news photographs of the casualties of war. *Journalism & Mass Communication Quarterly*, 83 (1), 150-168. DOI: 10.1177/107769900608300110.

Pfau, M., Park, D., Holbert, R. L. and Cho, J., 2001a. The effects of party-and PAC-sponsored issue advertising and the potential of inoculation to combat its impact on the democratic process. *American Behavioral Scientist*, 44 (12), 2379-2397. DOI: 10.1177/00027640121958384.

Pfau, M., Semmler, S. M., Deatrick, L., Mason, A., Nisbett, G., Lane, L., Craig, E., Underhill, J. and Banas, J., 2009. Nuances about the role and impact of affect in inoculation. *Communication Monographs*, 76 (1), 73-98. DOI: 10.1080/03637750802378807.

Pfau, M., Szabo, A., Anderson, J., Morrill, J., Zubric, J. and H-Wan, H. H., 2001b. The role and impact of affect in the process of resistance to persuasion. *Human Communication Research*, 27 (2), 216-252. DOI: 10.1111/j.1468-2958.2001.tb00781.x.

Pfau, M., Tusing, K. J., Koerner, A. F., Lee, W., Godbold, L. C., Penaloza, L. J., Yang, V. S.-H. and Hong, Y.-H., 1997. Enriching the inoculation construct: The role of critical components in the process of resistance. *Human Communication Research*, 24 (2), 187-215. DOI: 10.1111/j.1468-2958.1997.tb00413.x.

Pilaj, H., 2017. The choice architecture of sustainable and responsible investment: Nudging investors toward ethical decision-making. *Journal of business ethics*, 140, 743-753. DOI: 10.1007/s10551-015-2877-9.

Porter, J., Ungar, J., Frisch, G. R. and Chopra, R., 2004a. Loneliness and life dissatisfaction in gamblers. *Journal of Gambling issues*, (11).

Porter, S. R., Whitcomb, M. E. and Weitzer, W. H., 2004b. Multiple surveys of students and survey fatigue. *New directions for institutional research*, 2004 (121), 63-73. DOI: 10.1002/ir.101.

Potenza, M. N., 2013. Neurobiology of gambling behaviors. *Current opinion in neurobiology*, 23 (4), 660-667. DOI: 10.1016/j.conb.2013.03.004.

Powers, P., 2007. Persuasion and coercion: a critical review of philosophical and empirical approaches. *HEC F.*, 19, 125. DOI: 10.1007/s10730-007-9035-4.

QSR International Pty Ltd, 2018. *NVivo (Version 12)*.

Rai, A., 2020. Explainable AI: from black box to glass box. *Journal of the Academy of Marketing Science*, 48 (1), 137-141. DOI: 10.1007/s11747-019-00710-5.

Ramnerö, J., Molander, O., Lindner, P. and Carlbring, P., 2019. What can be learned about gambling from a learning perspective? A narrative review. *Nordic Psychology*, 71 (4), 303-322. DOI: 10.1080/19012276.2019.1616320.

Rapp, C., 2011. *Aristotle's Rhetoric* [online]. Available from: https://plato.stanford.edu/entries/aristotle-rhetoric/ [Accessed

Rash, C. J., Weinstock, J. and Van Patten, R., 2016. A review of gambling disorder and substance use disorders. *Substance abuse and rehabilitation*, 7, 3. DOI: 10.2147/SAR.S83460.

Raylu, N. and Oei, T. P., 2004. Role of culture in gambling and problem gambling. *Clinical psychology review*, 23 (8), 1087-1114. DOI: 10.1016/j.cpr.2003.09.005.

Raylu, N. and Oei, T. P. S., 2002. Pathological gambling: A comprehensive review. *Clinical Psychology Review*, 22 (7), 1009-1061. DOI: 10.1016/S0272-7358(02)00101-0.

Reader's Digest, 2020. *The History of Gambling* [online]. Reader's Digest: Available from: https://www.readersdigest.co.uk/inspire/life/the-history-of-gambling [Accessed May 2022].

Redström, J., 2006. Persuasive Design: Fringes and Foundations. *In:* Ijsselsteijn, W. A., de Kort, Y. A. W., Midden, C., Eggen, B. and van den Hoven, E., eds. *Persuasive Technology*, Berlin, Heidelberg 2006//. Springer Berlin Heidelberg. 112-122. DOI: 10.1007/11755494_17.

Reichertz, J., 2007. Abduction: The logic of discovery of grounded theory. *The SAGE handbook of grounded theory*. 214-228.

Reid, R., 1986. The psychology of the near miss. *Journal of gambling behavior*, 2 (1), 32-39. DOI: 10.1007/BF01019932.

Reid, R. C., McKittrick, H. L., Davtian, M. and Fong, T. W., 2012. Self-reported differences on measures of executive function in a patient sample of pathological gamblers.

International Journal of Neuroscience, 122 (9), 500-505. DOI: 10.3109/00207454.2012.673516.

Reips, U.-D., 2000. The Web experiment method: Advantages, disadvantages, and solutions. *Psychological experiments on the Internet.* Elsevier, 89-117 DOI: 10.1016/B978-012099980-4/50005-8.

Reith, G. and Dobbie, F., 2011. Beginning gambling: The role of social networks and environment. *Addiction Research & Theory*, 19 (6), 483-493. DOI: 10.3109/16066359.2011.558955.

Renaud, K. and Zimmermann, V., 2018. Ethical guidelines for nudging in information security & privacy. *International Journal of Human-Computer Studies*, 120, 22-35. DOI: 10.1016/j.ijhcs.2018.05.011.

Reynolds-Tylus, T., Martinez Gonzalez, A. and Quick, B. L., 2019. The role of choice clustering and descriptive norms in attenuating psychological reactance to water and energy conservation messages. *Environmental Communication*, 13 (7), 847-863. DOI: 10.1080/17524032.2018.1461672.

Reynolds, J., Kairouz, S., Ilacqua, S. and French, M., 2020. Responsible gambling: a scoping review. *Critical Gambling Studies*, 1 (1), 23-39. DOI: 10.29173/cgs42.

Roberts, K. J., Smith, N., Bowden-Jones, H. and Cheeta, S., 2017. Gambling disorder and suicidality within the UK: an analysis investigating mental health and gambling severity as risk factors to suicidality. *International Gambling Studies*, 17 (1), 51-64. DOI: 10.1080/14459795.2016.1257648.

Robinson, T. E. and Berridge, K. C., 1993. The neural basis of drug craving: an incentive-sensitization theory of addiction. *Brain research reviews*, 18 (3), 247-291. DOI: 10.1016/0165-0173(93)90013-P.

Roets, A., Kruglanski, A. W., Kossowska, M., Pierro, A. and Hong, Y.-y., 2015. The motivated gatekeeper of our minds: New directions in need for closure theory and research. *Advances in experimental social psychology.* Elsevier, 221-283 DOI: 10.1016/bs.aesp.2015.01.001.

Roger, E. M., 1995. *Diffusion of Innovations 3" edition*. The free press, Macmillan.

Rogers, R. W., 1975. A protection motivation theory of fear appeals and attitude change. *The journal of psychology*, 91 (1), 93-114. DOI: 10.1080/00223980.1975.9915803.

Rogier, G., Beomonte Zobel, S. and Velotti, P., 2020. Pathological personality facets and emotion (dys) regulation in gambling disorder. *Scandinavian journal of psychology*, 61 (2), 262-270. DOI: 10.1111/sjop.12579.

Roloff, M. E. and Miller, G. R., 1980. *Persuasion: New directions in theory and research.* Vol. 8. SAGE Publications, Incorporated.

Roozenbeek, J. and van der Linden, S., 2019a. Fake news game confers psychological resistance against online misinformation. *Palgrave Communications*, 5 (1), 1-10. DOI: 10.1057/s41599-019-0279-9.

Roozenbeek, J. and Van Der Linden, S., 2019b. The fake news game: actively inoculating against the risk of misinformation. *Journal of Risk Research*, 22 (5), 570-580. DOI: 10.1080/13669877.2018.1443491.

Rosenfeld, A. and Richardson, A., 2019. Explainability in human–agent systems. *Autonomous Agents and Multi-Agent Systems*, 33 (6), 673-705. DOI: 10.1007/s10458-019-09408-y.

Rucker, D. D., Tormala, Z. L. and Petty, R. E., 2004. Individual differences in resistance to persuasion: The role of beliefs and meta-beliefs. *Resistance and persuasion.*

Salonen, A. H., Hellman, M., Latvala, T. and Castrén, S., 2018. Gambling participation, gambling habits, gambling-related harm, and opinions on gambling advertising in Finland in 2016. *Nordic Studies on Alcohol and Drugs*, 35 (3), 215-234. DOI: 10.1177/1455072518765875.

Samek, W., Montavon, G., Vedaldi, A., Hansen, L. K. and Müller, K.-R., 2019. *Explainable AI: interpreting, explaining and visualizing deep learning.* Vol. 11700. Springer Nature.

Samuelson, W. and Zeckhauser, R., 1988. Status quo bias in decision making. *Journal of risk and uncertainty*, 1 (1), 7-59. DOI: 10.1007/BF00055564.

Saunders, M. N. K., Lewis, P. and Thornhill, A., 2019. *Research methods for business students.* Eighth edition. edition. Harlow, United Kingdom: Pearson.

Schaub, F., Balebako, R., Durity, A. L. and Cranor, L. F., 2015. A design space for effective privacy notices. *Eleventh symposium on usable privacy and security (SOUPS 2015)*. 1-17. DOI: 10.5555/3235866.3235868.

Schauer, F., 2011. Transparency in three dimensions. *U. Ill. L. Rev.*, 1339.

Schüll, N. D., 2012. *Addiction by design*. Princeton University Press.

Schultz, W., Dayan, P. and Montague, P. R., 1997. A neural substrate of prediction and reward. *Science*, 275 (5306), 1593-1599. DOI: 10.1126/science.275.5306.1593.

Scott, J., 2000. Rational choice theory. *Understanding contemporary society: Theories of the present.* 126-138.

Sescousse, G., Barbalat, G., Domenech, P. and Dreher, J.-C., 2013. Imbalance in the sensitivity to different types of rewards in pathological gambling. *Brain*, 136 (8), 2527-2538. DOI: 10.1093/brain/awt126.

Shaffer, H. J. and Hall, M. N., 2001. Updating and refining prevalence estimates of disordered gambling behaviour in the United States and Canada. *Canadian Journal of Public Health*, 92 (3), 168-172. DOI: 10.1007/BF03404298.

Shaffer, H. J., Ladouceur, R., Blaszczynski, A. and Whyte, K., 2016. Extending the RENO model: Clinical and ethical applications. *American Journal of Orthopsychiatry*, 86 (3), 297. DOI: 10.1037/ort0000123.

Shah, K. R., Eisen, S. A., Xian, H. and Potenza, M. N., 2005. Genetic studies of pathological gambling: a review of methodology and analyses of data from the Vietnam Era Twin Registry. *Journal of Gambling Studies*, 21 (2), 179-203. DOI: 10.1007/s10899-005-3031-x.

Sharma, A. and Sacco, P., 2015. Adverse childhood experiences and gambling: Results from a national survey. *Journal of Social Work Practice in the Addictions*, 15 (1), 25-43. DOI: 10.1080/1533256X.2015.996502.

Shen, L., 2010. Mitigating psychological reactance: The role of message-induced empathy in persuasion. *Human Communication Research*, 36 (3), 397-422. DOI: 10.1111/j.1468-2958.2010.01381.x.

Shepherd, L. A. and Renaud, K., 2018. How to design browser security and privacy alerts. *2018 AISB Convention: Symposium on Digital Behaviour Intervention for Cyber Security*. Society for the Study of Artificial Intelligence and Simulation for …. 21-28. DOI: 10.48550/arXiv.1806.05426.

Sheskin, D. J., 2003. *Handbook of parametric and nonparametric statistical procedures*. Chapman and Hall/CRC.

Siles, I., Espinoza-Rojas, J., Naranjo, A. and Tristán, M. F., 2019. The mutual domestication of users and algorithmic recommendations on Netflix. *Communication, Culture & Critique*, 12 (4), 499-518. DOI: 10.1093/ccc/tcz025.

Sioni, S. R., Burleson, M. H. and Bekerian, D. A., 2017. Internet gaming disorder: Social phobia and identifying with your virtual self. *Computers in Human Behavior*, 71, 11-15. DOI: 10.1016/j.chb.2017.01.044.

Sirola, A., Savela, N., Savolainen, I., Kaakinen, M. and Oksanen, A., 2021. The role of virtual communities in gambling and gaming behaviors: A systematic review. *Journal of Gambling Studies*, 37 (1), 165-187. DOI: 10.1007/s10899-020-09946-1.

Skinner, B. F., 1965. *Science and human behavior*. The Free Press.

Slutske, W. S., Eisen, S., True, W. R., Lyons, M. J., Goldberg, J. and Tsuang, M., 2000. Common genetic vulnerability for pathological gambling and alcohol dependence in men. *Archives of general psychiatry*, 57 (7), 666-673. DOI: 10-1001/pubs.Arch Gen Psychiatry-ISSN-0003-990x-57-7-yoa9396.

Slutske, W. S., Zhu, G., Meier, M. H. and Martin, N. G., 2010. Genetic and environmental influences on disordered gambling in men and women. *Archives of general psychiatry*, 67 (6), 624-630. DOI: 10.1001/archgenpsychiatry.2010.51.

Smedley, B. D. and Syme, S. L., 2001. Committee on capitalizing on social science and behavioral research to improve the public's health. *Promoting health: intervention strategies from social and behavioral research. Am J Health Promot*, 15 (3), 149-166.

Smids, J., 2012. The Voluntariness of Persuasive Technology. *In:* Bang, M. and Ragnemalm, E. L., eds. *Persuasive Technology. Design for Health and Safety*, Berlin, Heidelberg 2012//. Springer Berlin Heidelberg. 123-132. DOI: 10.1007/978-3-642-31037-9_11.

Smith, M. E., Thorpe, R. and Jackson, P., 2008. *Management research*.

So, R., Matsushita, S., Kishimoto, S. and Furukawa, T. A., 2019. Development and validation of the Japanese version of the problem gambling severity index. *Addictive behaviors*, 98, 105987. DOI: 10.1016/j.addbeh.2019.05.011.

Sokol, K. and Flach, P., 2020. Explainability fact sheets: a framework for systematic assessment of explainable approaches. *Proceedings of the 2020 Conference on Fairness, Accountability, and Transparency*, Barcelona, Spain. Association for Computing Machinery. 56–67. DOI: 10.1145/3351095.3372870.

Spahn, A., 2012. And lead us (not) into persuasion…? Persuasive technology and the ethics of communication. *Science and engineering ethics*, 18 (4), 633-650. DOI: 10.1007/s11948-011-9278-y.

Spotts, H., 1994. Evidence of a relationship between need for cognition and chronological age: Implications for persuasion in consumer research. *ACR North American Advances*.

Springer, A. and Whittaker, S., 2019. Progressive disclosure: empirically motivated approaches to designing effective transparency. *Proceedings of the 24th international conference on intelligent user interfaces*. 107-120. DOI: 10.1145/3301275.3302322.

Stanovich, K., 2011. *Rationality and the reflective mind*. Oxford University Press.

Statista, 2022. *Online gambling participation by Gender Great Britain 2021* [online]. Available from: https://www.statista.com/statistics/917028/share-of-at-online-gamblers-by-gender-great-britain/ [Accessed 21 June].

Ste-Marie, C., Gupta, R. and Derevensky, J. L., 2006. Anxiety and social stress related to adolescent gambling behavior and substance use. *Journal of Child & Adolescent Substance Abuse*, 15 (4), 55-74. DOI: 10.1300/J029v15n04_03.

Storr, C. L., Lee, G. P., Derevensky, J. L., Ialongo, N. S. and Martins, S. S., 2012. Gambling and adverse life events among urban adolescents. *Journal of Gambling Studies*, 28 (2), 325-336. DOI: 10.1007/s10899-011-9254-0.

Sudhinaraset, M., Wigglesworth, C. and Takeuchi, D. T., 2016. Social and cultural contexts of alcohol use: Influences in a social–ecological framework. *Alcohol research: current reviews*.

Sulkunen, P., 2007. Images of addiction: Representations of addictions in films. *Addiction Research & Theory*, 15 (6), 543-559. DOI: 10.1080/16066350701651255.

Sunstein, C. R., 2016. Do People Like Nudges? *Administrative Law Review*, 177-232.

Tanabe, J., Thompson, L., Claus, E., Dalwani, M., Hutchison, K. and Banich, M. T., 2007. Prefrontal cortex activity is reduced in gambling and nongambling substance users during decision-making. *Human brain mapping*, 28 (12), 1276-1286. DOI: 10.1002/hbm.20344.

Tatar, D., 2007. The Design Tensions Framework. *Human–Computer Interaction*, 22 (4), 413-451. DOI: 10.1080/07370020701638814.

Taylor, C. R., 2017. Native advertising: The black sheep of the marketing family. *International Journal of Advertising* 36 (2), 207-209. DOI: 10.1080/02650487.2017.1285389.

Taylor, S. and Todd, P., 1995. Assessing IT usage: The role of prior experience. *MIS quarterly*, 561-570. DOI: 10.2307/249633.

Technavio, 2020. *Gambling Market by Type, Platform, and Geography - Forecast and Analysis 2020-2024*.

Thompson, R. L., Higgins, C. A. and Howell, J. M., 1991. Personal computing: Toward a conceptual model of utilization. *MIS quarterly*, 125-143. DOI: 10.2307/249443.

Timmer, J., Kool, L. and van Est, R., 2015. Ethical Challenges in Emerging Applications of Persuasive Technology. *In:* MacTavish, T. and Basapur, S., eds. *Persuasive Technology*, Cham 2015//. Springer International Publishing. 196-201. DOI: 10.1007/978-3-319-20306-5_18.

Tintarev, N. and Masthoff, J., 2007. A survey of explanations in recommender systems. *2007 IEEE 23rd international conference on data engineering workshop*. IEEE. 801-810. DOI: 10.1109/ICDEW.2007.4401070.

Toce-Gerstein, M., Gerstein, D. R. and Volberg, R. A., 2003. A hierarchy of gambling disorders in the community. *Addiction*, 98 (12), 1661-1672. DOI: 10.1111/j.1360-0443.2003.00545.x.

Toneatto, T., 1999. Cognitive psychopathology of problem gambling. *Substance use & misuse*, 34 (11), 1593-1604. DOI: 10.3109/10826089909039417.

Torning, K. and Oinas-Kukkonen, H., 2009. Persuasive system design: state of the art and future directions. *Proceedings of the 4th international conference on persuasive technology*. 1-8. DOI: 10.1145/1541948.1541989.

Turilli, M. and Floridi, L., 2009. The ethics of information transparency. *Ethics and Information Technology*, 11 (2), 105-112. DOI: 10.1007/s10676-009-9187-9.

Tversky, A. and Kahneman, D., 1974. Judgment under uncertainty: Heuristics and biases. *Science*, 185 (4157), 1124-1131.

Vaghefi, I., Lapointe, L. and Boudreau-Pinsonneault, C., 2017. A typology of user liability to IT addiction. *Information Systems Journal*, 27 (2), 125-169. DOI: 10.1111/isj.12098.

Van der Linden, S. and Roozenbeek, J., 2020. Psychological inoculation against fake news. *The psychology of fake news: Accepting, sharing, and correcting misinformation*, 147-169. DOI: 10.4324/9780429295379-11.

Van der Maas, M., 2016. Problem gambling, anxiety and poverty: an examination of the relationship between poor mental health and gambling problems across socio-economic status. *International Gambling Studies*, 16 (2), 281-295. DOI: 10.1080/14459795.2016.1172651.

Van Holst, R. J., van den Brink, W., Veltman, D. J. and Goudriaan, A. E., 2010. Why gamblers fail to win: a review of cognitive and neuroimaging findings in pathological gambling. *Neuroscience & Biobehavioral Reviews*, 34 (1), 87-107. DOI: 10.1016/j.neubiorev.2009.07.007.

Van Holst, R. J., Veltman, D. J., Büchel, C., van den Brink, W. and Goudriaan, A. E., 2012. Distorted expectancy coding in problem gambling: is the addictive in the anticipation? *Biological psychiatry*, 71 (8), 741-748. DOI: 10.1016/j.biopsych.2011.12.030.

Van Reijmersdal, E. A., Fransen, M. L., Van Noort, G., Opree, S. J., Vandeberg, L., Reusch, S., Van Lieshout, F. and Boerman, S. C., 2016. Effects of disclosing sponsored content in blogs: How the use of resistance strategies mediates effects on persuasion. *American Behavioral Scientist*, 60 (12), 1458-1474. DOI: 10.1177/0002764216660141.

Van Reijmersdal, E. A., Neijens, P. C. and Smit, E. G., 2010. Customer magazines: Effects of commerciality on readers' reactions. *Journal of Current Issues & Research in Advertising*, 32 (1), 59-67. DOI: 10.1080/10641734.2010.10505275.

Van Ryzin, M. J., Fosco, G. M. and Dishion, T. J., 2012. Family and peer predictors of substance use from early adolescence to early adulthood: An 11-year prospective analysis. *Addictive behaviors*, 37 (12), 1314-1324. DOI: 10.1016/j.addbeh.2012.06.020.

Van Welie, M., Van Der Veer, G. C. and Eliëns, A., 1999. Breaking Down Usability. *Interact*. 613-620.

Vaportzis, E., Giatsi Clausen, M. and Gow, A. J., 2017. Older adults perceptions of technology and barriers to interacting with tablet computers: a focus group study. *Frontiers in psychology*, 8, 1687. DOI: 10.3389/fpsyg.2017.01687.

Venkatesh, V., Thong, J. Y. and Xu, X., 2012. Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. *MIS quarterly*, 157-178. DOI: 10.2307/41410412.

Volkow, N. D. and Fowler, J. S., 2000. Addiction, a disease of compulsion and drive: involvement of the orbitofrontal cortex. *Cerebral cortex*, 10 (3), 318-325. DOI: 10.1093/cercor/10.3.318.

Volkow, N. D., Fowler, J. S. and Wang, G. J., 2002. Role of dopamine in drug reinforcement and addiction in humans: results from imaging studies. *Behavioural pharmacology*, 13 (5), 355-366.

Volkow, N. D., Wang, G.-J., Fowler, J. S., Tomasi, D. and Telang, F., 2011. Addiction: beyond dopamine reward circuitry. *Proceedings of the National Academy of Sciences*, 108 (37), 15037-15042. DOI: 10.1073/pnas.1010654108.

Voorhees, C. C., Ye, C., Carter-Pokras, O., MacPherson, L., Kanamori, M., Zhang, G., Chen, L. and Fiedler, R., 2011. Peers, tobacco advertising, and secondhand smoke exposure influences smoking initiation in diverse adolescents. *American Journal of Health Promotion*, 25 (3), e1-e11. DOI: 10.4278/ajhp.090604-QUAN-180.

Walker, M. B., 1992. Irrational thinking among slot machine players. *Journal of Gambling studies*, 8 (3), 245-261. DOI: 10.1007/BF01014652.

Walters, G. D., 1996. Addiction and identity: Exploring the possibility of a relationship. *Psychology of Addictive Behaviors*, 10 (1), 9. DOI: 10.1037/0893-164X.10.1.9.

Wang, R., Bush-Evans, R., Arden-Close, E., Bolat, E., McAlaney, J., Hodge, S., Thomas, S. and Phalp, K., 2022. Transparency in persuasive technology, immersive technology, and online marketing: Facilitating users' informed decision making and practical implications. *Computers in Human Behavior*, 107545. DOI: 10.1016/j.chb.2022.107545.

Wang, Y., Wu, A. M. S. and Lau, J. T. F., 2016. The health belief model and number of peers with internet addiction as inter-related factors of Internet addiction among secondary school students in Hong Kong. *BMC Public Health*, 16 (1), 272. DOI: 10.1186/s12889-016-2947-7.

Wason, P. C. and Evans, J. S. B. T., 1974. Dual processes in reasoning? *Cognition*, 3 (2), 141-154. DOI: 10.1016/0010-0277(74)90017-1.

Webb, T. L., Sheeran, P. and Luszczynska, A., 2009. Planning to break unwanted habits: Habit strength moderates implementation intention effects on behaviour change. *British Journal of Social Psychology*, 48 (3), 507-523. DOI: 10.1348/014466608X370591.

Webb, T. L., Sheeran, P., Totterdell, P., Miles, E., Mansell, W. and Baker, S., 2012. Using implementation intentions to overcome the effect of mood on risky behaviour. *British Journal of Social Psychology*, 51 (2), 330-345. DOI: 10.1348/014466610X533623.

Webb, T. L., Sniehotta, F. F. and Michie, S., 2010. Using theories of behaviour change to inform interventions for addictive behaviours. *Addiction*, 105 (11), 1879-1892. DOI: 10.1111/j.1360-0443.2010.03028.x.

Webster, J., Trevino, L. K. and Ryan, L., 1993. The dimensionality and correlates of flow in human-computer interactions. *Computers in human behavior*, 9 (4), 411-426. DOI: 10.1016/0747-5632(93)90032-N.

West, R., 2001. Theories of addiction. *Addiction*, 96 (1), 3-13. DOI: 10.1046/j.1360-0443.2001.96131.x.

West, R., 2013. EMCDDA Insights: Models of addiction. *Publications Office of the European Union. Luxemburg*.

Williams, E. J., Beardmore, A. and Joinson, A. N., 2017. Individual differences in susceptibility to online influence: A theoretical review. *Computers in Human Behavior*, 72, 412-421. DOI: 10.1016/j.chb.2017.03.002.

Wills, T. A., 1981. Downward comparison principles in social psychology. *Psychological bulletin*, 90 (2), 245. DOI: 10.1037/0033-2909.90.2.245.

Winkel, T. D., Jensen, T. and Poulsen, S. B., 2016. Who is to change? nudging and provocative communication discussed through Løgstrup's ontological ethics. *ACM SIGCAS Computers and Society*, 45 (3), 337-343. DOI: 10.1145/2874239.2874289.

Winters, K. C. and Rich, T., 1998. A twin study of adult gambling behavior. *Journal of Gambling Studies*, 14 (3), 213-225. DOI: 10.1023/A:1022084924589.

Wohl, M. J., Davis, C. G. and Hollingshead, S. J., 2017. How much have you won or lost? Personalized behavioral feedback about gambling expenditures regulates play. *Computers in Human Behavior*, 70, 437-445. DOI: 10.1016/j.chb.2017.01.025.

Wojdynski, B. W. and Golan, G. J., 2016. Native Advertising and the Future of Mass Communication. *American Behavioral Scientist*, 60 (12), 1403-1407. DOI: 10.1177/0002764216660134.

Wong, I. L. and So, E. M., 2003. Prevalence estimates of problem and pathological gambling in Hong Kong. *American Journal of Psychiatry*, 160 (7), 1353-1354. DOI: 10.1176/appi.ajp.160.7.1353.

Wood, W. and Rünger, D., 2016. Psychology of habit. *Annual review of psychology*, 67. DOI: 10.1146/annurev-psych-122414-033417.

Wright, K. B., 2005. Researching Internet-based populations: Advantages and disadvantages of online survey research, online questionnaire authoring software packages, and web survey services. *Journal of computer-mediated communication*, 10 (3), JCMC1034. DOI: 10.1111/j.1083-6101.2005.tb00259.x.

Wright, P., 1975. Factors affecting cognitive resistance to advertising. *journal of Consumer Research*, 2 (1), 1-9. DOI: 10.1086/208610.

Wulfert, E., Maxson, J. and Jardin, B., 2009. Cue-specific reactivity in experienced gamblers. *Psychology of Addictive Behaviors*, 23 (4), 731. DOI: 10.1037/a0017134.

Yani-de-Soriano, M., Javed, U. and Yousafzai, S., 2012. Can an industry be socially responsible if its products harm consumers? The case of online gambling. *Journal of business ethics*, 110 (4), 481-497. DOI: 10.1007/s10551-012-1495-z.

Yau, M. Y. H. and Potenza, M. N., 2015. Gambling disorder and other behavioral addictions: recognition and treatment. *Harvard review of psychiatry*, 23 (2), 134. DOI: 10.1097/HRP.0000000000000051.

Yetim, F., 2011. A set of critical heuristics for value sensitive designers and users of persuasive systems. In: ECIS 2011 Proceedings, Helsinki.

Zaichkowsky, J. L., 1985. Measuring the involvement construct. *Journal of consumer research*, 12 (3), 341-352. DOI: 10.1086/208520.

Zajonc, R. B., 1965. Social Facilitation: A solution is suggested for an old unresolved social psychological problem. *Science*, 149 (3681), 269-274. DOI: 10.1126/science.149.3681.269.

Zhang-Kennedy, L. and Chiasson, S., 2021. A systematic review of multimedia tools for cybersecurity awareness and education. *ACM Computing Surveys (CSUR)*, 54 (1), 1-39. DOI: 10.1145/3427920.

Zhang, K. and Clark, L., 2020. Loss-chasing in gambling behaviour: Neurocognitive and behavioural economic perspectives. *Current Opinion in Behavioral Sciences*, 31, 1-7. DOI: 10.1016/j.cobeha.2019.10.006.

Zhang, X., Shi, X., Xu, S., Qiu, J., Turel, O. and He, Q., 2020. The effect of solution-focused group counseling intervention on college students' internet addiction: a pilot study. *International journal of environmental research and public health*, 17 (7), 2519. DOI: 10.3390/ijerph17072519.

Zuckerman, M., 1994. *Behavioral expressions and biosocial bases of sensation seeking*. Cambridge university press.

Zullig, K. J., Valois, R. F., Huebner, E. S., Oeltmann, J. E. and Drane, J. W., 2001. Relationship between perceived life satisfaction and adolescents' substance abuse. *Journal of Adolescent Health*, 29 (4), 279-288. DOI: 10.1016/S1054-139X(01)00269-5.

Zuwerink Jacks, J. and Cameron, K. A., 2003. Strategies for resisting persuasion. *Basic and applied social psychology*, 25 (2), 145-161. DOI: 10.1207/S15324834BASP2502_5.

APPENDIX

APPENDIX B. ONLINE SURVEY

Introduction

We invite you to participate in a research study called "Player Engagement in Online Gambling Websites". Online gambling websites use certain techniques to influence player attitudes or behaviours to increase player engagement. These techniques are called persuasive techniques. This research aims to explore the impact of persuasive techniques on gambling behaviours. Accordingly, the online survey will address player perspectives.

Eligibility Criteria

Participants who regularly bet online on slot and roulette games, are over 18 years old, and fluent English speakers can participate in the study.

Duration

The survey will take approximately 35 minutes to complete.

Compensation

Participants who successfully complete the survey will receive £5. The researchers will disqualify any participant who provides false or contradictory responses. To claim your reward, you will need to enter the completion code provided.

Contact for further information

If you have any questions about this survey or difficulty accessing the site or completing the survey, please contact Deniz Cemiloglu by email at dcemiloglu@bournemouth.ac.uk

Participant Information Sheet

What is the purpose of the research?
You are being invited to take part in an online survey conducted by Deniz Cemiloglu, a postgraduate researcher in the Department of Computing and Informatics, Faculty of Science and Technology, Bournemouth University, UK. This study is part of her PhD thesis and is supervised by Dr Raian Ali. Before you decide to participate it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

In their quest for attention and maximizing interaction, interactive online platforms use certain techniques to reinforce, change or shape attitudes or behaviours to increase player engagement. These techniques are called persuasive techniques. This research aims to explore the role of persuasive techniques in influencing the use of digital technology. Taking online gambling as a distinct domain, the research will explore the impact of persuasive techniques on gambling activity. Accordingly, player perspectives will be addressed by the online survey. The project will take place over the next year.

Why have I been chosen?
You have been invited to the study because you regularly bet online on slot and roulette games, you are over 18 years old, and you are a fluent English Speaker. Around 500 participants will be recruited for this study.

Do I have to take part?
It is up to you to decide whether or not to take part. If you do decide to take part, you will be given this information sheet to read. You can withdraw from participation at any time and without giving a reason, simply by closing the browser page. Please note that once you have completed and submitted your survey responses, we are unable to remove your anonymised responses from the study. Deciding to take part or not will not impact upon you

How long will the questionnaire/online survey take to complete?
You will be asked to complete an online survey which will approximately take 35 minutes.

What are the advantages and possible disadvantages or risks of taking part?
Whilst there are no immediate benefits to you participating in the project, it is hoped that this work will improve understanding of how the design of online gambling platforms can help people gamble responsibly. There are no anticipated risks associated with taking part in this study.

What type of information will be sought from me and why is the collection of this information relevant for achieving the research project's objectives?
Two types of information will be sought from you. First, your demographic information (e.g., age and gender), information about your online gambling attitudes and behaviour, your attitude towards responsible gambling, your tendency to enjoy and engage in complex thinking and your locus of control. This information will help the researcher make sure that the recruited participants are fit to the study. Demographic data will be anonymised and held securely separate from the project data. Second, your answers about your awareness of and attitude towards the relationship between persuasive techniques used in online gambling platforms and gambling will be collected. Your feedback will help with developing and refining the structure

and content of this research from the players' perspective.

Use of my information
Participation in this study is on the basis of consent: you do not have to complete the survey, and you can change your mind at any point before submitting the survey responses. We will use your data on the basis that it is necessary for the conduct of research, which is an activity in the public interest. We put safeguards in place to ensure that your responses are kept secure and only used as necessary for this research study and associated activities such as a research audit. Once you have submitted your survey response it will not be possible for us to remove it from the study analysis because you will not be identifiable.

The anonymous information collected may be used to support other research projects in the future and access to it in this form will not be restricted. It will not be possible for you to be identified from this data. Anonymised data will be added to BU's Online Research (a central location where data is stored) and which will be publicly available.

Compensation
Participants who successfully complete the survey will receive **£5**. Any participant who provides false or contradictory responses will be disqualified by the researchers. To claim your reward, you will need to enter the completion code provided.

Contact for further information
If you have any questions or would like further information, please contact Deniz Cemiloglu by email to dcemiloglu@bournemouth.ac.uk.

In case of complaints
Any concerns about the study should be directed to Professor Tiantian Zhang, The Faculty of Science and Technology, Bournemouth University by email to researchgovernance@bournemouth.ac.uk.

Consent to Participate
Please indicate your agreement for the Research Team to access and use your recorded responses to this questionnaire before continuing:

☐ **I have read and understood the Participant Information Sheet and consent to take part in this questionnaire.**

☐ **I give permission for members of the Research Team to have access to my anonymised responses. I understand that my anonymised responses may be reproduced in reports, academic publications and presentations but I will not be identified or identifiable.**

☐ **I understand that my data may be included in an anonymised form within a dataset to be archived at BU's Online Research Data Repository.**

Q1 Please enter your unique Prolific ID

_____

Q2 This survey consists of 3 parts. Please press next to start **Part 1.**

✱

Q3 **Are you 18 or older?**

○   Yes (1)

○   No (2)

✱

Q4 **Thinking about the last 12 months, do you regularly spend money on online slot or roulette games?**

○   Yes (1)

○   No (2)

Page Break ———————————————————

Q5 **Other than online slot or roulette games, what other forms of online gambling, if any, have you spent money on in the last 12 months? (sports betting, bingo, lottery etc.)**

_____

_____

Q6 **Thinking about all your online gambling activities, how many days per week do you spend money on these activities?**

_____

Q7 **Thinking about all your online gambling activities, how many online accounts do you currently have with gambling companies?**

- ○ 1 account
- ○ 2 accounts
- ○ 3 accounts
- ○ 4 accounts
- ○ 5 accounts
- ○ More than 6 accounts

Q8 **Do you or have you ever worked in the gambling industry?**

- ○ Yes (1)
- ○ No (2)

Q9 The scale below assesses your gambling behaviour.
Some of the next questions may not apply to you, but please try to be as accurate as possible.
Thinking about the last 12 months…

	Never (1)	Sometimes (2)	Most of the time (3)	Almost always (4)
How often have you bet more than you could really afford to lose?	○	○	○	○
How often have you needed to gamble with larger amounts of money to get the same feeling of excitement?	○	○	○	○
How often have you gone back another day to try to win back the money you lost?	○	○	○	○
How often have you borrowed money or sold anything to get money to gamble?	○	○	○	○
How often have you felt that you might have a problem with gambling?	○	○	○	○
How often have people criticized your betting or told you that you had a gambling problem, regardless of whether or not you thought it was true?	○	○	○	○

How often have you felt guilty about the way you gamble or what happens when you gamble?	○	○	○	○
How often has your gambling caused you any health problems, including stress or anxiety?	○	○	○	○
How often has your gambling caused any financial problems for you or your household?	○	○	○	○

End of Block: CPGI

Start of Block: Gambling Motives

Q10 The scale below assesses your gambling motives.
How often do you gamble...?

	Never or almost never (1)	Sometimes (2)	Often (3)	Almost always or always (4)
… because it's what most of your friends do when you get together?	○	○	○	○
… to forget your worries?	○	○	○	○
… because it's exciting?	○	○	○	○
… because winning would change your lifestyle?	○	○	○	○
… to be sociable?	○	○	○	○
… because you feel more self-confident or sure of yourself?	○	○	○	○
… because you like the feeling?	○	○	○	○
… to earn money?	○	○	○	○
… because it's something you do on special occasions?	○	○	○	○
… because it helps when you are feeling nervous or depressed?	○	○	○	○
… because it's fun?	○	○	○	○
… to win money?	○	○	○	○
… because it makes a social gathering more enjoyable?	○	○	○	○
… to cheer you up when you're in a bad mood?	○	○	○	○
… because it makes you feel good?	○	○	○	○

… because you enjoy thinking about what you would do if you won a jackpot?	○	○	○	○

Q11 The scale below assesses your gambling thoughts and behaviour.
Thinking about your gambling over the last 12 month, please answer the following:
In the last 12 months…

	1- Never	2	3	4	5	6	7- Always
I felt in control of my gambling behaviour.	○	○	○	○	○	○	○
I was honest with my family and/or friends about the amount of MONEY I spent gambling.	○	○	○	○	○	○	○
I was honest with my family and/or friends about the amount of TIME I spent gambling.	○	○	○	○	○	○	○
I only gambled with MONEY that I could afford to lose.	○	○	○	○	○	○	○
I only spent TIME gambling that I could afford to spend.	○	○	○	○	○	○	○
I considered the amount of MONEY I was willing to lose BEFORE I gambled.	○	○	○	○	○	○	○
I considered the amount of TIME I was willing to spend BEFORE I gambled.	○	○	○	○	○	○	○

Q12 Please indicate the extent to which you agree or disagree with the following statements:
I believe that…

	1- Strongly Disagree	2	3	4	5	6	7- Strongly Agree
I should be able to walk away from gambling at any time.	○	○	○	○	○	○	○
I should be aware of how much MONEY I spend when I gamble.	○	○	○	○	○	○	○
It's my responsibility to spend only money that I can afford to lose.	○	○	○	○	○	○	○

I should only gamble when I have enough money to cover all my bills first.	○	○	○	○	○	○	○
Gambling is not a good way to try to make money.	○	○	○	○	○	○	○
My chances of winning get better after I have lost.	○	○	○	○	○	○	○
If I gamble more often, it will help me to win more than I lose.	○	○	○	○	○	○	○

End of Block: Positive Play

Start of Block: Introduction to PSD

Q13 You have completed Part 1.

In Part 2, we would like to learn about your general understanding and attitude towards how players engage with online gambling websites. Please press next to continue.

Page Break

Q14
Online gambling websites use certain techniques to reinforce, change or shape attitudes or behaviours to increase player engagement. These techniques are called **persuasive techniques.** For example, cash bonuses and free spins are used by the gambling websites to reinforce continued play.

Were you aware that online gambling websites use persuasive techniques to increase player engagement?

- ○   Yes (1)
- ○   No (2)

Q15 **Can you think of other persuasive techniques use in online gambling websites that encourage player engagement? Please give examples.**

_____

_____

Page Break

Q16 **Claim: Persuasive techniques used in online gambling websites to increase player engagement may, in some cases, contribute to problem gambling.**

Problem gambling is defined as disproportionate time and money spent on gambling due to loss of control. For example, reducing the effort required to place a deposit by linking one's credit

Page | CCXC

card to the online gambling website may make it difficult to resist gambling impulses.

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
What do you think about the claim stated above?	○	○	○	○	○

Q17

Q18
In this part you will learn about different persuasive techniques used in online gambling websites and how they might relate to problem gambling. In total you will see 13 explanation cards. Please read each explanation card carefully and answer the following questions.

Q19

[13 Explanation Cards are shown in randomised order. Each Card is shown individually followed by the corresponding questions. To view the cards please refer to Appendix IV.

Q20 **In your gambling experience have you seen examples of this technique?**

○ Yes (1)

○ No (2)

Q21 Did you know this technique could be persuasive?

- ○ Yes (1)
- ○ No (2)

Q22

	Extremely unlikely (1)	Unlikely (2)	Neutral (3)	Likely (4)	Extremely likely (5)
How likely do you think this persuasive technique can influence you to interact with the gambling website?	○	○	○	○	○
How likely do you think this persuasive technique can influence other players to interact with the gambling website?	○	○	○	○	○

Q23 Did you know this technique could potentially facilitate problem gambling?

- ○ Yes (1)
- ○ No (2)

Q24

	Extremely unlikely (1)	Unlikely (2)	Neutral (3)	Likely (4)	Extremely likely (5)
In general, how likely do you think this this technique could facilitate problem gambling?	○	○	○	○	○

End of Block: Explanation Cards

Start of Block: Re-assessment

Q25
Claim: Persuasive techniques used in online gambling websites to increase player engagement may, in some cases, contribute to problem gambling.

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)

Having viewed explanation cards about persuasive techniques and their impact on problem gambling, what do you think about the claim stated above?

○   ○   ○   ○   ○

✳

Q26 **Please can you explain why you gave your answer.**
(Minimum 100 characters required)

_____

_____

✳

Q27 **When and in what circumstances do you think persuasive techniques might have the most impact, if any, on problem gambling?**
(Minimum 100 characters required)

_____

_____

End of Block: Re-assessment

Start of Block: Informing Players about PSD

Q28 You have completed Part 2.

In Part 3, we would like to learn about your general attitude towards providing explanations to players about the use and impact of persuasive techniques used in gambling websites. Please press next to continue.

End of Block: Informing Players about PSD

Start of Block: Agree with Informing Players?

Q29
Claim: Receiving explanations about persuasive techniques and their potential impact on problem gambling in gambling websites (like the cards you have viewed before) can help

players stay more in control of their gambling.

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
What do you think about the claim stated above?	○	○	○	○	○

✳

Q30 **Please can you explain why you gave your answer.**
(Minimum 100 characters required)

_____

_____

Page Break

Q31
What would your attitude be towards gambling operators that explain how persuasive techniques are used in gambling websites and their potential impact on problem gambling?

	Become more negative (1)	Become negative (2)	Would not change (3)	Become positive (4)	Become more positive (5)
My attitude will...	○	○	○	○	○

End of Block: Agree with Informing Players?

Start of Block: Design of Explanations

Q32
If players are to be informed about persuasive techniques in gambling websites, what information should be provided in these explanations? Using the "Auto-play" example, please check all the boxes that you believe should be provided to the user.

□ **Information about use** *This website uses persuasive design technique auto-play* (1)

□ **Information about intent** *Auto-play is used to have continuous interaction with the game and increase player engagement* (2)

□ **Information about tactic** *Auto-play persuades players to have continuous interaction with the game by reducing the effort to gamble as players are not required to press any buttons when they play in auto-play mode* (3)

□ **Why this technique is persuasive** *Reducing effort to take action is persuasive because people are naturally wired to choose the path of least "effort"* (4)

□ **Information about potential impact on problem gambling** *Reducing steps to gamble, in certain cases may, ─ make it difficult to resist impulses ─ speed up the decision-making process making it hard to reflect on behaviour* (5)

□ **Information about coping goal with persuasive technique** *Gambling is best enjoyed when you have control over your gambling time and amount* (6)

□ **Information about coping tactic with persuasive technique** *To minimize the negative impact of Auto-play, you can disable the auto-spin function or limit the time you play with auto-play mode* (7)

□ **Other information you find relevant** (8)

_____

Page Break ───

Q33 **If players are to be informed about persuasive techniques in gambling websites with explanations, when and how should this information be provided?**

_____

_____

Q34 **For what reasons, if any, players may be reluctant to engage with these explanations within gambling websites?**

_____

_____

Q35 **How could players be motivated to engage with these explanations within gambling websites?**

_____

_____

End of Block: Design of Explanations

Q36 The scale below assesses your locus of control.

The following statements may apply more or less to you.
To what extent do you think each statement applies to you personally?

	Does not apply at all (1)	Applies a bit (2)	Applies somewhat (3)	Applies mostly (4)	Applies completely (5)
I'm my own boss.	○	○	○	○	○
If I work hard, I will succeed.	○	○	○	○	○
Whether at work or in my private life: What I do is mainly determined by others.	○	○	○	○	○
Fate often gets in the way of my plans.	○	○	○	○	○

Q37 The scale below assesses your tendency to engage in complex thinking.
Please select the options that best describe you.

	Extremely uncharacteristic of me (1)	Somewhat uncharacteristic of me (2)	Uncertain (3)	Somewhat characteristic of me (4)	Extremely characteristic of me (5)
I would prefer complex to simple problems.	○	○	○	○	○
I like to have the responsibility of handling a situation that requires a lot of thinking.	○	○	○	○	○
Thinking is not my idea of fun.	○	○	○	○	○
I would rather do something that requires little thought than something that is sure to challenge my thinking abilities.	○	○	○	○	○
I really enjoy a task that involves coming up with new solutions to problems.	○	○	○	○	○
Please select uncertain as the answer for this statement and move on to the next one.	○	○	○	○	○
I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.	○	○	○	○	○

Q38 You have completed Part 3. The survey will conclude with some demographic questions which are relevant to the study.

Q39 **What gender do you identify as?**

_____

Q40 **What is your age?**

_____

Q41 **Which statement best describes the highest level of education you have completed?**

- ○ Compulsory school education not completed (1)
- ○ Compulsory school education completed (2)
- ○ Vocational training (3)
- ○ College (4)
- ○ University degree (5)
- ○ Postgraduate qualification (e.g., MSc, PhD) (6)

Q42 **What is your current employment status?**

- ○ Full time employment (1)
- ○ Part time employment (2)
- ○ Self-employed (3)
- ○ Unemployed (4)
- ○ On sick leave (5)
- ○ Student (6)
- ○ Retired (7)
- ○ Homemaker (8)
- ○ Other (9) _____

Q43 **What is your country of origin?**

▼ Afghanistan (7) ... Zimbabwe (225)

Q44 **Are there any further comments you would like to make about the study?**
_____

Q45 Your completion code to enter to Prolific is
3A3EDE75

REDUCTION

People are naturally wired to choose the path of least "effort".
The reduction technique persuades players to have continuous
/uninterrupted interaction with the game by reducing the effort to
gamble. Therefore, requiring less behaviour affordances by the player.

EXAMPLE

Auto-play enables a repetitive play by spinning the reels consecutively
and automatically without requiring the player to press any buttons.
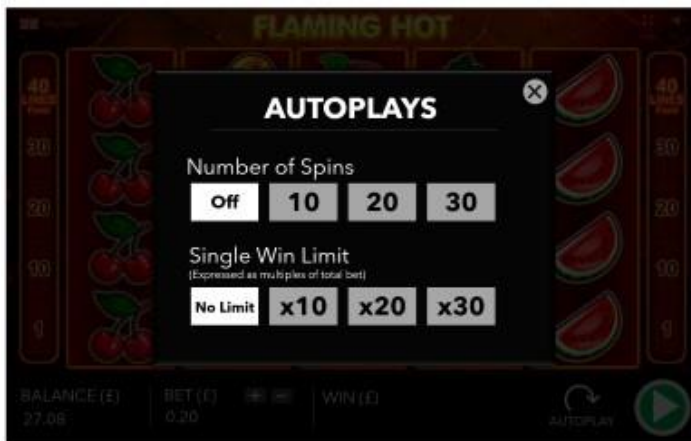
POTENTIAL IMPACT ON PROBLEM GAMBLING

Reducing steps to gamble, in certain cases may,

– **speed up the decision-making process making it hard to reflect on behavior.**

– **make it difficult to resist impulses.**

SELF-MONITORING

People self-assess their actions and the impact it has on the environment to regulate their behavior. The self-monitoring technique persuades players to interact with the game by providing the ability to track and evaluate gambling performance.

EXAMPLE

Most of the game interfaces present information about balance (money), total bet, and wins with a reference to the currency in this instance (£).

POTENTIAL IMPACT ON PROBLEM GAMBLING

Providing an option to monitor performance, in certain cases may,

– **reinforce responsible gambling as the player can reflect on wins and losses. However, when the player focuses on the losses, self-monitoring can reinforce loss chasing, which is increasing stakes to win back prior losses.**

REHEARSAL

People feel more confident in performing a task when they have practised it. The rehearsal technique persuades players to interact with games by providing the ability to gamble without having to experience it in a real -world setting.

EXAMPLE

Gambling websites provide demo slots with dummy money or free spins
– to newcomers to show and become familiar with game dynamics without the risk
– to existing players as a taster, letting players choose which one they like the most

POTENTIAL IMPACT ON PROBLEM GAMBLING

Providing rehearsal options, in certain cases may,

– **increase sense of control over gambling outcomes and encourage gambling with real money.**

– **produce positive expectancies about gambling outcomes in a real-world setting (especially when the demo payout rates are inflated), increasing the likelihood of risk-taking behavior.**

PRAISE

People like interacting with others who like them and say so.
The praise technique persuades players to interact with games by expressing approval or admiration via words, images, symbols, and sounds.

EXAMPLE

– Emphasising wins through dynamic animations, loud sound effects, and musical tunes.
– Showing admiration to wins through verbal interaction with statements such as "you are cool!" or "you got this!"

POTENTIAL IMPACT ON PROBLEM GAMBLING

Praising players, in certain cases may,

– **reinforce gambling as it implies an exciting environment where winning is more frequent than losing. This may, in turn, contribute to positive feelings about gambling and reinforce further betting.**

– **distort player judgement especially when losses are masked as wins through positive symbols and sounds.**

– **appeal to self-esteem as it acknowledges the progress made. This can create a link between winning and feeling of self-worth, which can lead to more gambling.**

IN-GAME REWARDS

Brains are wired to respond to and seek out rewards, as rewards contribute to feelings of pleasure. The reward technique persuades players to gamble by giving something in return when the players perform a target behaviour set by the gambling website.

EXAMPLE

Gambling sites generally use rewards to attract new players and/or increase the gambling of existing players. Players can claim these rewards once they fulfil play requirements, such as betting a certain amount of money (e.g., get a £100 bonus when you bet £100).

- Money/ bonus reward
- Free spin reward
- Money + free spin reward
- Chance to be in random draws

JOIN AND SPEND £10   GET A £60 BONUS

New customers only. Min £10 staking required. Reward valid for 7 days.

POTENTIAL IMPACT ON PROBLEM GAMBLING

Rewarding players to interact with the games, in certain cases may,

- **act as triggers that disrupt players from their responsible gambling goals and reinforce gambling.**

- **encourage players to deposit more money into their gambling account than they initially intended. The words "free" or "bonus" may distort a player's cost-benefit analysis of claiming rewards by lowering the perceived cost of play requirements and increasing the perceived benefit of receiving rewards.**

- **encourage players to place more importance on the positive experience of the reward and make it hard to reflect on negative consequences that they may face in the future regarding excessive gambling.**

REMINDERS

People are more likely to perform a target task if they are reminded of it. The reminder technique persuades players to interact with the gambling website by reminding them about gambling.

EXAMPLE

Gambling websites may send automatic reminders to players about gambling through emails or in-game reminders to reinforce further gambling.

- Email: sending emails to remind/notify about
  - new games
  - general promotions/rewards
  - exclusive promotions

- In-game reminders: notifying players about real-time promotions, jackpots, and tournaments

POTENTIAL IMPACT ON PROBLEM GAMBLING

Reminding players about gambling, in certain cases may,

- **act as triggers that disrupt players from their responsible gambling goals and preoccupy them with gambling.**

- **lead to habit formation such that reminders trigger automatic responses without the awareness of the player.**

NORMATIVE INFLUENCES

People behave in ways that are common and seen appropriate by others. Normative influence technique persuades players to interact with the gambling website by showing how the majority acts.

EXAMPLE

Gambling websites highlight the games that the majority of players choose to play to create normative influence.

Such normative influence can be seen in game info page, game page or banner advertisements.

POTENTIAL IMPACT ON PROBLEM GAMBLING

Using normative influence technique, in certain cases may,

− **reinforce trying out new gambling activities and games.
For example, "All Time Favourites" label may create the perception that a majority of players choose these games because they are more exciting and/or have higher odds of winning. Or trending now may suggest others are involved and players may have the social desire to be a part of and not miss out.**

SOCIAL FACILITATION

People exert more effort in a task when they know others are performing the task along with them. Social facilitation technique persuades players to interact with the gambling website by showing how other players are engaging in the same activity.

EXAMPLE

Progressive Jackpot is a jackpot that increases every time a player makes a spin until its won. The increase in jackpot value indicates that other players are actively spinning the slot at the same time. Amongst other influences the increase in the jackpot value emphasizes social facilitation.

POTENTIAL IMPACT ON PROBLEM GAMBLING

Using the social facilitation technique, in certain cases may,

– **reinforce further betting as the player observes that the other players are actively interacting with the game.**

COMPETITION

People are driven by an upward push to meet target performance and/or protect one's mastery against others. Competition technique persuades players to gamble by stimulating players to compete against themselves or each other.

EXAMPLE

Slot Tournaments: Gambling websites run slot tournaments in which the winner is determined by who wins the most in a single spin proportional to their stake. For example, if Player 1 wins £30 after betting 20p, while Player 2 wins £50 after betting £1, then Player 1 will gain more points and finish higher on the leader board.

POTENTIAL IMPACT ON PROBLEM GAMBLING

Having players compete, in certain cases may,

- **trigger social comparison and reinforce further gambling as players want to make their way up on leader boards.**

- **trigger negative emotions such as anger and stress during competition. This can make it hard for the players to reflect on their behavior.**

AUTHORITY

People tend to comply with authority figures (e.g. politicians, celebrities) as they believe such people may have greater knowledge and power. Authority technique persuades players to interact with the gambling website by promoting statements or norms of authority figures.

EXAMPLE

Gambling websites use celebrity endorsements to boost the popularity of their games. Celebrities could be used for advertisement or celebrity themed games could be designed to attract fans and players.

POTENTIAL IMPACT ON PROBLEM GAMBLING

Referring to authority, in certain cases may,

– **contribute to positive attitudes towards gambling and reinforce trying out new gambling activities and games promoted through celebrity endorsement.**

SCARCITY

People tend to assign greater value to items that are seen as rare or limited. Scarcity persuades players to interact with the gambling website by emphasizing limitedness and/or exclusivity or by underlying possible losses of an advantage.

EXAMPLE

Exclusiveness
- – exclusive games
- – exclusive promotions

Limitedness
- – limited time to attend / limited space to attend
- – "Must-Hit-By" Jackpot: is a jackpots that pays once it is close to the predefined payout value.
- – seasonal events

POTENTIAL IMPACT ON PROBLEM GAMBLING

Using scarcity technique, in certain cases may,

- – **create a sense of urgency and reinforce gambling. For example, as the "must-hit-by" jackpots come close to payout value, the limited time to win the prize encourages further betting.**

IN-GAME CONTROL ELEMENTS

People tend to overestimate their capacity to influence events. In -game control elements persuade players to gamble through stimulating their perceived control over betting outcomes.

EXAMPLE

Gambling websites provide play features such as 'nudge', 'hold', and 'gamble' buttons which create the sense that the player has a control over the betting outcome.

POTENTIAL IMPACT ON PROBLEM GAMBLING

Using in-game control elements, in certain cases may,

- give a false sense of control over betting outcome and contribute to erroneous thoughts such as "I win more when I control the game". Such erroneous thoughts may encourage further gambling.

IN-GAME CONTROL ELEMENTS

People tend to overestimate their capacity to influence events. In-game control elements persuade players to gamble through stimulating their perceived control over betting outcomes.

EXAMPLE

Gambling websites provide play features such as 'nudge', 'hold', and 'gamble' buttons which create the sense that the player has a control over the betting outcome.

POTENTIAL IMPACT ON PROBLEM GAMBLING

Using in-game control elements, in certain cases may,

– **give a false sense of control over betting outcome and contribute to erroneous thoughts such as "I win more when I control the game". Such erroneous thoughts may encourage further gambling.**

V.   CODING AND SCORING SCALES

1.   CANADIAN PROBLEM GAMBLING INDEX

A.   MAIL

Dear Dr. Wynne

I am a PhD candidate at Bournemouth University in the Department of Computing and Informatics, Faculty of Science and Technology. I am currently working on my dissertation which is on exploring player awareness of persuasive techniques adopted at online gambling websites and how to inform players about these techniques. I am interested in using The Canadian Problem Gambling Scale you developed in "The Canadian Problem Gambling Index: Final report". To ensure we are using the scale correctly, may you provide the copy of the scale, coding and scoring instructions and guidelines.

Thank you for your help,

Best wishes
Deniz Cemiloglu

Hi Deniz,

You are most welcome to use the CPGI/PGSI for your research, as it is part of the public domain. I ask that you use the following original reference citations:
Ferris, J., & Wynne, H. J. (2001a). The Canadian Problem Gambling Index. Ottawa: Canadian Centre on Substance Abuse.
Ferris, J., & Wynne, H. J. (2001b). The Canadian Problem Gambling Index: Users manual. Ottawa: Canadian Centre on Substance Abuse.
I have attached these original reference documents for your information.

I have also added the following related articles that you may find useful:

Wynne, H. (2003). Introducing the Problem Gambling Index. Edmonton, AB: Wynne Resources.

Jackson, A. et al (2009). Using the CPGI to determine problem gambling prevalence in Australia: Measurement Issues. International Journal of Mental Health Addiction, August.
Miller, et al. (2013). Validation of the problem gambling severity index using confirmatory factor analysis and Rasch modelling. International Journal of Methods in Psychiatric Research, 22(3).

I wish you all the best with your research. Be well during this most difficult time.

Scoring Algorithm and Questionnaire Items
1. PGSI Questionnaire Items Scored
- The 9 items (Q1-Q9) in the questionnaire below are scored.
- Score 1 for each response of "sometimes," 2 for each "most of the time," and 3 for each "almost always." A score of between 0 and 27 points is possible.

2. Classification of Gambler Sub-Types
- There are four classification categories based on the following cut-points for

PGSI scores:
o 0 = non-problem gambler
o 1-2 = low-risk gambler
o 3-7 = moderate-risk gambler
o 8+ = problem gambler

- The non-problem gambler group is separated into gamblers and non-gamblers as these sub-groups have quite different characteristics.

3. PGSI Scored Items by Category

Dimension	Variables	Indicators	PGSI Scored Items
Problem Gambling Behaviour	Loss of control	Bet more than could afford	1. How often have you bet more than you could really afford to lose?
	Motivation	Increase wagers	2. How often have you needed to gamble with larger amounts of money to get the same feeling of excitement?
	Chasing	Return to win back losses	3. How often have you gone back another day to try to win back the money you lost?
	Borrowing	Borrow money or sold anything	4. How often have you borrowed money or sold anything to get money to gamble?
Adverse Consequences	Problem recognition	Felt problem	5. How often have you felt that you might have a problem with gambling?
		Criticism	6. How often have people criticized your betting or told you that you had a gambling problem, regardless of whether or not you thought it was true?
	Personal consequences	Feelings of guilt	7. How often have you felt guilty about the way you gamble or what happens when you gamble?
		Negative health effects	8. How often has your gambling caused you any health problems, including stress or anxiety?
	Social consequences	Financial problems	9. How often has your gambling caused any financial problems for you or your household?

2.   GAMBLING MOTIVES

A.   MAIL

Dear Dr. Ben Schellenberg,

I am a PhD candidate at Bournemouth University in the Department of Computing and Informatics, Faculty of Science and Technology. I am currently working on my dissertation which is on exploring player awareness of persuasive techniques adopted at online gambling websites and how to inform players about these techniques. I am interested in using Gambling Motives Questionnaire you developed in "Show me the money: Incorporating financial motives into the Gambling Motives Questionnaire". To ensure we are using the scale correctly, may you provide the copy of the scale, coding and scoring instructions and guidelines?

Thank you for your help,

Best wishes
Deniz Cemiloglu

Hi Deniz,

Thanks for reaching out. I've attached a copy of the GMQF that was administered in the study. It has been such a long time since I've done research on this topic, so all I had in my files was a colour-coded picture of the scale items and response options (see the manuscript for more details about administration).

Best of luck with your research project!
Ben

B. *SCORING*

How often do you gamble...?

… because it's what most of your friends do when you get together? (1)

… to forget your worries? (2)

… because it's exciting? (3)

… because winning would change your lifestyle? (4)

… to be sociable? (5)

… because you feel more self-confident or sure of yourself? (6)

… because you like the feeling? (7)

… to earn money? (8)

… because it's something you do on special occasions? (9)

… because it helps when you are feeling nervous or depressed? (10)

… because it's fun? (11)

… to win money? (12)

… because it makes a social gathering more enjoyable? (13)

… to cheer you up when you're in a bad mood? (14)

… because it makes you feel good? (15)

… because you enjoy thinking about what you would do if you won a jackpot? (16)

Table A2. The answer-scale.

Never or almost never	1
Sometimes	2
Often	3
Almost always	4

Table A3. Scoring.

Items				
Social	1	5	9	13
Coping	2	6	10	14
Enhancement	3	7	11	15
Financial	4	8	12	16

3.   POSITIVE PLAY

A.   MAIL

Dear Dr. Michael Wohl,

I am a PhD candidate at Bournemouth University in the Department of Computing and Informatics, Faculty of Science and Technology. I am currently working on my dissertation which is on exploring player awareness of persuasive techniques adopted at online gambling websites and how to inform players about these techniques. I am interested in using the Positive Play Scale you developed in "Measuring responsible gambling amongst players: development of the positive play scale". To ensure we are using the scale correctly, may you provide the copy of the scale, coding and scoring instructions and guidelines?

Thank you for your help,

Best wishes
Deniz Cemiloglu

Hi Deniz et al.

Attached is a doc we put together for such requests. Note, lately we have been using "last 12 months" in our research as opposed to "last month".

Best of luck with your research. I am keen to know the results. Please do pass them along.
Michael

B.   SCORING

Thinking about your gambling over the last 12 month, please answer the following:

In the last 12 months…

1	2	3	4	5	6	7
Never						Always

1.   I felt in control of my gambling behaviour.

2. I was honest with my family and/or friends about the amount of MONEY I spent gambling.
3. I was honest with my family and/or friends about the amount of TIME I spent gambling.
4. I only gambled with MONEY that I could afford to lose.
5. I only spent TIME gambling that I could afford to spend.
6. I considered the amount of MONEY I was willing to lose BEFORE I gambled.
7. I considered the amount of TIME I was willing to spend BEFORE I gambled.

Please indicate the extent to which you agree or disagree with the following statements:

I believe that…

1	2	3	4	5	6	7
Never						Always

8. I should be able to walk away from gambling at any time.
9. I should be aware of how much MONEY I spend when I gamble.
10. It's my responsibility to spend only money that I can afford to lose.
11. I should only gamble when I have enough money to cover all my bills first.
12. Gambling is not a good way to try to make money.
13. My chances of winning get better after I have lost.
14. If I gamble more often, it will help me to win more than I lose.

Note: Items 6 & 7 should be reverse coded.

Cut-off scoring scheme

Each of the four sub-scales should be scored and reported separately.

Table A4. Scoring

Items				
Honesty and Control	1	2	3	
Pre-commitment	4	5	6	7
Personal Responsibility	8	9	10	11
Gambling Literacy	12	13	14	

High PPS = all items score at least 6 out of 7 on the response scale (clearly a positive player)

Medium PPS = all items have a score of 4 or more (a positive player with room for improvement)

Low PPS = at least one item has a score of 3 or less (not an overall positive player, but may have positive play tendencies and/or beliefs)

4.   NEED FOR COGNITION

A.   MAIL

Dear Dr. Gabriel Coelho

I am a PhD candidate at Bournemouth University in the Department of Computing and Informatics, Faculty of Science and Technology. I am currently working on my dissertation which is on exploring player awareness of persuasive techniques adopted at online gambling websites and how to inform players about these techniques. I am interested in using the Need for Cognition scale you developed in "The Very Efficient Assessment of Need for Cognition: Developing a Six-Item Version". To ensure we are using the scale correctly, may you provide the copy of the scale, coding and scoring instructions and guidelines?

Thank you for your help,

Best wishes
Deniz Cemiloglu

Hi Deniz!
Thank you for your message. You can find the six-item Need for Cognition Scale in my personal website:
https://sites.google.com/view/glhcoelho/measures-developed-and-adapted?authuser=0
The answer-scale is: (1) Extremely Uncharacteristic of Me, (2) Somewhat Uncharacteristic of Me, (3)Uncertain, (4) Somewhat Characteristic of Me, and (5) Extremely Characteristic of Me. So you only need to take the average of the answered items, then you'll have the total NfC. Please, be aware to reverse Items 03 and 04, as highlighted in the file on my website.

Good luck! Let me know if something is you need anything else.
Best,

Gabriel L. H. Coelho, Ph.D.

B.   SCORING

Table A5. The answer-scale.

Extremely Uncharacteristic of Me	1
Somewhat Uncharacteristic of Me	2
Uncertain	3
Somewhat Characteristic of Me	4
Extremely Characteristic of Me	5

Scoring:
Items 03 and 04 should be reversed. To calculate the total score, take the average of all items, then you'll have the total NfC.

5.   LOCUS OF CONTROL

A.   MAIL

Dear Beatrice, Thorsten,

We are considering the use of IE-4 Locus of Control Scale in our research. I would like just to confirm if the below are the final items.

5-points Likert scale (1 strongly disagree, …, 5: Strongly agree)

Internal Locus of Control
- If I work hard, I will succeed.
- I'm my own boss.

External Locus of Control
- Whether at work or in my private life: What I do is mainly determined by others.
- Fate often gets in the way of my plans.

Thanks a lot.

Dear Dr. Ali,

Thank you for your e-mail and for your interest in using IE-4.

The English-language items are correct but the order of the first two items is reversed:

I'm my own boss.
If I work hard, I will succeed.
Whether at work or in my private life: What I do is mainly determined by others.
Fate often gets in the way of my plans.

The instruction is the following:
"The following statements may apply more or less to you. To what extent do you think each statement applies to you personally?"

The items are answered using a 5-point rating scale ranging from does not apply at all (1), over applies a bit (2), applies somewhat (3), and applies mostly (4) to applies completely (5).

You can cite the English-language version of IE-4 as follows:
Nießen, D., Schmidt, I., Groskurth, K., Rammstedt, B., & Lechner, C. M. (2021). The Internal–External Locus of Control Short Scale–4 (IE-4): A comprehensive validation of the English-language adaptation [Manuscript submitted for publication]. GESIS – Leibniz Institute for the Social Sciences.

If you have any further questions, do not hesitate to contact us.

Kind regards,
Désirée Nießen

B.   SCORING

Table A6. The answer-scale.

Does Not Apply at All	1
Applies a Bit	2
Applies Somewhat	3
Applies Mostly	4
Applies Completely	5

Table A7. Scoring.

Items		
Internal Locus	1	2
External Locus	3	4

6.   CODING CONTINOUS VARIABLES

Table A1. Gambling Activity per Week – Coding for Length

less than once	0.5
2 to 3	2.5
at least 2	3 (value+1)

7.   CODING QUALITATIVE DATA

Name	Files	References
PSD can cause problem	94	1
emotional impact	24	1
false hope	75	1
sense of control	4	1
impacts decision making	13	1
impacts self control	50	1
important quotes	15	1
PSD wont cause problem	28	1
not that persuasive	12	1
present customer value	4	1
responsibility is on the player	12	1

PSD can cause problem ✕

<Files\\110522_qualitative_summarised (2)> - § 94 references coded [4.18% Coverage]

Reference 1 - 0.04% Coverage

They are persuasive. It you gamble these techniques are likely to encourage you to put in more money or continue to play

Reference 2 - 0.04% Coverage

Based upon the examples provided, such as adverts and offers, I can see why it can encourage people and cause a problem

Reference 3 - 0.04% Coverage

they draw customers in and certain techniques can encourage players to keep playing such as bonuses. the use of jackpots and big wins will make players think they have a change at winning when the chance is very low

Reference 4 - 0.04% Coverage

Gambling itself is just addictive, even if its a basic bet between two friends. the outcome is always going to be exciting for only one party and that's what makes gambling generally addictive. The use of persuasive techniques for large gambling corporations take advantage of how the brain works.

Reference 5 - 0.04% Coverage

Gambling websites are now using numerous different methods, techniques, and attempts to entice the player to return to their site. Most, if not all of the methods used only benefit the website in the long run. If a player keeps getting these promotions offered to them, they will stay engaged and be more likely to gamble their own money in the future.

Reference 6 - 0.04% Coverage

All the techniques shown entice you to play more, join or make you think you are going to win more if you continue playing.

Name	Files	References
2. Concept of Explainable Persuasion	1	456
1. Acceptance Factors	1	309
Demographics	1	3
Performance Expectancy	1	306
1. Raises awareness	1	257
Characteristics and operation of games	1	7
Commercial nature of gambling	1	57
Persuasive intent	1	100
Potential negative impacts	1	12
Self-awareness	1	25
of actions	1	16
of feelings	1	4
Unknown persuasive techniques	1	26
2. Facilitates informed decision making	1	43

2. Facilitates informed decision ✕

<Files\\110522_qualitative_summarised (2)> - § 43 references coded [1.91% Coverage]

Reference 1 - 0.04% Coverage

If the player understands the persuasive techniques they may think twice about playing.

Reference 2 - 0.04% Coverage

Make people more aware, encourage people to stop and think before absent mindedly betting/spending money.

Reference 3 - 0.04% Coverage

It has certainly opened my eyes to some of the techniques which I hadn't thought about and will make me think twice in the future.

Reference 4 - 0.04% Coverage

When you have a problem with gambling you can't always think clearly about it. If the warnings were there it would make you pay attention

Reference 5 - 0.04% Coverage

Being aware of these techniques I think would at least make the gambler question some of the decisions they make. It would increase the knowledge of gamblers and i think is a responsible action to take for the websites.

Reference 6 - 0.04% Coverage

I don't think it will stop people playing but it might make people think twice about the impact of playing and if they should be doing it

VI.   ASSUMPTION TESTS

Non-parametric tests were used as the data was not normally distributed.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Gambling_Days_Perweek	0.219	244	0.000	0.855	244	0.000
Number_of_Accounts	0.214	244	0.000	0.848	244	0.000
PGSI_TOTAL	0.175	244	0.000	0.834	244	0.000
T1_ALL_Contribute_to_PG	0.256	244	0.000	0.732	244	0.000
Total_Seen	0.188	244	0.000	0.918	244	0.000
Aware_Total	0.115	244	0.000	0.955	244	0.000
Aware_of_Harm_total	0.129	244	0.000	0.956	244	0.000
T2_ALL_Contribute_to_PG	0.447	244	0.000	0.544	244	0.000
Can_Explanations_Help	0.265	244	0.000	0.846	244	0.000
Explanation_Depth_Scale	0.166	244	0.000	0.912	244	0.000
Age	0.076	244	0.002	0.953	244	0.000
SELF_MONITORING_Influence_U	0.183	244	0.000	0.913	244	0.000
SELF_MONITORING_Influence_Others	0.211	244	0.000	0.887	244	0.000
REHEARSAL_Influence_U	0.192	244	0.000	0.909	244	0.000
REHEARSAL_Influence_Others	0.270	244	0.000	0.871	244	0.000
PRAISE_Influence_U	0.249	244	0.000	0.889	244	0.000
PRAISE_Influence_Others	0.298	244	0.000	0.849	244	0.000
REWARDS_Influence_U	0.258	244	0.000	0.768	244	0.000
REWARDS_Influence_Others	0.436	244	0.000	0.605	244	0.000
REMINDERS_Influence_U	0.275	244	0.000	0.827	244	0.000
REMINDERS_Influence_Others	0.326	244	0.000	0.739	244	0.000
SOCIAL_N_Influence_U	0.188	244	0.000	0.909	244	0.000
SOCIAL_N_Influence_Others	0.269	244	0.000	0.861	244	0.000
SOCIAL_F_Influence_U	0.205	244	0.000	0.898	244	0.000
SOCIAL_F_Influence_Others	0.275	244	0.000	0.843	244	0.000
COMPETE_Influence_U	0.200	244	0.000	0.898	244	0.000
COMPETE_Influence_Others	0.269	244	0.000	0.850	244	0.000
AUTHORITY_Influence_U	0.176	244	0.000	0.880	244	0.000
AUTHORITY_Influence_Others	0.286	244	0.000	0.865	244	0.000
SCARCITY_Influence_U	0.227	244	0.000	0.899	244	0.000
SCARCITY_Influence_Others	0.285	244	0.000	0.830	244	0.000
CONTROL_Influence_U	0.249	244	0.000	0.890	244	0.000
CONTROL_Influence_Others	0.280	244	0.000	0.820	244	0.000
NEARMISS_Influence_U	0.237	244	0.000	0.886	244	0.000

NEARMISS_Influence_Others	0.234	244	0.000	0.819	244	0.000

a. Lilliefors Significance Correction

Chi-square Goodness-of-fit

Assumption #1: You have one categorical variable (i.e., the variable can be dichotomous, nominal or ordinal).

Assumption #2: You should have independence of observations, which means that there is no relationship between the cases in each group of your categorical variable.

Assumption #3: There must be an expected frequency of at least 5 in each group of your categorical variable.

Spearman's Rank-order Correlation

Assumption #1: You have two variables that are measured on a continuous and/or ordinal scale.

Assumption #2: Your two variables represent paired observations.

Assumption #3: There needs to be a monotonic relationship between the two variables.

Scatter Plot of Gambling_Days_Perweek by Aware_Total

Scatter Plot of Gambling_Days_Perweek by Aware_of_Harm_total

Scatter Plot of Number_of_Accounts by Total_Seen

Scatter Plot of Can_Explanations_Help by Age

Scatter Plot of Explanation_Depth_Scale by Age

Scatter Plot of Explanation_Depth_Scale by Aware_Total

Scatter Plot of Explanation_Depth_Scale by Aware_of_Harm_total

Scatter Plot of Attitudes_ Gambling_Operator by Age

A Wilcoxon Signed-rank Test

Assumption #1: You have one dependent variable that is measured at the continuous (i.e., ratio or interval) or ordinal level.

Assumption #2: You have one independent variable that consists of two categorical, related groups or matched pairs.

Assumption #3: Wilcoxon signed-rank test also requires the distribution of the differences between the two related groups to be symmetrical in shape.

As shown below the distribution of differences can be considered symmetrically shaped.

Related-Samples Wilcoxon Signed Rank Test
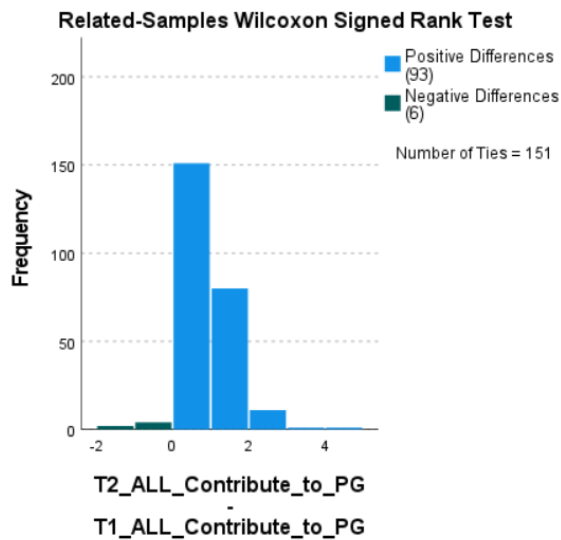
Friedman Test

Assumption #1: You have one dependent variable that is measured at the continuous or ordinal level.

Assumption #2: You have one independent variable that consists of three or more categorical, related groups or matched cases.

VII. CORRELATION MATRIX

	Gambling Days Per Week	Number of Accounts	Age	Gender	Aware of Use	Aware of Intent	Aware of Harm	Explanations Can Help	Number of Content Requested from Explainable Persuasion	Attitude Towards Operators
Gambling Days Per Week	—									
Number of Accounts	0.36***	—								
Age	0.25***	0.06	—							
Gender	0.17**	0.02	0.15**	—						
Aware of Use	0.22***	0.27***	0.08	0.07	—					
Aware of Intent	0.151*	0.06	0.04	0.02	0.36***	—				
Aware of Harm	0.15*	0.01	0.02	0.001	0.29***	0.90***	—			
Explanations Can Help	0.02	0.02	-0.19**	0.01	-0.01	0.02	0.06	—		
Number of Content Requested from Explainable Persuasion	-0.05	-0.04	-0.14*	0.01	-0.02	0.15*	0.14*	0.1	—	
Attitude Towards Operators	-0.04	0.08	-0.13*	-0.01	0.01	0	-0.01	0.29***	0.08	—

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

APPENDIX C. ONLINE EXPERIMENT

Introduction

We invite you to participate in a research study called "Player Engagement in Online Gambling Websites". This research will explore player attitudes towards casino bonuses (e.g., cash bonuses and free spins) offered by online gambling websites. The online study will address the player's perspective.

Eligibility Criteria

Participants who have regularly bet on the online slot and roulette games (i.e., daily or weekly recurring gambling activity) in the previous 12 months, who are over 18 years old, and who are fluent English speakers can participate in the study.

Important Note

This study is intended for moderate gamblers. (i.e., gambling within reasonable and proper limits). If you are under treatment or if you are experiencing any negative consequences as a result of your gambling, please do not participate in this study.

A screening survey will be conducted prior to the study to measure gambling-related behaviours and those found to require support for their gambling behaviours will be excluded from the study.

If you think you may need support in terms of your gambling behaviours, we encourage you to contact with relevant support services for free and confidential help.

  – BeGambleAware: https://www.begambleaware.org
  – GamCare: https://www.gamcare.org.uk

Duration

Initially, you will be asked screening questions to confirm that you are eligible to participate in the study. Those who are eligible will take part in the study. The study will be carried out in three phases over the course of three weeks. You will be notified when the next phase is ready. Below you can see how long each phase will take. In total, the study will take 20 minutes.

  – Screening – 2 minutes
  – First Phase – 3 minutes
  – Second Phase (one week after the first phase) – 10 minutes
  – Third Phase (one week after the second phase) – 5 minutes

Compensation

Participants who fill in the screening questions will receive £0.20 for their participation. To claim your reward, you will need to enter the completion code provided at the end of the screening phase.

Participants who are eligible to take part in the study and who successfully complete all three phases of the survey will receive an additional £2.50. Any participant who provides false or contradictory responses will be disqualified by the researchers. To claim the £2.50 reward, you will need to enter the completion code provided at the end of phase three. If you don't complete all three phases you will not be compensated.

In total participants who complete the study will receive £2.70 (£0.20 + £2.50) for their participation in the study.

Contact for further information
If you have any questions about this survey or difficulty accessing the site or completing the survey, please contact Deniz Cemiloglu by email at dcemiloglu@bournemouth.ac.uk

2.   PHASE 1

Welcome to the first phase of the research study "Player Engagement in Online Gambling Websites".

This phase will approximately take 3 minutes.

After you finish the first phase, the link to the second phase will be emailed to you in a week.

Contact for further information
If you have any questions about this survey or difficulty accessing the site or completing the survey, please contact Deniz Cemiloglu by email at dcemiloglu@bournemouth.ac.uk

3.   PHASE 2

Welcome to the second phase of the research study "Player Engagement in Online Gambling Websites".

This phase will approximately take 10 minutes.

After you finish the second phase, the link of the last phase will be emailed to you in a week. Your payment will be issued upon completion of the final phase.

Contact for further information
If you have any questions about this survey or difficulty accessing the site or completing the survey, please contact Deniz Cemiloglu by email at dcemiloglu@bournemouth.ac.uk

4.   PHASE 3

Welcome to the last phase of the research study "Player Engagement in Online Gambling Websites".

This phase will approximately take 5 minutes.

Your payment will be issued upon completion of this phase.

Contact for further information
If you have any questions about this survey or difficulty accessing the site or completing the survey, please contact Deniz Cemiloglu by email at dcemiloglu@bournemouth.ac.uk

5. STUDY EXCLUSION MESSAGE

According to your answers to the screening survey you are not eligible to take part in the study. Thank you for your time and interest.

If you think you may need support in terms of your gambling behaviours, we encourage you to contact with relevant support services for free and confidential help.

- BeGambleAware: https://www.begambleaware.org
- GamCare: https://www.gamcare.org.uk

What is the purpose of the research?

You are being invited to take part in a research project conducted by Deniz Cemiloglu, a postgraduate researcher in the Department of Computing and Informatics, Faculty of Science and Technology, Bournemouth University, UK. This study is part of her PhD thesis and is supervised by Dr Nan Jiang. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. This research explores player attitudes towards casino bonuses (e.g., cash bonuses and free spins) offered by online gambling websites. Accordingly, player perspectives will be addressed by an online study. The project will take place over the next year.

Why have I been chosen?

You have been invited to the study because, in the past 12 months, you have regularly bet online on slot and roulette games (i.e., daily or weekly recurring gambling activity), you are over 18 years old, and you are a fluent English Speaker. In total, around 300 participants will be recruited for this study.

Important Note

This study is intended for moderate gamblers. (i.e., gambling within reasonable and proper limits). If you are under treatment or if you are experiencing any negative consequences as a result of your gambling, please do not participate in this study. A screening survey will be conducted prior to the study to measure gambling-related behaviours and those found to require support for their gambling behaviours will be excluded from the study. If you think you may need support in terms of your gambling behaviours, we encourage you to contact relevant support services for free and confidential help.

BeGambleAware: https://www.begambleaware.org
GamCare: https://www.gamcare.org.uk

Do I have to take part?

It is up to you to decide whether or not to take part. You can withdraw from participation at any time and without giving a reason simply by closing the browser page. Please note that once you have completed and submitted your responses, we are unable to remove your anonymised responses from the study. Deciding to take part or not will not impact upon you.

How long will the study take to complete?

Initially, you will be asked screening questions to confirm that you are eligible to participate in the study. Those who are eligible will take part in the study. The study will be carried out in three phases over the course of three weeks. You will be notified when the next phase is ready. Below you can see how long each phase will take. In total, the study will approximately take 20 minutes.

Screening – 2 minutes
First Phase – 3 minutes
Second Phase (one week after the first phase) – 10 minutes
Third Phase (one week after the second phase) – 5 minutes

What would taking part involve?

In the first phase of the study, you will be asked to answer questions relating to your gambling attitudes and behaviour. In this phase, we will also ask you questions about your general

understanding of and attitude towards casino bonuses offered on online gambling websites. In the second phase, which will occur a week after the first phase, we will ask you to watch a 5-minute video and answer some questions. In the third phase, which will occur one week after the second phase, we will ask you to read a scenario and answer several questions. In the last phase, we will also ask you several demographic questions.

What are the advantages and possible disadvantages or risks of taking part?
Whilst there are no immediate benefits to you participating in the project, it is hoped that this work will improve understanding of how the design of online gambling platforms can help people gamble responsibly. There are no anticipated risks associated with taking part in this study.

What type of information will be sought from me and why is the collection of this information relevant for achieving the research project's objectives?
Two types of information will be sought from you. First, your demographic information (e.g., age and gender), and information about your online gambling attitudes will be collected. This information will help the researcher make sure that the recruited participants are fit for the study and will allow for a more in-depth analysis of the research topic. Demographic data will be anonymised and held securely separate from the project data. Second, your answers on your attitudes towards online casino bonuses will be collected. Your feedback will help with developing and refining the structure and content of this research from the players' perspective.

Use of my information
Participation in this study is on the basis of consent: you do not have to complete the survey, and you can change your mind at any point before submitting the survey responses. We will use your data on the basis that it is necessary for the conduct of research, which is an activity in the public interest. We put safeguards in place to ensure that your responses are kept secure and only used as necessary for this research study and associated activities such as a research audit. Once you have submitted your survey response, it will not be possible for us to remove it from the study analysis because you will not be identifiable. The anonymous information collected may be used to support other research projects in the future and access to it in this form will not be restricted. It will not be possible for you to be identified from this data. Anonymised data will be added to BU's Online Research (a central location where data is stored) and which will be publicly available.

Compensation
Participants who fill in the screening questions will receive **£0.20** for their participation. To claim your reward, you will need to enter the completion code provided at the end of the screening phase.

Participants who are eligible to take part in the study and who successfully complete all three phases of the survey will receive an **additional £2.50.** Any participant who provides false or contradictory responses will be disqualified by the researchers. To claim the £2.50 reward, you will need to enter the completion code provided at the end of phase three. If you don't complete all three phases you will not be compensated.

Participants who complete the study, in total will receive **£2.70** (£0.20 + £2.50) for their participation in the study.

Contact for further information
If you have any questions or would like further information, please contact Deniz Cemiloglu by email to dcemiloglu@bournemouth.ac.uk.

In case of complaints

Any concerns about the study should be directed to Professor Tiantian Zhang, The Faculty of Science and Technology, Bournemouth University by email to researchgovernance@bournemouth.ac.uk.

Consent to Participate

Please indicate that you have read and understood the Participant Information Sheet for this research project and that you consent to take part in this questionnaire before continuing:

☐ **I confirm that I am not experiencing gambling related harms.**

☐ **I have read and understood the Participant Information Sheet and consent to take part in this study.**

☐ **I give permission for members of the Research Team to have access to my anonymised responses. I understand that my anonymised responses may be reproduced in reports, academic publications and presentations but I will not be identified or identifiable.**

☐ **I understand that my data may be included in an anonymised form within a dataset to be archived at BU's Online Research Data Repository.**

*III.		SCREENING*

Q2 Please enter your unique Prolific ID

_____

✳

Q3 **Are you 18 or older?**

- ○ Yes (1)
- ○ No (2)

✳

Q4 **Thinking about the last 12 months, do you regularly spend money on online slot or roulette games?**

- ○ Yes (1)
- ○ No (2)

Page Break ——

Q5 The scale below assesses your gambling behaviour.

Some of the next questions may not apply to you, but please try to be as accurate as possible. **Thinking about the last 12 months…**

	Never (0)	Sometimes (1)	Most of the time (2)	Almost always (3)
How often have you bet more than you could really afford to lose?	○	○	○	○
How often have you needed to gamble with larger amounts of money to get the same feeling of excitement?	○	○	○	○
How often have you gone back another day to try to win back the money you lost? (3)	○	○	○	○
How often have you borrowed money or sold anything to get money to gamble? (4)	○	○	○	○

How often have you felt that you might have a problem with gambling? (5)	○	○	○	○
How often have people criticized your betting or told you that you had a gambling problem, regardless of whether or not you thought it was true? (6)	○	○	○	○
How often have you felt guilty about the way you gamble or what happens when you gamble? (7)	○	○	○	○
How often has your gambling caused you any health problems, including stress or anxiety? (8)	○	○	○	○
How often has your gambling caused any financial problems for you or your household? (9)	○	○	○	○

End of Block: Screener 1

Start of Block: Thank you

Q6 Thank you for your responses. You will be notified if you are eligible to take part in the study.

Q7 Your completion code to enter to Prolific is
CTCUELSY

End of Block: Thank you.

Q1 Please enter your unique Prolific ID

_____

Q2 This study consists of 3 phases. Please press next to start **Phase 1.**

Q3 **Other than online slot or roulette games, what other forms of online gambling, if any, have you spent money on in the last 12 months? (sports betting, bingo, lottery etc.)**

_____

_____

Q4 **Thinking about all your online gambling activities, how many days per week do you spend money on these activities?**

_____

_____

Q5 **Thinking about all your online gambling activities, how many online accounts do you currently have with gambling companies?**

- ○ 1 account (1)
- ○ 2 accounts (2)
- ○ 3 accounts (3)
- ○ 4 accounts (4)
- ○ 5 accounts (5)
- ○ More than 6 accounts (6)

Page Break

Q6 **Do you or have you ever worked in the gambling industry?**

○ Yes (1)

○ No (2)

Q7 In this part, we would like to learn about your general understanding and attitude towards online casino bonuses offered in online gambling websites.

Online casino bonuses are in-game rewards offered by gambling websites. The most commonly offered online casino bonuses are cash bonuses (i.e., extra cash offer for betting) and free spins (i.e., free play for betting).

Please press next to continue.

Q8 Please indicate your answer to the following questions.

Q9 **Claiming online casino bonuses (e.g., cash bonuses and free spins) while gambling is...**

				Neutral				
	1	2	3	4	5	6	7	
Unacceptable	○	○	○	○	○	○	○	Acceptable
Foolish	○	○	○	○	○	○	○	Wise
Negative	○	○	○	○	○	○	○	Positive
Unfavourable	○	○	○	○	○	○	○	Favourable
Wrong	○	○	○	○	○	○	○	Right
Bad	○	○	○	○	○	○	○	Good

Q10 On a scale from 0 (no probability) to 100 (certain probability), what is the likelihood you will claim an online casino bonus (e.g., cash bonuses and free spins)?

0   10   20   30   40   50   60   70   80   90   100

Q11 Please indicate your answer to the following questions.

Q12 **In my gambling experience, staying in control of time and money is …**

				Neutral				
	1	2	3	4	5	6	7	
Unimportant	○	○	○	○	○	○	○	Important
Irrelevant	○	○	○	○	○	○	○	Relevant
Non-essential	○	○	○	○	○	○	○	Essential
Of no concern	○	○	○	○	○	○	○	Of concern
Does not matter	○	○	○	○	○	○	○	Does matter
Useless	○	○	○	○	○	○	○	Useful
Trivial	○	○	○	○	○	○	○	Fundamental

Q13 This is the end of Phase 1. We will notify you when the next phase is ready.

Q14 Your completion code to enter to Prolific is
C1FAZZ5Z

V.   *PHASE 2*

1.   *INOCULATION CONDITION*

Q1 Welcome to Phase 2. Please press next to continue.

Q2 Please enter your unique Prolific ID

_____

Q3 On a scale from 0 (no knowledge) to 100 (high knowledge), how well do you know how online gambling websites can motivate you to gamble?

0   10   20   30   40   50   60   70   80   90   100

Page Break

Q4 In this phase, we would like you to watch a 5-minute video and answer several multiple choice and open-ended questions.

This video contains audio. Please make sure you are able to hear it well.

Please press next to continue.

Page Break

Q5 Please confirm that you have watched the video.

○   I confirm I have watched the video. (1)

Page Break

Q6 Please answer the questions below. If you'd like you can refer back to the video.

Q7 Approximately how many people struggle to control their gambling behaviour in United Kingdom?

- ○ 1.4 million people (1)
- ○ 2.5 million people (2)
- ○ 5 million people (3)

Q8 What claims do gambling sites make to promote online casino bonuses (e.g., cash bonuses and free spins)?

_____

_____

Q9 In what ways might online casino bonuses (e.g., cash bonuses and free spins) have a negative impact on gambling behaviour?

_____

_____

Q10 Imagine that you are at the end of your gambling session for the day and are ready to leave the gambling website. You receive a notification offering you an extra £20 bonus to spend on a new game if you deposit £20. This notification intends to cause you to rethink your decision of leaving the gambling website. We want to know how this would make you feel.

Q11 **The idea that the gambling website may try to convince me to gamble more with a casino bonus offer is...**

	Neutral	

	1	2	3	4	5	6	7	
Unintimidating	○	○	○	○	○	○	○	Intimidating
Nonthreatening	○	○	○	○	○	○	○	Threatening
Not risky	○	○	○	○	○	○	○	Risky
Not Harmful	○	○	○	○	○	○	○	Harmful
Safe	○	○	○	○	○	○	○	Dangerous

Q12 **Claiming online casino bonuses (e.g., cash bonuses and free spins) while gambling is...**

			Neutral					
	1	2	3	4	5	6	7	
Unacceptable	○	○	○	○	○	○	○	Acceptable
Foolish	○	○	○	○	○	○	○	Wise
Negative	○	○	○	○	○	○	○	Positive
Unfavourable	○	○	○	○	○	○	○	Favourable
Wrong	○	○	○	○	○	○	○	Right
Bad	○	○	○	○	○	○	○	Good

Q13 On a scale from 0 (no probability) to 100 (certain probability), what is the likelihood you will claim an online casino bonus (e.g., cash bonuses and free spins)?

0   10   20   30   40   50   60   70   80   90   100

Q14 **In my gambling experience, staying in control of time and money is …**

				Neutral				
	1	2	3	4	5	6	7	
Unimportant	○	○	○	○	○	○	○	Important
Irrelevant	○	○	○	○	○	○	○	Relevant
Non-essential	○	○	○	○	○	○	○	Essential
Of no concern	○	○	○	○	○	○	○	Of concern
Does not matter	○	○	○	○	○	○	○	Does matter
Useless	○	○	○	○	○	○	○	Useful
Trivial	○	○	○	○	○	○	○	Fundamental

Q15 This is the end of Phase 2. We will notify you when the final phase is ready.

Q16 Your completion code to enter to Prolific is
C12YDFL1

Q1 Welcome to Phase 2. Please press next to continue.

Q2 Please enter your unique Prolific ID

_____

Q3 In this phase, we would like you to watch a 5-minute video and answer several multiple choice and open-ended questions.

This video contains audio. Please make sure you are able to hear it well.

Please press next to continue.

Q4 Please confirm that you have watched the video.

○   I confirm I have watched the video. (1)

Q5 Please answer the questions below. If you'd like you can refer back to the video.

X→

Q6 The first mention of organised gambling dates back to...

- ○ First Millennium B.C. (1)
- ○ Second Millennium B.C. (2)
- ○ Third Millennium B.C. (3)

Q7 What influence did technological advancements have on gambling industry throughout history?

_____

_____

Q8 Do you think online gambling has fundamental differences to non-online forms of gambling?

_____

_____

Q9
Imagine that you are at the end of your gambling session for the day and are ready to leave the gambling website. You receive a notification offering you an extra £20 bonus to spend on a new game if you deposit £20. This notification intends to cause you to rethink your decision of leaving the gambling website. We want to know how this would make you feel.

Q10 **The idea that the gambling website may try to convince me to gamble more with a casino bonus offer is...**

	Neutral							
	1	2	3	4	5	6	7	
Unintimidating	○	○	○	○	○	○	○	Intimidating
Nonthreatening	○	○	○	○	○	○	○	Threatening
Not risky	○	○	○	○	○	○	○	Risky
Not Harmful	○	○	○	○	○	○	○	Harmful
Safe	○	○	○	○	○	○	○	Dangerous

Q11 **Claiming online casino bonuses (e.g., cash bonuses and free spins) while gambling is...**

				Neutral				
	1	2	3	4	5	6	7	
Unacceptable	○	○	○	○	○	○	○	Acceptable
Foolish	○	○	○	○	○	○	○	Wise
Negative	○	○	○	○	○	○	○	Positive
Unfavourable	○	○	○	○	○	○	○	Favourable
Wrong	○	○	○	○	○	○	○	Right
Bad	○	○	○	○	○	○	○	Good

Q12 On a scale from 0 (no probability) to 100 (certain probability), what is the likelihood you will claim an online casino bonus (e.g., cash bonuses and free spins)?

0   10   20   30   40   50   60   70   80   90   100

Q13 **In my gambling experience, staying in control of time and money is …**

	Neutral	

	1	2	3	4	5	6	7	
Unimportant	○	○	○	○	○	○	○	Important
Irrelevant	○	○	○	○	○	○	○	Relevant
Non-essential	○	○	○	○	○	○	○	Essential
Of no concern	○	○	○	○	○	○	○	Of concern
Does not matter	○	○	○	○	○	○	○	Does matter
Useless	○	○	○	○	○	○	○	Useful
Trivial	○	○	○	○	○	○	○	Fundamental

End of Block: T2_Issue Involvement with Problem Gambling

Start of Block: End of Phase 2

Q14 This is the end of Phase 2. We will notify you when the final phase is ready.

Q15 Your completion code to enter to Prolific is
CXVUFERV

End of Block: End of Phase 2

VI.   PHASE 3

1.   WITH DISCLOSURE STATEMENT ABOUT PERSUASIVE INTENT

Start of Block: Phase 3

Q1 Welcome to Phase 3. Please press next to continue.

End of Block: Phase 3

Start of Block: Prolific ID

Q2 Please enter your unique Prolific ID

_____

End of Block: Prolific ID

Start of Block: Persuasive Attack

Q3 In this part, we would like you to read a scenario and answer some questions.

Please press next to continue.

Page Break

Q4 **Scenario**:

Imagine you have been gambling at a gambling website called Fun & Bet Casino. You realise that you lost more money than you expected in your gambling session and are considering leaving the website. Just before you close the website, a pop-up message appears.

Please press next to see the pop-up message.

Page Break

Q5 Below, you can see the pop-up message. Please take your time to read sections labelled a,b,c,d.

Q6

◦   I confirm I have read sections labelled a,b,c,d. (1)

————————————————————————

Q7 Please answer the questions below.

Q8 How likely is it that you would click learn more to find out how persuasive features may impact your gambling behaviour?

	Very Unlikely (1)	Unlikely (2)	Neutral (3)	Likely (4)	Very Likely (5)
	◯	◯	◯	◯	◯

✳

Q9 Please can you explain why you gave your answer (minimum 100 characters required).

_____

_____

End of Block: Persuasive Attack

X→

Q10 Please write down all the thoughts that had passed through your mind while you viewed the pop-up message. Please write one thought per box and do not worry about spelling, punctuation, or writing in complete sentences.

Click to write Thought 1_____

Click to write Thought 2_____

Click to write Thought 3_____

Click to write Thought 4_____

Click to write Thought 5_____

Click to write Thought 6_____

Click to write Thought 7_____

Click to write Thought 8_____

Click to write Thought 9_____

Click to write Thought 10_____

Page Break ——————————————————————————————————

Carry Forward All Choices - Entered Text from "Q10"

X→

Q11 For each thought you have written down, please indicate whether it is about the pop-up message or not.

	The thought is about the pop-up message (1)	The thought is not about the pop-up message (2)
Click to write Thought 1	○	○
Click to write Thought 2	○	○
Click to write Thought 3	○	○
Click to write Thought 4	○	○
Click to write Thought 5	○	○
Click to write Thought 6	○	○
Click to write Thought 7	○	○
Click to write Thought 8	○	○
Click to write Thought 9	○	○
Click to write Thought 10	○	○

Carry Forward All Choices - Entered Text from "Q10"

[X→]

Q12 For each thought you have written, please indicate whether it is a **negative** thought, a **neutral thought** (neither negative nor positive thought) or a **positive thought** about the pop-up message.

	Negative (1)	Neutral (2)	Positive (3)
Click to write Thought 1	○	○	○
Click to write Thought 2	○	○	○
Click to write Thought 3	○	○	○
Click to write Thought 4	○	○	○
Click to write Thought 5	○	○	○
Click to write Thought 6	○	○	○
Click to write Thought 7	○	○	○
Click to write Thought 8	○	○	○
Click to write Thought 9	○	○	○
Click to write Thought 10	○	○	○

End of Block: T3_Counterarguments

Start of Block: T3_Attitude Towards the Use of Online Casino Bonuses

Q13 **Claiming online casino bonuses (e.g., cash bonuses and free spins) while gambling is...**

	Neutral	

	1	2	3	4	5	6	7	
Unacceptable	○	○	○	○	○	○	○	Acceptable
Foolish	○	○	○	○	○	○	○	Wise
Negative	○	○	○	○	○	○	○	Positive
Unfavourable	○	○	○	○	○	○	○	Favourable
Wrong	○	○	○	○	○	○	○	Right
Bad	○	○	○	○	○	○	○	Good

Q14 **Being offered an online casino bonus while browsing an online gaming website is...**

			Neutral					
	1	2	3	4	5	6	7	
Unacceptable	○	○	○	○	○	○	○	Acceptable
Foolish	○	○	○	○	○	○	○	Wise
Negative	○	○	○	○	○	○	○	Positive
Unfavourable	○	○	○	○	○	○	○	Favourable
Wrong	○	○	○	○	○	○	○	Right
Bad	○	○	○	○	○	○	○	Good

Q15 On a scale from 0 (no probability) to 100 (certain probability), what is the likelihood you will claim an online casino bonus (e.g., cash bonuses and free spins)?

0   10   20   30   40   50   60   70   80   90   100

Q16 If you are reading this question, answer it with the value ten.

0 10 20 30 40 50 60 70 80 90 100

End of Block: T3_Intention to Claim Online Casino Bonuses

Start of Block: Demographics

Q17 This study will conclude with some demographic questions which are relevant to the study.

Q18 **What gender do you identify as?**
_____

Q19 **What is your age?**
_____

Q20 **Which statement best describes the highest level of education you have completed?**
- ○ Compulsory school education not completed (1)
- ○ Compulsory school education completed (2)
- ○ Vocational training (3)
- ○ College (4)
- ○ University degree (5)
- ○ Postgraduate qualification (e.g., MSc, PhD) (6)

Q21 **What is your current employment status?**
- ○ Full time employment (1)
- ○ Part time employment (2)
- ○ Self-employed (3)
- ○ Unemployed (4)
- ○ Student (6)
- ○ Retired (7)
- ○ Homemaker (8)
- ○ Other (9) _____

End of Block: Demographics

Q22 **Are there any further comments you would like to make about the study?**

_____

Q23 This is the end of the study.
Your completion code is **C77032QO**

Start of Block: Phase 3

Q1 Welcome to Phase 3. Please press next to continue.

End of Block: Phase 3

Start of Block: Prolific ID

Q2 Please enter your unique Prolific ID

_____

End of Block: Prolific ID

Start of Block: Persuasive Attack

Q3 In this part, we would like you to read a scenario and answer some questions.

Please press next to continue.

Page Break

Q4 **Scenario**:

Imagine you have been gambling at a gambling website called Fun & Bet Casino. You realise that you lost more money than you expected in your gambling session and are considering leaving the website. Just before you close the website, a pop-up message appears.

Please press next to see the pop-up message.

Page Break

Q5 Below, you can see the pop-up message. Please take your time to read sections labelled a,b,c.

Q6

○ I confirm I have read sections labelled a,b,c. (1)

X→

Q7 Please write down all the thoughts that had passed through your mind while you viewed the pop-up message. Please write one thought per box and do not worry about spelling, punctuation,

or writing in complete sentences.

Click to write Thought 1_____

Click to write Thought 2_____

Click to write Thought 3_____

Click to write Thought 4_____

Click to write Thought 5_____

Click to write Thought 6_____

Click to write Thought 7_____

Click to write Thought 8_____

Click to write Thought 9_____

Click to write Thought 10_____

Page Break ——

Carry Forward All Choices - Entered Text from "Q7"

X→

Q8 For each thought you have written down, please indicate whether it is about the pop-up message or not.

	The thought is about the pop-up message (1)	The thought is not about the pop-up message (2)
Click to write Thought 1	○	○
Click to write Thought 2	○	○
Click to write Thought 3	○	○
Click to write Thought 4	○	○
Click to write Thought 5	○	○
Click to write Thought 6	○	○
Click to write Thought 7	○	○
Click to write Thought 8	○	○
Click to write Thought 9	○	○
Click to write Thought 10	○	○

Page Break ——

Carry Forward All Choices - Entered Text from "Q7"

[X→]

Q9 For each thought you have written, please indicate whether it is a **negative** thought, a **neutral thought** (neither negative nor positive thought) or a **positive thought** about the pop-up message.

	Negative (1)	Neutral (2)	Positive (3)
Click to write Thought 1	○	○	○
Click to write Thought 2	○	○	○
Click to write Thought 3	○	○	○
Click to write Thought 4	○	○	○
Click to write Thought 5	○	○	○
Click to write Thought 6	○	○	○
Click to write Thought 7	○	○	○
Click to write Thought 8	○	○	○
Click to write Thought 9	○	○	○
Click to write Thought 10	○	○	○

End of Block: T3_Counterarguments

Start of Block: T3_Attitude Towards the Use of Online Casino Bonuses

Q10 **Claiming online casino bonuses (e.g., cash bonuses and free spins) while gambling is...**

				Neutral				
	1	2	3	4	5	6	7	
Unacceptable	○	○	○	○	○	○	○	Acceptable
Foolish	○	○	○	○	○	○	○	Wise
Negative	○	○	○	○	○	○	○	Positive
Unfavourable	○	○	○	○	○	○	○	Favourable
Wrong	○	○	○	○	○	○	○	Right
Bad	○	○	○	○	○	○	○	Good

Q11 **Being offered an online casino bonus while browsing an online gaming website is...**

	Neutral							
	1	2	3	4	5	6	7	
Unacceptable	○	○	○	○	○	○	○	Acceptable
Foolish	○	○	○	○	○	○	○	Wise
Negative	○	○	○	○	○	○	○	Positive
Unfavourable	○	○	○	○	○	○	○	Favourable
Wrong	○	○	○	○	○	○	○	Right
Bad	○	○	○	○	○	○	○	Good

Q12 On a scale from 0 (no probability) to 100 (certain probability), what is the likelihood you will claim an online casino bonus (e.g., cash bonuses and free spins)?

0   10   20   30   40   50   60   70   80   90   100

Q13 If you are reading this question, answer it with the value ten.

0   10   20   30   40   50   60   70   80   90   100

Q14 This study will conclude with some demographic questions which are relevant to the study.

Q15 **What gender do you identify as?**
_____

Q16 **What is your age?**
_____

Q17 **Which statement best describes the highest level of education you have completed?**

- ○ Compulsory school education not completed (1)
- ○ Compulsory school education completed (2)
- ○ Vocational training (3)
- ○ College (4)
- ○ University degree (5)
- ○ Postgraduate qualification (e.g., MSc, PhD) (6)

Q18 **What is your current employment status?**

- ○ Full time employment (1)
- ○ Part time employment (2)
- ○ Self-employed (3)
- ○ Unemployed (4)
- ○ Student (6)
- ○ Retired (7)
- ○ Homemaker (8)
- ○ Other (9) _____

End of Block: Demographics

Start of Block: Final Comments

Q19 **Are there any further comments you would like to make about the study?**

_____

End of Block: Final Comments

Start of Block: End of Phase 3

Q21 This is the end of the study.
Your completion code is **CTEXVVBO**

End of Block: End of Phase 3

417 Words
https://youtu.be/h8CCbAnTFTY

Did you know that gambling websites know well how to hook you?

According to recent studies, 1.4 million adults in United Kingdom are struggling to control their gambling and they suffer significant harms such as mental health problems, relationship conflicts, unrepayable debts.

While many players are in control of their gambling and enjoy it as a leisure activity, gambling websites successfully persuade players to spend more time and money than they initially intended by using persuasive techniques such as cash bonuses and free spins. These techniques utilise human biases and 'predictably irrational' decision making processes.

Some offers are so persuasive that they may make it difficult for YOU to resist your impulses and control your gambling.

Do you think you are resilient enough to such well-thought persuasive techniques?

This video will inform you about the science and dynamics underpinning online casino bonuses, showing how they are presented to you by gambling websites and the associated risks they bring about.

Let's learn about Gambling Website Claims VS Research Underpinnings

Gambling Website Claim #1
Gambling sites claim that 'casino bonuses give you a head start for free'.

However, casino bonuses are rarely free. On the contrary, bonus offers may persuade players to deposit or gamble more money than they initially intended. This is because players can claim casino bonuses only when they fulfil specific play requirements. For example " get £100 bonus when you deposit £100!" or "deposit £10 to get 50 free spins!"

Research Underpinnings #1:
Claims like "free" and "bonus" distort the perception of the true cost of play requirements and increase the perceived benefit of receiving "free" cash and spins. This positive perception persuades players to claim casino bonuses.

Gambling Website Claim #2
Gambling websites claim that casino bonuses are a great and generous way to try out new games for free. Gambling websites use bonuses to advertise their new games.

However, new game bonuses may increase gambling by reinforcing engagement with more games.

Research Underpinnings #2:
Casino bonuses can disrupt players from their responsible gambling goals by acting as triggers. They can encourage players to place more value on the immediate positive experiences and make it hard to reflect on the negative consequences post play.

The psychological impact of casino bonuses may be much more severe for recovering gambling addicts. According to reports, after building resilience to gambling for many years, recovering gambling addicts may relapse when triggered by casino bonus offers.

Are YOU one of those who thinks twice before claiming a casino bonus?

Example Video Screenshots

396 Words
https://youtu.be/RMNNrKLK9Pc
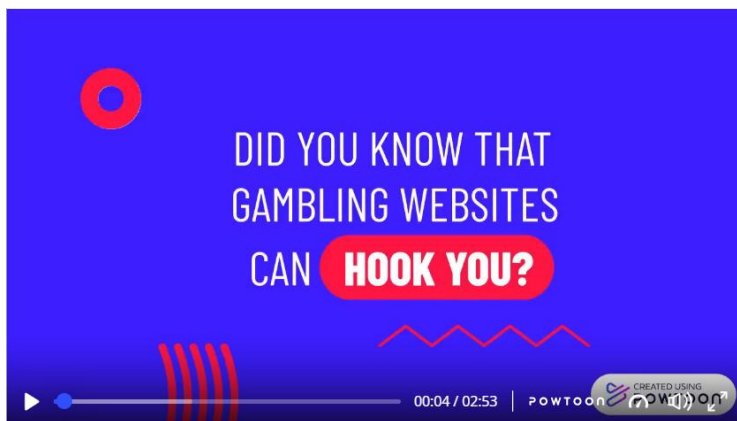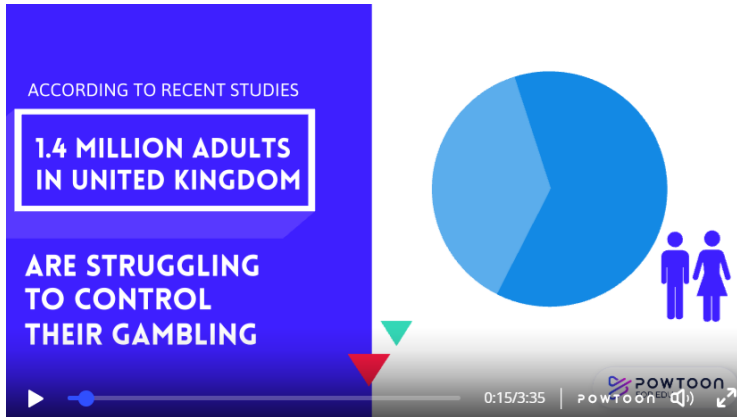
Did you know that gambling has a history as old as human history?

The Earliest Foundations
While records are limited, the first mention of organised gambling dates back to the first millennium BC in ancient China. Records show a primitive version of the lottery, the usage of dice, and betting on animals.

The Ancient World
The ancient Greeks and Egyptians would roll dice made of clay and ivory, while hundreds of miles away, the Aztecs would spend hours on games of patolli. These games are represented in ancient writings and artworks discovered by archaeologists over the centuries.

The Middle Ages
The Middle Ages were a difficult period in human history, although they did have their moments of rest. Dice rolls and coin tosses were popular bets, there were also many skill games to enjoy at the neighbourhood inns.

The Enlightenment
The evidence of the first dedicated western gambling establishment dates back as early as the 17th century. The earliest recorded casino, the Ridotto, opened in Venice, Italy in 1638. It was a gathering place for wealthy Venetians to play games like Barbacole, a forerunner to blackjack and poker.

The roulette wheel was invented just a few years after the Ridotto opened its doors to the public. The earliest version was invented when French physicist and mathematician Blaise Pascal sought to develop a perpetual motion machine. His effort to challenge physics backfired, but it did result in the creation of one of the most popular casino games in history.

Later, first wave of specialised gambling establishments began to open throughout Europe, welcoming people seeking to test their luck.

Modern History
By the late 19th century, bookmakers could shorten the betting process by using telegrams. This allowed people across the country to make numerous bets on sporting events.
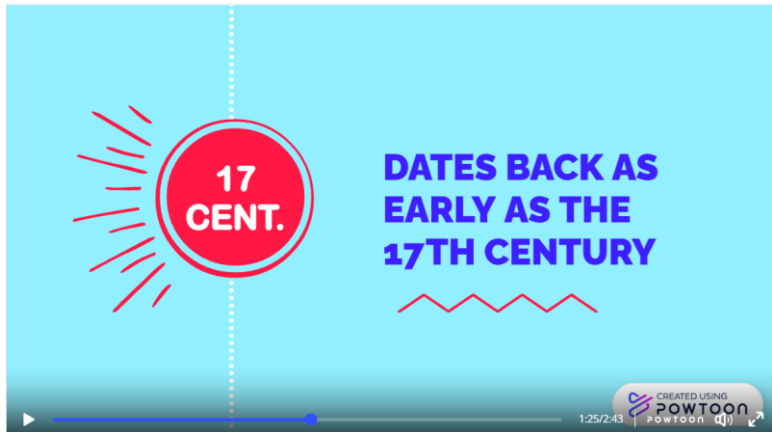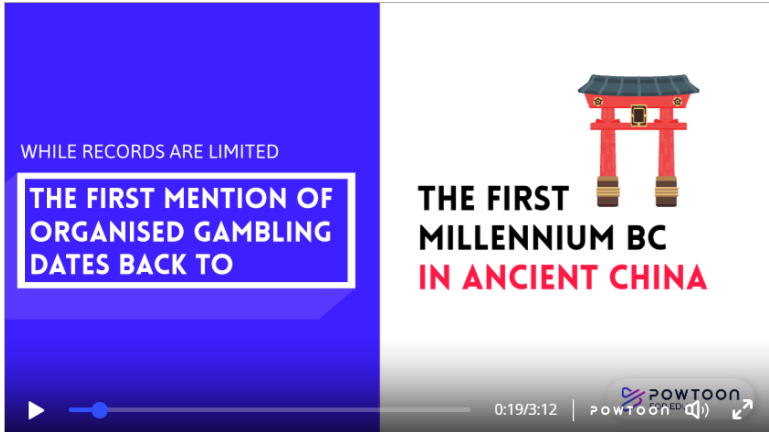
In 1891, a new 'gambling machine' was invented in America, giving rise to the slot machines that continue to attract countless players today.

It was based on poker and consisted of five drums containing a total of 50 cards. Using a mechanical lever players would draw cards to form winning combinations. The winnings generally consisted of free food or drinks.

The Digital Age
By the latter part of the 1990s, the number of online casinos began growing significantly. Various games were presented to players. For the first time, individuals could access casino-quality games from nearly any spot in the world.

Example Video Screenshots

3.   PERSUASIVE ATTACK

A.   WITH DISCLOSURE OF PERSUASIVE INTENT (EXPLAINABLE PERSUASION)

VIII.   CODING

1.   CODING CONTINOUS VARIABLES

Table AX. Gambling Activity per Week – Coding for Length

less than once	0.5
2 to 3	2.5
at least 2	3 (value+1)

2.   CODING QUALITATIVE DATA

Name	Files	References
Likely to engage	1	45
context dependent -chasing loses	1	1
curiousity	1	3
informed choice & empowerment	1	5
integrity of operator	1	1
learn about how they can help	1	1
Unlikely to engage	1	138
mistrust in operators	1	4
not interested	1	46
already know	1	30
desentisized	1	3
immersion effect	1	2
not a problem gambler	1	9
small print	1	4
the pop-up is not appealing anyway	1	5
too long- boring	1	1

◯ Unlikely to engage   ✖

<Files\\131222_DATA_FINAL_SPSS> - § 138 references coded [32.50% Coverage]

Reference 1 - 0.42% Coverage

I've already lost plus I still have to put money in to get the free spins. I'm losing so I'm leaving it and calling it a day.

References 2-4 - 0.42% Coverage

Find it to just give out superficial informative information which can just be brushed away when I am in the zone.

References 5-7 - 0.42% Coverage

It is not something that I would really feel the need to read as I don' have a gambling problem or gamble out of my affordability level. This offer is not one that I would likely take up so it is not something I would look into more.

References 8-9 - 0.42% Coverage

Because it's trying to make me lose more money essentially. I know there trick is to keep me on the website and keep spending more money. I know they're only trying to temp me because they want more money

References 10-11 - 0.42% Coverage

I already know a bit about how gambling companies try to keep people gaming and so feel that there is not much else to learn.

IX. ASSUMPTION TESTS

1. PHASE 2: TWO-WAY ANCOVA

Assumption #1: You have one dependent variable that is measured at the continuous level (i.e., the interval or ratio level).

Assumption #2: You have two independent variables where each independent variable consists of two or more categorical, independent groups.

Assumption #3: You have one covariate that is measured at the continuous level.

Assumption #4: You should have independence of observations, which means that there is no relationship between the observations in each group of the independent variables or between the groups themselves.

Assumption #5: The covariate should be linearly related to the dependent variable for each combination of groups of the two independent variables (i.e., each cell of the design).

Elicited Threat
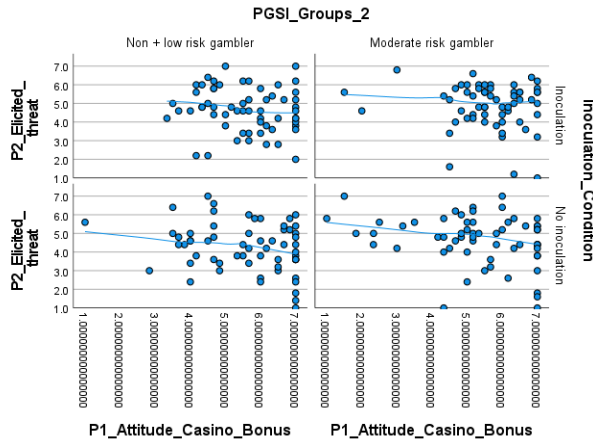
Attitudes Towards Online Casino Bonuses
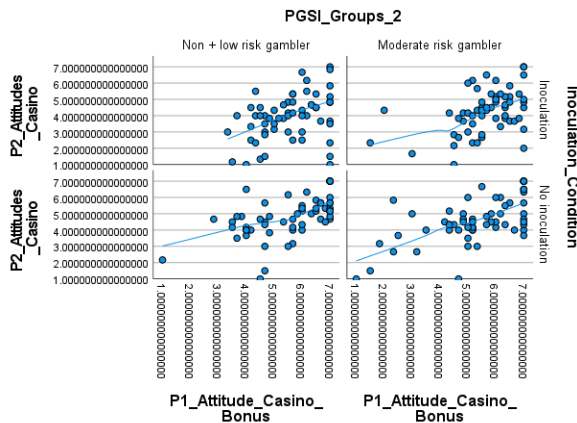
Intention to Claim Online Casino Bonuses

Scatter Plot of P2_Intention by P1_Attitude_Casino_Bonus by PGSI_Groups_2 by Inoculation_Condition
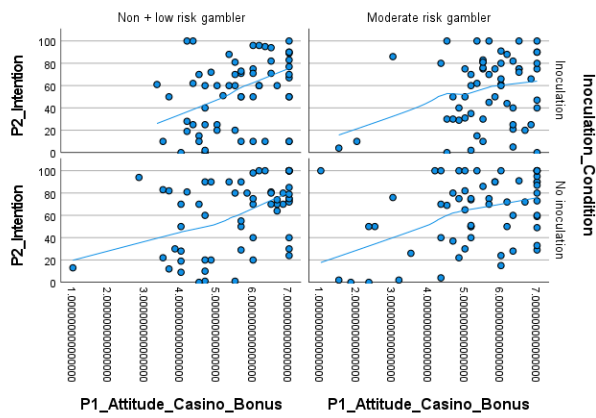
Issue Involvement with Responsible Gambling

Scatter Plot of P2_Issue_Involvement by P1_Attitude_Casino_Bonus by PGSI_Groups_2 by Inoculation_Condition
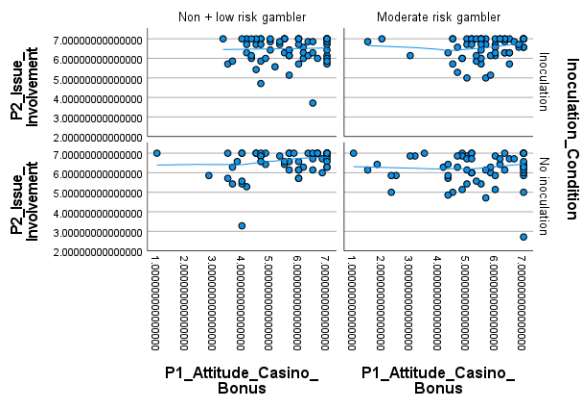
There was a linear relationship between P1 attitudes towards casino bonuses and dependent variable (i.e., elicited threat, attitudes towards casino, intention and issue involvement at time 2) for each intervention group, as assessed by visual inspection of a scatterplot.

Assumption #6: There should be homogeneity of regression slopes.

Elicited Threat

Tests of Between-Subjects Effects

Dependent Variable:

Source	Squares	df	Mean Square	F	Sig.
Corrected Model	28.510[a]	7	4.073	2.692	0.011
Intercept	353.095	1	353.095	233.400	0.000
Groups1	0.454	3	0.151	0.100	0.960
P1_Attitude_Casino_Bonus	12.289	1	12.289	8.123	0.005
Groups1 * P1_Attitude_Casino_Bonus	1.009	3	0.336	0.222	0.881
Error	350.977	232	1.513		
Total	5483.680	240			
Corrected Total	379.487	239			

a. R Squared = .075 (Adjusted R Squared = .047)

> There was homogeneity of regression slopes as determined by a comparison between the two-way ANCOVA model with and without interaction terms, $F(3, 232) = 0.22$, $p = 0.88$.

Attitudes Towards Online Casino Bonuses

Tests of Between-Subjects Effects

Dependent Variable:

Source	Squares	df	Mean Square	F	Sig.
Corrected Model	140.318ª	7	20.045	14.889	0.000
Intercept	25.710	1	25.710	19.097	0.000
Groups1	0.832	3	0.277	0.206	0.892
P1_Attitude_Casino_Bonus	99.252	1	99.252	73.722	0.000
Groups1 * P1_Attitude_Casino_Bonus	0.129	3	0.043	0.032	0.992
Error	312.343	232	1.346		
Total	5124.028	240			
Corrected Total	452.661	239			

a. R Squared = .310 (Adjusted R Squared = .289)

Intention to Claim Online Casino Bonuses

Tests of Between-Subjects Effects

Dependent Variable:

Source	Squares	df	Mean Square	F	Sig.
Corrected Model	32934.763ª	7	4704.966	5.639	0.000
Intercept	1320.782	1	1320.782	1.583	0.210
Groups1	1437.478	3	479.159	0.574	0.632
P1_Attitude_Casino_Bonus	26922.271	1	26922.271	32.266	0.000
Groups1 * P1_Attitude_Casino_Bonus	939.234	3	313.078	0.375	0.771
Error	193579.733	232	834.395		
Total	1051251.000	240			
Corrected Total	226514.496	239			

a. R Squared = .145 (Adjusted R Squared = .120)

Issue Involvement with Responsible Gambling

Tests of Between-Subjects Effects

Dependent Variable:

Source	Squares	df	Mean Square	F	Sig.
Corrected Model	7.449ª	7	1.064	2.403	0.022
Intercept	418.836	1	418.836	945.847	0.000
Groups1	0.750	3	0.250	0.565	0.639
P1_Attitude_Casino_Bonus	0.984	1	0.984	2.221	0.137
Groups1 * P1_Attitude_Casino_Bonus	1.622	3	0.541	1.221	0.303
Error	102.733	232	0.443		
Total	9999.184	240			
Corrected Total	110.182	239			

a. R Squared = .068 (Adjusted R Squared = .039)

Assumption #7: There should be homoscedasticity.

There was homoscedasticity within each combination of groups of the two independent variables, as assessed by visual inspection of the studentized residuals plotted against the predicted values for each group.

This will mean that: (a) the points of each of the scatterplots above will exhibit no pattern and will be approximately constantly spread (on the y-axis) across the predicted values (on the x-axis) for each combination of the groups of the two independent variable.

Elicited Threat

Scatter Plot of Studentized Residual for P2_Elicited_threat by Predicted Value for P2_Elicited_threat by PGSI_Groups_2 by Inoculation_Condition
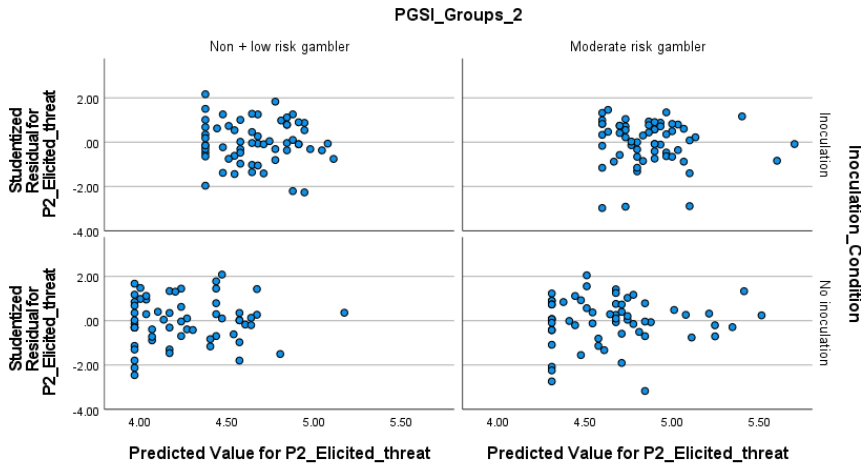
Attitudes Towards Online Casino Bonuses

Scatter Plot of Studentized Residual for P2_Attitudes_Casino by Predicted Value for P2_Attitudes_Casino by PGSI_Groups_2 by Inoculation_Condition
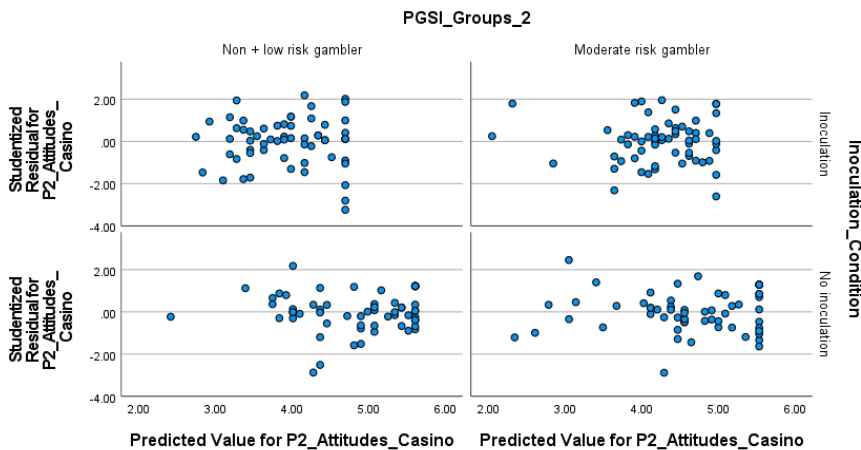
Intention to Claim Online Casino Bonuses

Scatter Plot of Studentized Residual for P2_Intention by Predicted Value for P2_Intention by PGSI_Groups_2 by Inoculation_Condition
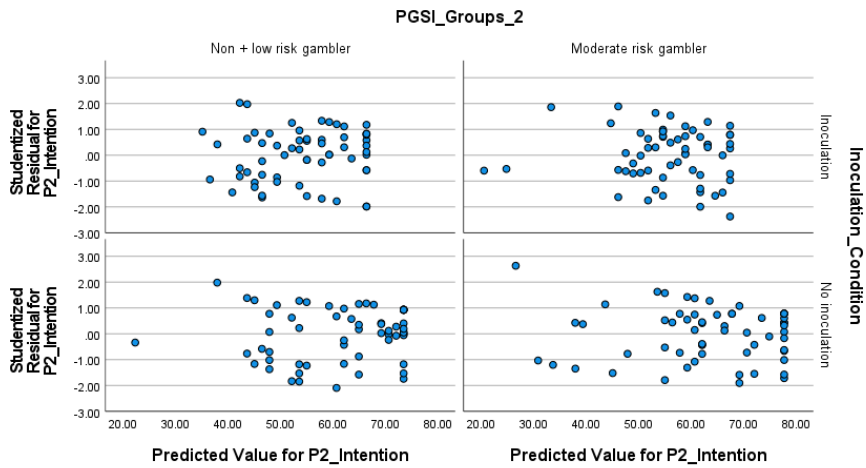
Issue Involvement with Responsible Gambling

Scatter Plot of Studentized Residual for P2_Issue_Involvement by Predicted Value for P2_Issue_Involvement by PGSI_Groups_2 by Inoculation_Condition
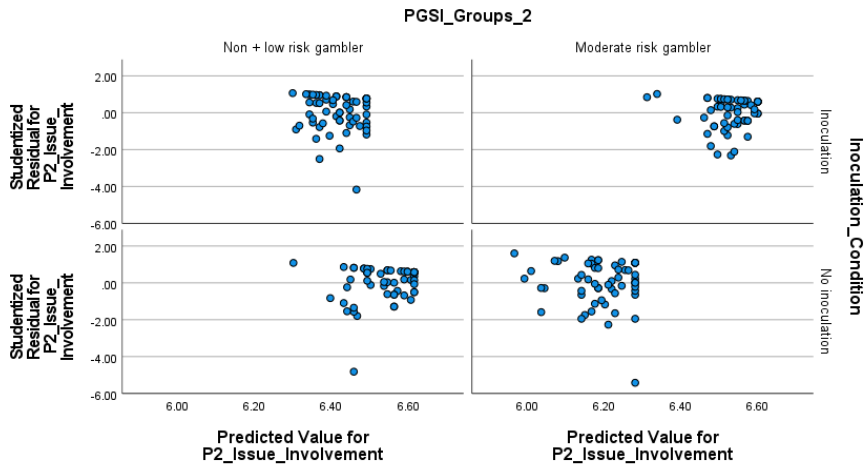
Assumption #8: There should be homogeneity of variances.

Elicited Threat

Levene's Test of Equality of Error Variances[a]

Dependent Variable:

F	df1	df2	Sig.
0.109	3	236	0.955

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + P1_Attitude_Casino_Bonus + PGSI_Groups_2 + Inoculation_Condition + PGSI_Groups_2 *

> if Levene's test **is not** statistically significant (i.e., $p > .05$; that is, p is **greater than** .05), you **have** equal variances and you have **not violated** the assumption of homogeneity of variances.
>
> There was homogeneity of variances, as assessed by Levene's test of homogeneity of variance ($p = 0.955$).

Attitudes Towards Online Casino Bonuses

Levene's Test of Equality of Error Variances[a]

Dependent Variable:

F	df1	df2	Sig.
0.971	3	236	0.407

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + P1_Attitude_Casino_Bonus + PGSI_Groups_2 + Inoculation_Condition + PGSI_Groups_2 *

Intention to Claim Online Casino Bonuses

Levene's Test of Equality of Error Variances[a]

Dependent Variable:

F	df1	df2	Sig.
0.030	3	236	0.993

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + P1_Attitude_Casino_Bonus + PGSI_Groups_2 + Inoculation_Condition + PGSI_Groups_2 *

Issue Involvement with Responsible Gambling

Levene's Test of Equality of Error Variances[a]

Dependent Variable:

F	df1	df2	Sig.
1.137	3	236	0.335

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + P1_Attitude_Casino_Bonus + PGSI_Groups_2 + Inoculation_Condition + PGSI_Groups_2 *

Assumption #9: There should be no significant unusual points in any combinations of groups of your two independent variables.

SRE	
SRE which is more **than 3** / less than -3 (standard deviations).	
Elicited Threat	68
Attitudes Casino	282
Intention	NA
Issue Involvement	215, 144, 169

LEV

To determine whether any cases exhibit **high leverage**, a general rule of thumb is to consider **leverage values less than 0.2** as **safe**, values of **0.2 to less than 0.5** as **risky**, and values of **0.5 and above** as **dangerous**

Elicited Threat	**124, 8, 117**
Attitudes Casino	**FOR ALL**
Intention	
Issue Involvement	

COOK

Cook's distance is a measure of influence. As a rule of thumb, if there are Cook's Distance values **above 1**, they should be investigated (Cook and Weisberg, 1982).

no value above 1

There were 8 outliers in the data.

I included all the outliers in the analysis because the result was not materially affected (i.e., determined by comparing the result of the two-way ANCOVA with and without the outlier).

Assumption #10: Your dependent variable should be approximately normally distributed for each combination of groups of the two independent variables.

Tests of Normality								
			Kolmogorov-Smirnov[a]			Shapiro-Wilk		
PGSI_Groups_2			Statistic	df	Sig.	Statistic	df	Sig.
Non + low risk gambler	inoculation	Studentiz	0.070	60	.200*	0.986	60	0.725
		Studentiz	0.140	60	0.005	0.968	60	0.123
		Studentiz	0.095	60	.200*	0.967	60	0.103
		Studentiz	0.150	60	0.002	0.850	60	0.000
	no inoculation	Studentiz	0.063	60	.200*	0.987	60	0.761
		Studentiz	0.100	60	.200*	0.951	60	0.018
		Studentiz	0.104	60	0.172	0.952	60	0.019
		Studentiz	0.197	60	0.000	0.763	60	0.000
Moderate risk gambler	inoculation	Studentiz	0.104	60	0.164	0.901	60	0.000
		Studentiz	0.091	60	.200*	0.974	60	0.238
		Studentiz	0.096	60	.200*	0.975	60	0.259
		Studentiz	0.167	60	0.000	0.864	60	0.000
	no inoculation	Studentiz	0.123	60	0.025	0.948	60	0.013
		Studentiz	0.063	60	.200*	0.986	60	0.728
		Studentiz	0.118	60	0.038	0.968	60	0.122
		Studentiz	0.127	60	0.018	0.861	60	0.000

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Run the test regardless because the two-way ANCOVA is fairly robust to deviations from normality. Generally speaking, if your sample sizes (numbers in each group) are equal, or nearly equal, only strong violations of normality might actually cause problems. Indeed, if sample sizes are not small, even fairly skewed distributions – as long as the groups are similarly skewed – are not always problematic. In other words, non-normality does not affect Type I error rate substantially and the two-way ANCOVA can be considered robust. However, if you choose this route, you should still report the violation in your results.

Assumption #1: You have one dependent variable that is measured at the continuous level (i.e., the interval or ratio level).

Assumption #2: You have two independent variables where each independent variable consists of two or more categorical, independent groups.

Assumption #3: You have one covariate that is measured at the continuous level.

Assumption #4: You should have independence of observations, which means that there is no relationship between the observations in each group of the independent variables or between the groups themselves.

Assumption #5: The covariate should be linearly related to the dependent variable for each combination of groups of the two independent variables (i.e., each cell of the design).

Attitudes Towards Online Casino Bonuses
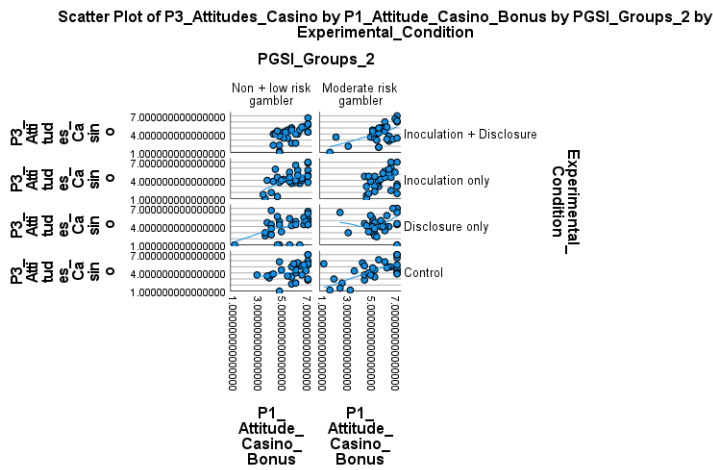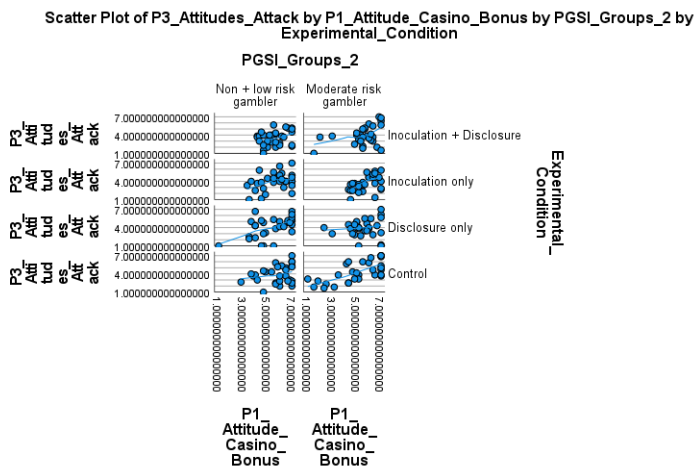
Attitudes Towards Persuasive Attack

Counterarguments
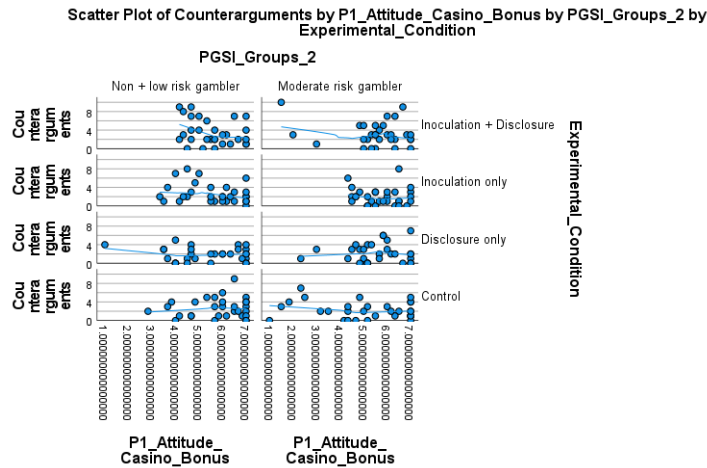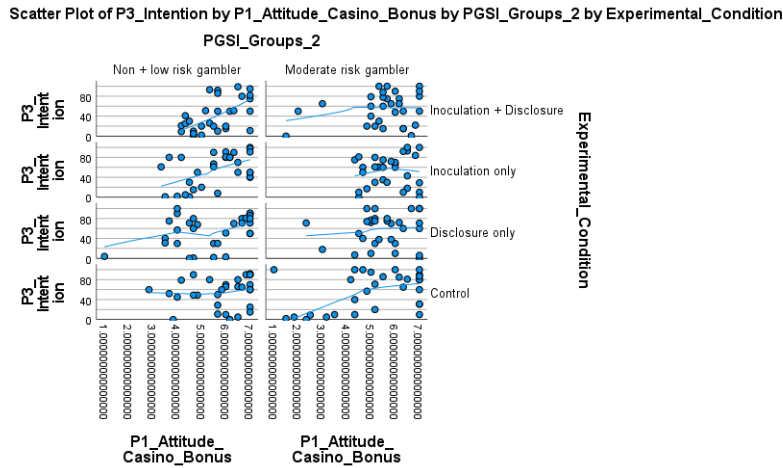
Scatter Plot of Counterarguments by P1_Attitude_Casino_Bonus by PGSI_Groups_2 by Experimental_Condition

Intention to Claim Online Casino Bonuses

Scatter Plot of P3_Intention by P1_Attitude_Casino_Bonus by PGSI_Groups_2 by Experimental_Condition

> There was a linear relationship between P1 attitudes towards casino bonuses and dependent variable (i.e., attitudes towards casino, attitudes towards attack, counterarguments, and intention at time 3) for each intervention group, as assessed by visual inspection of a scatterplot.

Assumption #6: There should be homogeneity of regression slopes.

Attitudes Towards Online Casino Bonuses

Tests of Between-Subjects Effects

Dependent Variable:

Source	Squares	df	Mean Square	F	Sig.
Corrected Model	133.452[a]	15	8.897	5.020	0.000
Intercept	9.693	1	9.693	5.469	0.020
Groups	11.969	7	1.710	0.965	0.458
P1_Attitude_Casino_Bonus	104.357	1	104.357	58.878	0.000
Groups * P1_Attitude_Casino_Bonus	9.373	7	1.339	0.755	0.625
Error	397.024	224	1.772		
Total	4726.361	240			
Corrected Total	530.477	239			

> There was homogeneity of regression slopes as determined by a comparison between the two-way ANCOVA model with and without interaction terms, F(7, 224) = 0.75, p = 0.62.

Attitudes Towards Persuasive Attack

Tests of Between-Subjects Effects

Dependent Variable:

Source	Squares	df	Mean Square	F	Sig.
Corrected Model	112.359[a]	15	7.491	4.243	0.000
Intercept	20.195	1	20.195	11.441	0.001
Groups	6.811	7	0.973	0.551	0.795
P1_Attitude_Casino_Bonus	63.609	1	63.609	36.034	0.000
Groups * P1_Attitude_Casino_Bonus	10.041	7	1.434	0.813	0.578
Error	395.409	224	1.765		
Total	4177.694	240			
Corrected Total	507.768	239			
a. R Squared = .221 (Adjusted R Squared = .169)					

Counterarguments

Tests of Between-Subjects Effects

Dependent Variable:

Source	Squares	df	Mean Square	F	Sig.
Corrected Model	110.203[a]	15	7.347	1.660	0.060
Intercept	142.989	1	142.989	32.314	0.000
Groups	38.211	7	5.459	1.234	0.285
P1_Attitude_Casino_Bonus	17.393	1	17.393	3.931	0.049
Groups * P1_Attitude_Casino_Bonus	24.885	7	3.555	0.803	0.585
Error	991.197	224	4.425		
Total	2662.000	240			
Corrected Total	1101.400	239			
a. R Squared = .100 (Adjusted R Squared = .040)					

Intention to Claim Online Casino Bonuses

Tests of Between-Subjects Effects

Dependent Variable:

Source	Squares	df	Mean Square	F	Sig.
Corrected Model	35205.084[a]	15	2347.006	2.506	0.002
Intercept	1157.068	1	1157.068	1.235	0.268
Groups	8699.607	7	1242.801	1.327	0.239
P1_Attitude_Casino_Bonus	18695.615	1	18695.615	19.959	0.000
Groups * P1_Attitude_Casino_Bonus	7464.611	7	1066.373	1.138	0.340
Error	209824.912	224	936.718		
Total	923543.000	240			
Corrected Total	245029.996	239			
a. R Squared = .144 (Adjusted R Squared = .086)					

Assumption #7: There should be homoscedasticity.

There was homoscedasticity within each combination of groups of the two independent variables, as assessed by visual inspection of the studentized residuals plotted against the predicted values for each group.

Attitudes Towards Online Casino Bonuses

Scatter Plot of Studentized Residual for P3_Attitudes_Casino by Predicted Value for P3_Attitudes_Casino by PGSI_Groups_2 by Experimental_Condition
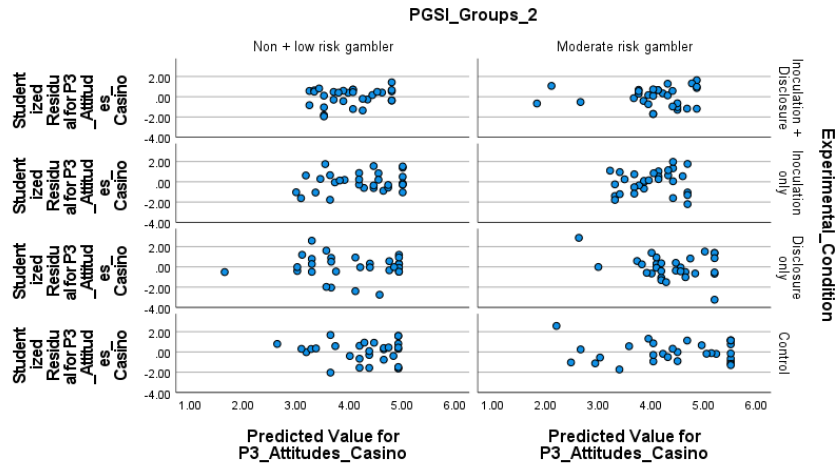
Attitudes Towards Persuasive Attack

Scatter Plot of Studentized Residual for P3_Attitudes_Attack by Predicted Value for P3_Attitudes_Attack by PGSI_Groups_2 by Experimental_Condition
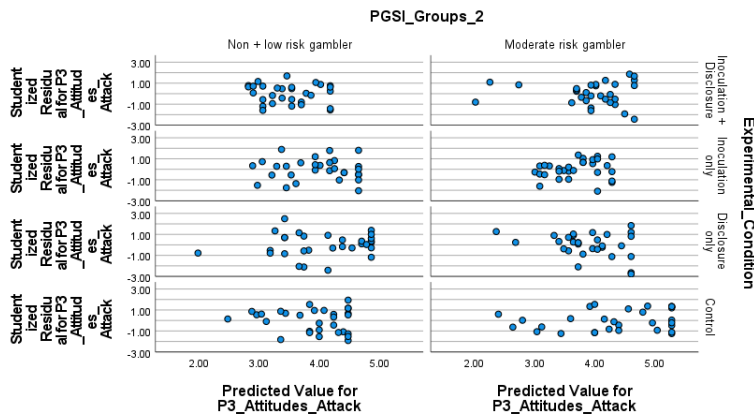
Counterarguments

Scatter Plot of Studentized Residual for Counterarguments by Predicted Value for Counterarguments by PGSI_Groups_2 by Experimental_Condition

Intention to Claim Online Casino Bonuses

Scatter Plot of Studentized Residual for P3_Intention by Predicted Value for P3_Intention by PGSI_Groups_2 by Experimental_Condition
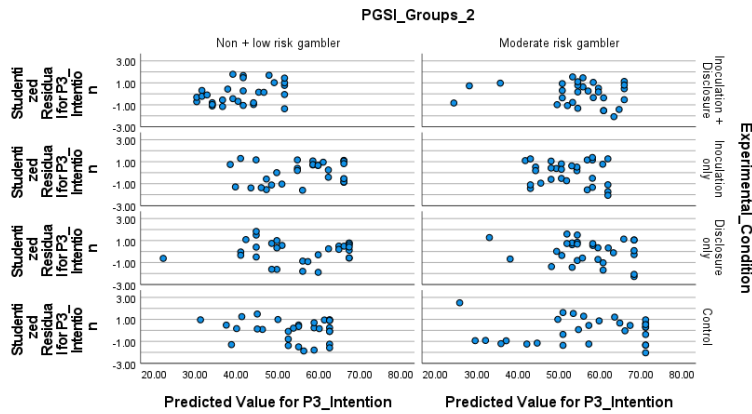
Assumption #8: There should be homogeneity of variances.

Attitudes Towards Online Casino Bonuses

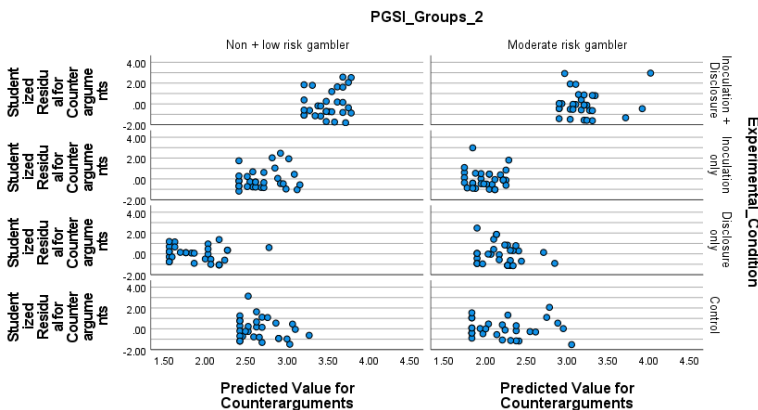| Levene's Test of Equality of Error Variances[a]			
Dependent Variable:			
F	df1	df2	Sig.
0.465	7	232	0.859
Tests the null hypothesis that the error variance of the dependent variable is equal across groups.			
a. Design: Intercept + P1_Attitude_Casino_Bonus + PGSI_Groups_2 + Experimental_Condition +			

> if Levene's test **is not** statistically significant (i.e., $p > .05$; that is, p is **greater than** .05), you **have** equal variances and you have **not violated** the assumption of homogeneity of variances.
>
> There was homogeneity of variances, as assessed by Levene's test of homogeneity of variance ($p = 0.85$).

Attitudes Towards Persuasive Attack

Levene's Test of Equality of Error Variances[a]			
Dependent Variable:			
F	df1	df2	Sig.
0.568	7	232	0.781
Tests the null hypothesis that the error variance of the dependent variable is equal across groups.			
a. Design: Intercept + P1_Attitude_Casino_Bonus + PGSI_Groups_2 + Experimental_Condition +			

Counterarguments

Levene's Test of Equality of Error Variances[a]

Dependent Variable:

F	df1	df2	Sig.
1.984	7	232	0.058

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + P1_Attitude_Casino_Bonus + PGSI_Groups_2 + Experimental_Condition +

Intention to Claim Online Casino Bonuses

Levene's Test of Equality of Error Variances[a]

Dependent Variable:

F	df1	df2	Sig.
0.466	7	232	0.859

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + P1_Attitude_Casino_Bonus + PGSI_Groups_2 + Experimental_Condition +

Assumption #9: There should be no significant unusual points in any combinations of groups of your two independent variables.

SRE

SRE which is more **than 3** / less than -3 (standard deviations).

Counterarguments	7
Attitudes Casino	217
Attitudes Attack	NA
Intention	NA

LEV

leverage, a general rule of thumb is to consider **leverage values less than 0.2** as **safe**, values of **0.2 to less than 0.5** as **risky**, and values of **0.5 and above** as **dangerous**

Counterarguments	8,117,124,155,168,176, 199, 266
Attitudes Casino	FOR ALL
Attitudes Attack	
Intention	

COOK

Cook's distance is a measure of influence. As a rule of thumb, if there are Cook's Distance values **above 1**, they should be investigated (Cook and Weisberg, 1982).

no value above 1

There were 10 outliers in the data.

I included all the outliers in the analysis because the result was not materially affected (i.e., determined by comparing the result of the two-way ANCOVA with and without the outlier).

Assumption #10: Your dependent variable should be approximately normally distributed for each combination of groups of the two independent variables.

Tests of Normality

PGSI_Groups_2			Kolmogorov-Smirnov[a]			Shapiro-Wilk		
			Statistic	df	Sig.	Statistic	df	Sig.
Non + low risk gambler	Inoculation + Disclosure	Studentiz	0.173	30	0.022	0.905	30	0.011
		Studentiz	0.218	30	0.001	0.902	30	0.010
		Studentiz	0.168	30	0.031	0.945	30	0.123
		Studentiz	0.123	30	.200*	0.919	30	0.025
	Inoculation only	Studentiz	0.214	30	0.001	0.864	30	0.001
		Studentiz	0.083	30	.200*	0.978	30	0.759
		Studentiz	0.092	30	.200*	0.975	30	0.695
		Studentiz	0.187	30	0.009	0.900	30	0.008
	Disclosure only	Studentiz	0.103	30	.200*	0.955	30	0.230
		Studentiz	0.198	30	0.004	0.938	30	0.082
		Studentiz	0.088	30	.200*	0.975	30	0.687
		Studentiz	0.117	30	.200*	0.962	30	0.341
	Control	Studentiz	0.127	30	.200*	0.936	30	0.072
		Studentiz	0.168	30	0.031	0.935	30	0.065
		Studentiz	0.179	30	0.015	0.935	30	0.067
		Studentiz	0.197	30	0.004	0.906	30	0.012
Moderate risk gambler	Inoculation + Disclosure	Studentiz	0.185	30	0.010	0.907	30	0.012
		Studentiz	0.124	30	.200*	0.959	30	0.284
		Studentiz	0.125	30	.200*	0.977	30	0.747
		Studentiz	0.137	30	0.157	0.949	30	0.154
	Inoculation only	Studentiz	0.126	30	.200*	0.877	30	0.002
		Studentiz	0.097	30	.200*	0.973	30	0.631
		Studentiz	0.102	30	.200*	0.969	30	0.507
		Studentiz	0.172	30	0.024	0.923	30	0.032
	Disclosure only	Studentiz	0.127	30	.200*	0.909	30	0.014
		Studentiz	0.113	30	.200*	0.965	30	0.413
		Studentiz	0.121	30	.200*	0.928	30	0.043
		Studentiz	0.132	30	0.195	0.952	30	0.189
	Control	Studentiz	0.130	30	.200*	0.968	30	0.484
		Studentiz	0.113	30	.200*	0.964	30	0.395
		Studentiz	0.142	30	0.128	0.895	30	0.006
		Studentiz	0.156	30	0.059	0.957	30	0.256

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Run the test regardless because the two-way ANCOVA is fairly robust to deviations from normality. Generally speaking, if your sample sizes (numbers in each group) are equal, or nearly equal, only strong violations of normality might actually cause problems. Indeed, if sample sizes are not small, even fairly skewed distributions – as long as the groups are similarly skewed – are not always problematic. In other words, non-normality does not affect Type I error rate substantially and the two-way ANCOVA can be considered robust. However, if you choose this route, you should still report the violation in your results.

X.   CORRELATION MATRIX

Correlation Matrix

	P1_Attitude_Casino_Bonus	P1_Intention	P1_IssueInvolvement	Knowledge_of_persuasion	P2_Elicited_threat	P2_Attitudes_Casino	P2_Intention	P2_Issue_Involvement	Age	Gambling_Activity	PGSI_Total
P1_Intention	0.367 ***	—									
	<.001	—									
P1_IssueInvolvement	0.114	0.041	—								
	0.214	0.654	—								
Knowledge_of_persuasion	0.298 ***	0.344 ***	0.118	—							
	<.001	<.001	0.199	—							
P2_Elicited_threat	-0.116	-0.038	0.027	0.005	—						
	0.208	0.682	0.769	0.954	—						
P2_Attitudes_Casino	0.416 ***	0.346 ***	-0.029	0.247 **	-0.248 **	—					
	<.001	<.001	0.75	0.007	0.006	—					
P2_Intention	0.288 **	0.499 ***	0.056	0.369 ***	-0.157	0.555 ***	—				
	0.001	<.001	0.54	<.001	0.086	<.001	—				
P2_Issue_Involvement	0.096	0.032	0.323 ***	0.161	0.094	-0.142	-0.051	—			
	0.296	0.728	<.001	0.08	0.309	0.123	0.583	—			
Age	-0.084	0.065	-0.101	0.022	0.074	-0.135	-0.164	0.149	—		
	0.361	0.481	0.273	0.807	0.421	0.14	0.074	0.105	—		
Gambling_Activity	0.251 **	0.428 ***	0.125	0.421 ***	-0.027	0.223 *	0.387 ***	0.179	0.147	—	
	0.007	<.001	0.181	<.001	0.773	0.016	<.001	0.055	0.115	—	
PGSI_Total	-0.028	0.017	-0.157	-0.034	0.126	0.031	0.006	0.072	-0.2 *	-0.055	—
	0.759	0.852	0.087	0.712	0.171	0.739	0.951	0.433	0.028	0.559	—
Number_Accounts	0.101	0.216 *	0.039	0.275 **	-0.09	0.147	0.382 ***	0.04	-0.11	0.353 ***	-0.044
	0.274	0.018	0.673	0.002	0.329	0.109	<.001	0.662	0.233	<.001	0.632

Note. * p < .05, ** p < .01, *** p < .001

Glossary

Abstinence Violation Effect (AVE)

Combined TAM And TPB (C-TAM-TPB)

Corporate Social Responsibility (CSR)

Diagnostic And Statistical Manual of Mental Disorders (DSM-5)

Explainable Artificial Intelligence (XAI)

Innovation Diffusion Theory (IDT)

Model of Pc Utilization (MPCU)

Motivational Model (MM)

Need For Cognition (NfC)

Persuasion Knowledge Model (PKM)

Persuasive System Design (PSD)

Problem Gambling Severity Index (PGSI)

Social Cognitive Theory (SCT)

Technology Acceptance Model (TAM)

The Elaboration Likelihood Model (ELM)

Theory of Planned Behaviour (TPB)

Theory Of Reasoned Action (TRA)

Unified Theory of Acceptance and Use of Technology (UTAUT)