

Dark Patterns and Video Games: Empirical Analysis Among Spanish Youth

PATRONES OSCUROS Y VIDEOJUEGOS: ANÁLISIS EMPÍRICO
ENTRE JÓVENES ESPAÑOLES

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Abstract: This paper analyzes the presence and impact of dark patterns in popular video games through a mixed-methods study focused on a sample of 927 young Spanish gamers aged 16 to 25. The research is divided into two phases: (1) a theoretical analysis conducted by 6 experts on 12 games, which identified 25 dark patterns classified into 8 general categories (loot boxes, virtual currency, play by appointment, FOMO, paywalls, pay-to-win, battle pass, and Game as a Service); and (2) an assessment of players' perceptions of the 6 most mentioned games regarding how these persuasive elements affect their experience. Results reveal that dark patterns operate as integrated monetization ecosystems that maximize players' time and spending—especially among younger users—with potential negative behavioral and social effects. The study uses both sets of results to establish a critical basis for future ethical debates and regulatory proposals on persuasive design.

Keywords: Video Games; Dark Patterns; Reward Systems; Loot Boxes; Persuasive Design; Microtransactions.

Resumen: Este artículo presenta un análisis sobre patrones oscuros y su impacto percibido por jugadores españoles entre 16 y 25 años (N = 927). Se analiza: (1) la jugabilidad y fuentes secundarias de 12 de los juegos más populares entre los encuestados por parte de 6 investigadores, a partir de 25 patrones oscuros clasificados en 8 categorías (cajas de botín, dinero virtual, juego bajo cita, FOMO, muros de pago, pagar por ganar, pase de batalla y juego como servicio); y (2) datos de una encuesta sobre cómo los jugadores de los 6 juegos más mencionados perciben la inclusión de las 8 categorías de patrones oscuros. Los resultados muestran que los patrones oscuros funcionan como ecosistemas de monetización que maximizan tiempo y gasto —especialmente en jóvenes— con posibles efectos negativos, conductuales y sociales. Este análisis aporta un histórico de videojuegos populares como posible base para discusiones éticas y regulatorias sobre el diseño persuasivo.

Palabras clave: videojuegos; patrones oscuros; sistemas de recompensas; cajas de botín; diseño persuasivo; microtransacciones.



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1. Introduction

In line with the increasing “platformization” of other areas of technology, large video game companies have been transforming the sector from one based on discrete product sales into a regular consumer and payment service (Ball, 2025: 106-123). In this process, as Dubois and Westar indicate (2021: *Servitization and the video game industry* section), companies have had to look for new ways to earn profits through persuasive strategies aimed at optimizing metrics (Key Performance Indicators or KPIs), moving beyond their role as products of leisure. One of these practices, known as “dark patterns”, was initially introduced in the creation of applications and interfaces as “malicious interface design” (Conti and Sobiesk, 2010) or “deceptive patterns” (Brignull, 2010), and is notably prevalent in the field of video games.

Dark patterns are design strategies that deliberately exploit cognitive biases to induce users to make decisions that contravene their interests without their awareness. In other words, dark patterns are the methods an app employs to obscure certain actions while promoting and facilitating others, thereby maximizing users' spending of time and money (Waldman, 2021: 107). Examples include making it difficult to cancel the purchase of a vanity item or offering a gift for entering the game daily. Studies such as those by Villalba-García *et al.* (2025: 4), Drummond *et al.* (2025: 7), Haidt (2024) or Sirola *et al.* (2023: 5) highlight how certain types of dark patterns, especially those linked to digital betting, are associated with increased stress, depression, and problem behaviors.

The study of dark patterns is particularly relevant in the context of society's changing media consumption, which has shifted from print and television to social media (Newman *et al.*, 2025: 12; Lacey, Goodwin and Lyons, 2026:265; for Spain, see: AIMC, 2025). This shift is accompanied by an increase in gambling (Tran *et al.*, 2024: e603; for trends in Spain, see: Save the Children Spain, 2024: 29; Calderón Gómez *et al.*, 2024: 24), particularly prevalent among young people and children, who may develop financially risky behaviors (Evans, 2020: 420-423), due to the legalization and visibility of certain platforms within the changing political-media sphere. For example, gambling has been shifting from regulated land-based casinos to often less-regulated digital casinos (such as “fantasy football” games).

From a sociocultural perspective, the relationship between video games, media, and gambling has thus been normalized through content creators and influencers, physical and digital sports teams/tournaments, and companies that promote betting platforms via paid clothing or ads (Cabeza-Ramírez *et al.*,

2022: 11; Macey and Mattinen, 2025: 8). Considering the observed trends and the widespread integration of multiple dark patterns in up to 95% of the 240 most popular apps (Di Geronimo *et al.*, 2020: 5) and most mobile games (Niknejad *et al.*, 2024: 152) an urgent study of their impact and format is warranted.

2. Objectives and Methodology

The main objective of this research is to determine the prevalence of dark patterns in popular video games in Spain and to assess young people's perception of their impact, thereby clarifying their potential psychosocial consequences. To achieve this, the analysis is structured according to the following specific objectives:

1. Identify a basic typology of dark patterns, synthesizing a previously conducted systematic literature review.
2. Provide an overview of how dark patterns manifest in a popular set of games marketed in Spain.
3. Ascertain the perceived impact among a sample of young Spanish video game players and evaluate the correlations among different categories of dark patterns.

Methodologically, the analysis is based on three components: (1) a systematic review of the scientific literature (of 357 screened articles; 16 were selected) on video game monetization and their impact on young people, which structured the study's contextual framework by identifying 25 types of dark patterns classified into 8 general categories; (2) a survey of Spanish youth within the age range of interest ($N = 927$, average age 20.8 years; 45.4% female), conducted in June 2025 with a response rate of 92.7% (data available in: Fernández-de-Castro *et al.*, 2025); and (3) the extraction from this survey of the most popular games among the sampled population and their perception of the effect of various dark patterns in video games generally.

A demographic research firm conducted the survey, capturing demographic data (e.g., age, gender) and information on video game use (e.g., time spent, favorite video games). The questionnaire included 34 Likert 1-5 scale questions to assess the perception and experience of different dark patterns (e.g., *"I have changed my schedule or daily routine just to get into the game at a specific time"* or *"I am frustrated to see that other players have advantages just because they have spent money"*). The items were selected from the 8 categories identified in the literature review; higher values indicated a greater per-

ception of impact. The final perception value for each dark pattern per subject was calculated as the average of the relevant Likert questions.

The individual wording of each item was based on the content of 27 screening instruments for problematic video game use and/or gambling, also identified in the review, such as PU-LB (González-Cabrera *et al.*, 2022), GAS (Lemmens *et al.*, 2009), or PGSI (Ferris and Wynne, 2001), though the survey's objective was not to create a new screening tool.

Based on data from the systematic review and the survey, video games were pre-selected for analysis according to their number of mentions in both sources. The final selection of video games (see Section 4.1) involved comparing the most cited titles in recent scientific literature with the games most mentioned by the respondents ($N > 20$).

For the analysis of each selected game, we employed gameplay analysis, a version of thematic content analysis suggested in *Playthrough Poetics* (Droumeva, 2024: Chapter 9). This analysis was used to configure an analytical taxonomy of 25 dark patterns, which were manually selected from those detected in the systematic literature review (Zagal *et al.*, 2013; Petrovskaya and Zendle, 2022: Figure 1; Nie *et al.*, 2024: Table 1). Although more than 25 patterns were identified, the selection was limited to 25 to manage workload, focusing on frequent patterns in video games rather than those found in electronic commerce or social networks. Table 1 provides a brief glossary of the different patterns examined.

Table 1. Glossary of 8 groups of dark patterns that appeared in the systematic review.

Dark pattern	Description	Example	Psychological effect
Loot Boxes	Packages with unknown variable rewards	"Pay for a spin, (10% epic draw)!"	Generates expectation with random rewards
In-game / digital /virtual currency	A special game currency with no external value	"100 gems = €6 1 object = 75 gems"	Obscures real value with asymmetrical exchanges
Playing by appointment	Limits when actions can be taken based on time	"Weekend with x3 experience!"	Manipulates playing times, so players are constantly on the lookout
Fear of Missing Out (FOMO)	Fear of missing content of limited duration	Playing an event just to get the exclusive reward	Social pressure to be playing so as not to be left behind
Paywalls	Paying gives access to blocked content	Paying to enter a special play area	Exploits the desire to go faster, and/or to express oneself

Pay to win (<i>Pay2win</i>)	Paying provides a competitive advantage	Buying a powerful item that is not available through free gameplay	Exploits the desire to win
Battle pass	Temporary unlocking system that requires playing	Increases dedication before the end of the season	Pressure to maximize profit in limited time
<i>Game as a service (GaaS)</i>	Conception of the video game as a dynamic and updated service to keep the user's interest	Minecraft celebrates 10 years of v.1.20.	Content novelty extends usage time

Source: Authors' own elaboration based on systematic literature review

3. Results

Next, the theoretical analysis is presented. Based on the explorations of the six researchers within the selected games (listed in Table 2), it also incorporates other relevant cases from the sector, contextualized as references.

3.1. Dark Pattern Usage Analysis

This study analyzes 12 games, structured according to the 8 patterns in Table 1. The resulting analysis aims to illustrate various dark patterns through vignettes (Barter and Renold, 1999), offering examples and historical context. It also highlights the differences between video games and other media, and underlines the possible risks associated with excessive or problematic use.

Table 2. List of selected video games

Name of Video Game	Mentions in survey	Mentions under review
Fortnite	157	0
FIFA (EAFC 25 Ultimate Team)	87	6
Brawl Stars	74	1
BO6 (Call of Duty: Black Ops 6)	70	1
Clash Royale	60	2
League of Legends	48	3
Roblox	45	0
Rocket League	31	2
Candy Crush Saga	29	1
Pokemon Go	27	2
CS:GO 2 (Counter Strike)	22	5
Clash of Clans	24	1

Source: Authors' own elaboration

3.1.1. Loot boxes

Among the games analyzed, loot boxes are identified as one of the most central and structurally integrated dark patterns. For example, in games like *Counter-Strike 2* (Valve, 2023) and *Team Fortress 2* (Valve, 2007), loot boxes and their keys serve as a standard exchange currency. The speculative trading of these objects introduces complex dynamics within the games, leading to their regulation in some countries. Consequently, based on these regulations, *Overwatch 2* (Blizzard Entertainment, 2023) had to eliminate its paid loot boxes, offering them only as a reward for playing (Sinclair, 2020). This had a domino effect, as some companies, complying with EU regulations, have removed paid loot boxes, but not free ones (Leahy, 2022: *Regulatory Action on Loot Boxes—Some Examples* section).

However, some companies, such as *Electronic Arts* (EA) prefer to pay fines and engage in legal proceedings in various countries (Xiao, 2024: 459) or actively work to preserve loot boxes, as reported by *The Lancet* (Wardle, 2024: 961 and 964), rather than relinquish the benefits generated by this dark pattern (van de Pol and Sanders, 2022). Countries like the UK illustrate the difficulty of regulatory enforcement (Xiao, 2023: 13), where the removal of loot boxes has often been limited to terminological or visual changes, with the practice continuing nonetheless (Xiao and Lund, 2025: 10 and 17)¹.

Other companies, such as Valve, are looking for a middle ground, keeping their loot boxes but eliminating the random factor to comply with new EU legislation. In 2025, Valve introduced the “*Genesis Uplink Terminal*” for *Counter Strike: Global Offensive 2* (CS:GO 2) which offered premium users one free box per week and gave them three days to purchase a specific skin², thus eliminating the need to pay before receiving content “with certainty”, as stipulated by law. Users can now renew the skin (thereby replacing the previous one) and obtain random skins up to three times a week, turning this process into a roulette store that imitates old-fashioned boxes (Sledge, 2025).

The centrality of loot boxes is visible in the video game *League of Legends* (Riot Games, 2009), where “hextech chests” offer random rewards. However, to comply with regulatory standards, these rewards do not materialize directly as objects, but as shards that require additional resources, game time,

¹ Further legal litigation can be found on the *Deceptive Patterns* website (<https://www.deceptive.design/cases>).

² Virtual vanity item that allows you to customize the appearance of other game elements (such as the character himself, weapons, vehicles, etc.)

and/or subsequent payments to be converted into permanent content. This mediation dilutes the perception of cost and prolongs the spending cycle. With a 3.6% chance of obtaining 10 “mythical essences” in *League of Legends* and given that “mythical aspects” cost between 100 and 200 shards, players may need to open more than 250 boxes to obtain one of these aspects, often accumulating duplicate rewards (Nong, 2025: 6).

An analogous design is observed in *Rocket League* (Psyonix, 2015); after replacing the boxes with the *Blueprints system*³, the player randomly reveals an object and must pay to unlock it. This transfers the uncertainty (and guilt/responsibility) from “what do I get” to “how much am I willing to pay”.

3.1.2. In-game/digital/virtual currency

Virtual or premium money is a very common dark pattern in video games, especially in free games, since it hides the real cost of the content (e.g. an object does not cost €1; it costs 50 gold bars). These digital currencies usually have distinctive names, such as PokeCoins in *Pokemon GO* (Niantic, 2016), V-Bucks in *Fortnite* (Epic Games, 2017), CoD Points in *Call of Duty: Black Ops 6* (Activision, 2024) or Robux in *Roblox* (Roblox Corporation, 2006). Naming them differentiates them and makes them more recognizable, but the similarities with real money end here.

This in-game money possesses several unique attributes that differentiate it from a state's legal tender, such as lack of interoperability (i.e., it cannot be used outside the game). Thus, if a player accumulates a large amount of game currency, they must spend it within that game, whereas if they earn a currency such as yuan, they can exchange it for euros.

In metaverses like *Roblox*, players can create and publish minigames for free, hoping to profit from their popularity. However, they don't directly receive real money. Instead, they earn Robux, which can only be redeemed for real money under the platform's evolving restrictions. For instance, players must accumulate 30,000 credits (equivalent to \$114), be over 13 years old (many players are teenagers), complete a form, and are limited to one exchange per month (Roblox, 2025). These restrictions compel most creators to spend their Robux within the game itself.

With *Fortnite*, users do not receive payments in the game currency, but in real money; however, certain conditions must again be met to withdraw it. For example, to withdraw \$100 (the minimum amount), creators must have spent

³ A preview of what an item will look like once the player makes it and how much it will cost.

at least \$73 in *V-Bucks* on their account in the previous three months. Additionally, the profit counter resets to \$0 each year if that minimum amount is not reached, effectively meaning that smaller creators receive nothing (Epic Games, 2025). Furthermore, only creators over the age of 18 are eligible, despite most players being minors).

More opaque scenarios exist in games like *CS:GO 2* and *Team Fortress 2* (Valve, 2023; 2007), where keys are used as currency to open boxes. Although these keys are integrated into the Valve *Steam Marketplace* company platform, their associated value is tied to an account and can only be used to purchase more games or DLCs within *Steam*, not withdrawn. This leads some users to take risks with gray markets⁴ such as *CS:GO Empire* (Wang *et al.*, 2025: 2), which facilitate gambling with *Steam* items and money, thus providing young people with an accessible gateway to casino-like environments.

A final feature of premium currencies is their pricing structures. Similar to some currency exchange services, most games offer bundles that provide more favorable exchange rates as the purchase amount of virtual currency increases. These rates are asymmetrical and fixed, meaning custom amounts cannot be chosen. For example, in *Fortnite*: €8.99 buys 1000 V-Bucks, €22.99 buys 2800 V-Bucks and €36.99 buys 5000 V-Bucks. This often results in a remainder of currency in the account (leftover currency). This incentivizes players to make additional purchases to “clean up” this excess and spend recurrently (Luotonen, 2024: 28; Petrovskaya and Zendle, 2022: 1076). Moreover, it is common to regularly introduce new currencies (e.g., seasonal or event-based money) (Steinnes, 2024:357), making it more difficult to track spending.

Table 3. League of Legends Pricing Chart

Currency		Exchange Amount					
Riot Points	575 RP	1380 RP	2800 RP	4500 RP	6500 RP	13500 RP	33500 RP
Euros €	€4.99	€10.99	€21.99	€34.99	€49.99	€99.99	€244.99
Ruble ₺	490₺	1090₺	2175₺	3450₺	4950₺	9900₺	24250₺

Source: League of Legends wiki (n.d.)

⁴ A gray market is an unregulated trading space or platform, but without legal risks for buyers.

Figure 1. Image of Roblox's Royale High minigame, with asymmetrical pricing



Source: Hardwick *et al.* (2025).

3.1.3. Playing by appointment

Gambling by appointment is not a dark pattern *per se*, but a set of techniques that condition the playing time of users, encouraging them to connect systematically to avoid “losing what they have gained”. This practice is visible in competitive titles with rankings and seasons, such as *Rocket League*, *Hearthstone* (Blizzard Entertainment, 2014), *Clash Royale* (Supercell, 2016) or *Rainbow Six Siege* (Ubisoft, 2015). Seasonal rank resets reduce or eliminate players' progress, pushing them to play routinely. In *League of Legends* (Riot Games, 2009), the high ranks (*Master*, *Grandmaster*, and *Challenger*) lose points if at least one game is not played every ten days, normalizing the feeling of temporary obligation to play to avoid losing what has already been gained.

Appointment gaming techniques have also been identified in some mobile video games, such as *Candy Crush* (King, 2012), through variable prizes and “push” notifications, with calls to action such as “Do you have a mysterious gift? Open it!” (Saffar, 2024: 42-43; Knezovic, 2024).

Beyond the daily rewards in *Genshin Impact* (HoYoverse, 2020), the weekly streaks in *Pokemon GO*, the 12 different types of missions in *Fortnite* (daily, weekly, seasonal, event, competitive, group, etc.), or the weekly loot boxes for *Prime* users in *Counter-Strike 2*, game by appointment is also revealed through temporary barriers that indicate when play is permitted (time gating technique). For example, in *Fortnite*, competitive play is usually limited to just 3 hours in the afternoon, from 7:00pm to 10:00pm.

In *EA SPORTS FC 25* (EA, 2025) (formerly FIFA) the *Ultimate Team Champions* competitive mode features 20 games in a limited weekly window (Thursday to Tuesday). For the rest of the week, players can qualify for the “Weekend League” but must wait until the designated dates to play qualifying matches and access higher-level rewards.

Figure 2. *Homescapes Game Push Notification Examples*



Source: Knezovic (2024)

3.1.4. Fear of Missing Out (FOMO)

Related to playing by appointment is FOMO (Fear of Missing Out), which exploits the anxiety of being excluded from rewards, events, or perks that last for a limited time. In competitive games, such as *Clash of Clans* (Supercell, 2012), not being connected means losing resources and rank, since other players can only loot inactive villages, reinforcing the need for continuous vigilance of the game.

Other games manage to generate FOMO not so much through their design, but through their community. In sandbox⁵ or open-world games, it is common to find content creators who reconfigure the rules of the game on servers dedicated to role-play, creating their own fandoms⁶ (Speed *et al.*, 2022: section 2.2, Theory: Parasocial relations). There are many examples, such as the English-speaking role-play servers *No Pixel RP* (Newzoo, 2019) from *GTA V* (Rockstar Games, 2013), *OfflineTV* (Livingston, 2021) on *Rust* (Facepunch Studios, 2018) or the *Minecraft Dream SMP* server (Asarch, 2021).

⁵ This type of video game offers an open world and freedom of action instead of a guided and closed narrative/gameplay.

⁶ Fan communities that are organized on separate servers and that reinterpret, expand and co-create an existing game (rules, narratives, extra content, etc.).

FOMO can also affect casual players, and even non-players, through exclusive time-limited events. *Fortnite* popularized this technique through live events, a novel dynamic for massively multiplayer online gaming. The unique characteristic of events such as the “Destruction of the Purple Cube” in 2018 or the “Big Bang Event” in 2023, which attracted 8 and 10 million simultaneous players respectively, was that they have occurred only once and cannot be re-experienced, thus piquing the curiosity of others (Duarte, 2025).

Other FOMO cases that have historically attracted spikes in users by appealing to nostalgia include *Fortnite OG* (Welsh, 2023) and *League of Legends' URF* (Riot Games, 2017). These events temporarily re-engage former users and reinforce the behavior of active players, capitalizing on the collective affective memory of the early stages of the game.

3.1.5. Paywalls

Paywalls consist of blocking content behind a cost. In video games that use them, paywalls often take the form of single-purchase content or expansions. For example, in massively multiplayer online role-playing games⁷, one of the most problematic genres according to Lemmens (2016), such as *World of Warcraft* (Blizzard Entertainment, 2004) and *Dofus* (Ankama, 2005), players can participate until they reach a blocked area, at which point they must pay to access additional content, such as expansions or downloadable content (DLCs). In free-to-play (F2P) games, these paywalls take many different forms, since, by not generating revenue from an initial game purchase, they are usually linked to in-game monetization.

In free-to-play titles such as *Clash Royale*, paywalls manifest as chests that require variable unlock times (3h, 8h, 12h, 24h, 36h). In base-building games such as *Clash of Clans* or *Farmville* (Supercell, 2009), advanced players usually have to wait more than a day to build or upgrade their buildings and continue progressing.

In these situations, paying allows players to progress faster, produce more (e.g., harvest), and achieve greater effectiveness or a higher, more competitive rank. These advantages are traits generally associated with desire (Kordyaka and Hribersek, 2019: 1506-1507). This monetization model has

⁷ Games in which thousands of players interact in a virtual world, creating characters and developing their own stories in real time.

proven profitable, as it has driven an entire genre of hypercasual games⁸ (genres such as idle games and clickers).

In *Candy Crush Saga*, the fifth mobile game with the most monthly active users (Kemp, 2025: 349), players must combine rows of three or more candies to create “combos” and reach level requirements. If they fail a level, they can try again using another life. Players have a maximum of five lives, with a new one granted for free every 25 minutes. Compared to *Clash of Clans*, this wait time is short, but since most levels are also short (under 2 minutes), all five available lives can be consumed very quickly. This makes real-money offers for infinite lives or extra moves within a more appealing level, presenting a clear way to pay to avoid the 25-minute wait.

3.1.6. Pay to win (Pay2win)

Although *Candy Crush Saga* has payment barriers, it does not have a competitive mode as such, a fact that differentiates the dark pattern of paying to advance from that of paying to win, as evidenced in collectible card games such as *Hearthstone* (Blizzard Entertainment, 2014), *Magic: The Gathering Arena* (Wizards Digital Games Studio, 2019), or *Clash Royale*. The dark pay-to-win pattern, originally termed “monetized rivalries” (Zagal *et al.*, 2013: 5), offers competitive advantages to players who pay, thereby pressuring others to invest money.

In practice, this pattern segregates players into “casual” (non-payers) and “competitive” (regular payers), contributing to the stereotyping of *gamer* culture (Houe, 2020: 3-4). On mobile platforms, players who regularly spend more than €20 (approximately, though the cut-off varies by study)—sometimes referred to as whales (high-spending individuals)—make up a small base. This base, however, enables other players to play for free (Sigmon, 2021: 78-80; 2019: 1), a point often used to minimize the negative impacts of F2P games.

However, since few users can afford such amounts, the reported number of whales is skewed by a few users who publicly interact in forums. Meanwhile, the majority of affected individuals remain invisible and are much more likely to develop problematic behaviors and experience guilt or denial, similar to what is observed among the gambling population (Dreier *et al.*, 2017: 330-331), thereby putting their economic stability at risk (Close *et al.*, 2021: 3).

⁸ Hypercasual video game genres that require minimal, but continuous intervention and report accelerators of progress and frequent rewards (Alharthi *et al.*, 2018).

In *Clash Royale*, players can obtain cards normally, but the pace of play and the rewards obtained generally do not align with the ability to rank up. This effectively means that to reach a competitive level, players must pay. This occurs twice in *Clash Royale*, as competitive players must pay both to acquire cards and to level them up.

When new playable cards or characters are published, they are usually more powerful than the older ones (until redesigned or modified). This phenomenon is known as *Power Creep*, (Mannström, 2022: 2 and 52) and creates a barrier, as only those who pay can access the characters that define new game strategies.

3.1.7. Battle passes

Battle passes are a special type of pay package that explicitly requires players to play for a set amount of time. This technique was popularized in battle royale games⁹ such as *PUBG* (Krafton, 2017), *Apex Legends* (Electronic Arts, 2019), or *Fortnite*. This dark mechanic or pattern allows players to opt for a free pass, offering small, common rewards (unless the maximum level is reached, which regards invested time and encourages compulsive play), or acquire the premium version of the pass to access exclusive items such as skins. However, they must actively play during the season unless they pay to level up (Joseph, 2021: 79).

In *Brawl Stars* (Supercell, 2018), with its update on December 12, 2023 (*Brawl Stars wiki*, n.d.), Supercell removed the option to acquire the “Brawl Pass” using gems earned through gameplay. This imposed an exclusively monetary payment barrier, which was further intensified with the introduction of the “*Brawl Pass Plus*”¹⁰ offering exclusive cosmetics and an instant 30% progress boost in the standard pass. Other metaverse platforms featuring mini-games, such as *Roblox* and *Fortnite*, take a different approach: they do not implement a universal pass system, instead allowing individual mini-games to create their own passes, from which the platform owner takes a commission. In stark contrast, *Minecraft*'s decentralized server system enables small designers to receive profits directly, without intermediaries.

⁹ Multiplayer games in which many players compete in a scenario until only one survivor or team remains.

¹⁰ Any element that modifies the appearance without affecting the gameplay (skins, gestures, animations, icons, etc.).

3.1.8. Game as a Service (GaaS)

The Game as a Service (GaaS) model defines video games as live platforms that receive continuous new content, monetizing them after their initial release, rather than being sold as static, one-time products. For titles launched over five years ago, such as *Fortnite* and *League of Legends* (and others with an offline version, such as *Minecraft*), the continuous introduction of updates has transformed them into success stories. By 2025, these games occupied 60% of total gaming time on PC, PlayStation, and Xbox platforms (Ball, 2025: 106).

The Games as a Service model allows players to track their progress and encourages users to invest more time in the pursuit of new milestones, a practice often referred to as “grinding”. For example, in *Rocket League*, some vanity items, can randomly acquire an additional feature when unlocked that turns them into “certified items”. These items record match-specific statistics (such as goals scored, distance traveled, wins, assists, etc.) while equipped, displaying the total count when viewed from the menu. This feature makes certain cosmetics “improvable”, as the certified item tracker changes its name upon reaching specific milestones (e.g., scoring more than X goals). This contributes to the sunk cost fallacy, fostering user attachment to items used over extended periods.

For example, in *Call of Duty: Black Ops 6*, the progression initially focuses on leveling up to level 55. However, players can choose to sacrifice most earned items to select “prestige”, which grants special weapons and new cosmetics (*Call of Duty staff*, 2024). There are 10 prestiges to master, each with 50 levels. Once these are completed, players then embark on another ascent, this time through the “Prestige Master” ranks up to 1000 levels. This almost infinite routine is sustained by an active community, a hallmark of the Game as a Service model, where reaching these goals serves as a visible demonstration of high mastery to other players.

Collectively, the GaaS model not only redefines the economics of video game development but also reshapes the player experience, transforming the relationship with the consumer product into a continuous, socially mediated interaction.

3.2. Perception of the impact of dark patterns among young people

The analysis of the results focuses on the games selected for the study (see Table 2), prioritizing those with a greater number of significant samples based on their survey appearances. A minimum representativeness value of 5% of the total samples was considered, ensuring at least 30 samples. These games

included: *Fortnite* (N = 157), *FIFA (EAFC 25 Ultimate Team)* (N = 87), *Brawl Stars* (N = 74), *Call of Duty: Black Ops 6* (N = 70), *Clash Royale* (N = 60), and *League of Legends* (N = 48).

Figure 3 shows the box diagrams displaying the final survey values for each type of dark pattern analyzed in this study, on a scale of 1 (lower impact or perceived persuasion) to 5 (higher impact). The final value representing each player's perception of a specific dark pattern was calculated by averaging all linked items (see Section 2).

Figure 4 presents the correlation tables for the different values, calculated using Pearson's coefficient (ρ) based on the answers from players of each indicated game. Its purpose is to evaluate the potential links or interactions between different dark patterns and how these may vary based on player type. Presented as a heat map, a clearer box indicates a stronger correlation, with cases of strong correlation ($\rho \geq 0.7$) highlighted in black.

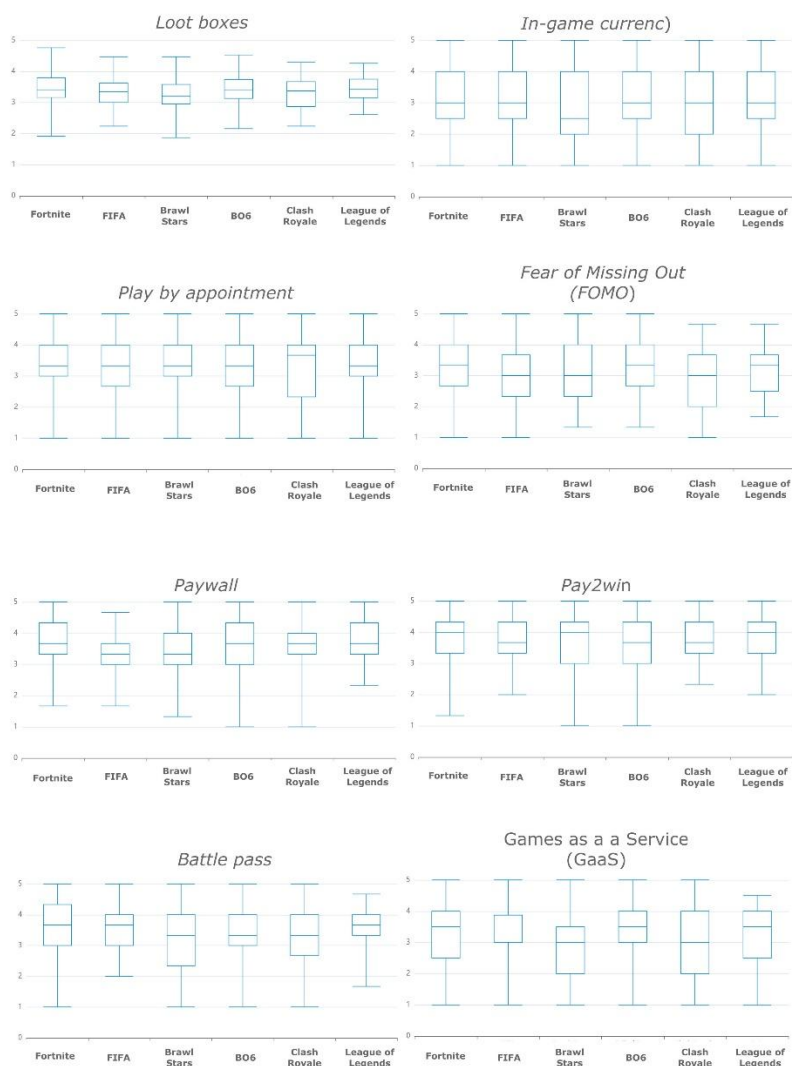
Notably, in both figures, due to the survey approach, these values do not reflect subjects' perception of dark patterns within a specific game, but rather their general predisposition to such patterns in video games. This aspect is particularly important when interpreting Figure 4. The purpose is to analyze whether general perception towards each dark pattern changes based on the games typically played.

From the data represented in Figure 3, it is observed that the ratings are similar in the eight categories of dark patterns, with most of the ratings falling above the intermediate value. The only instance where values are lower is among *Brawl Stars* players concerning the use of money or virtual currency. The pay-to-win pattern seems to be the most impactful, with medians close to 4 out of 5 for players of games like *Fortnite* or *League of Legends*. For *Fortnite* players, the perception of pay-to-win is significant, even though cosmetic elements in the game do not offer any competitive advantage. Another notable case involves loot boxes, as it is the only dark pattern where the lower range of distributions does not reach 1 for any game, exhibiting highly compact distributions and box diagrams appear distinctly different from the others.

From the data extracted from Figure 4, only strictly significant cases have been highlighted, though several cases with similarly high values ($\rho \geq 0.65$) are also detectable. Perhaps the most prominent aspect, somewhat linked to Figure 3, is the role of loot boxes in their interaction with the perception of other dark patterns. This suggests that loot boxes are a mechanic with special characteristics, a finding consistent with previous research indicating their role as a mediating factor in relation to other dark patterns or problem-

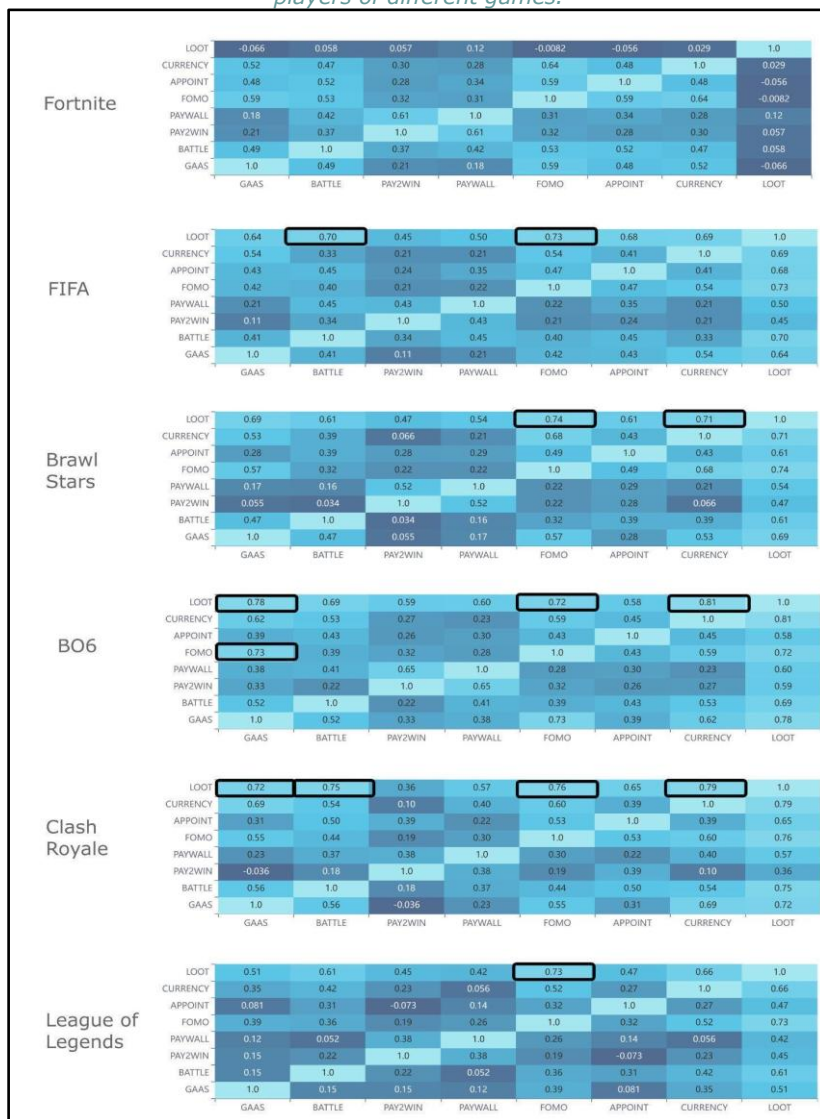
atic behaviors, and thus warranting greater scrutiny (Brooks and Clark, 2023; González-Cabrera *et al.*, 2024).

Figure 3. Boxplots of players' general perceptions by dark pattern category. (Likert scale 1-5; 1 = lower impact, 5 = greater impact)



Source: authors' own elaboration.

Figure 4. Correlations between impact perceptions by dark pattern category according to players of different games.



Source: authors' own elaboration

Finally, a remarkable aspect is that in the specific case of *Fortnite*, certain patterns are reversed, such as the occurrence of correlations associated

with loot boxes, which strongly contrasts with the findings for other games. This aspect merits a more detailed investigation.

4. Discussion

The results of this study visualize and highlight the frequent, premeditated presence and sophisticated nature of dark patterns in the most popular video games among Spanish youth. Twelve titles have been analyzed in depth, mapping and describing their dark patterns, and in several cases, offering a longitudinal view of their evolution and integration. This analysis reveals, as a first conclusion, that these mechanisms do not operate in isolation, but rather form integrated monetization ecosystems are mutually reinforcing. The objective of this integration is evident after the analysis: its intent is to maximize users' playing time and spending. This is achieved through the systematic exploitation of cognitive biases, behavioral patterns, and reward systems.

The prevalence of this monetization model, which has evolved from the traditional single-purchase model to the game-as-a-service (GaaS) paradigm, transforms the relationship between designer and player, especially in free-to-play (F2P) mobile games. The video games analyzed, popular among young Spaniards, are no longer conceived as finite experiences or complete products. Of particular concern is the standardization of gambling mechanics such as loot boxes, which persist in game design despite attempts at regulation, as demonstrated by the case of *FIFA*.

The complexity of dark patterns inherent in microtransactions based on virtual currencies, analogous to real-world monetary systems, is highlighted as especially dangerous for minors (in metaverses such as Roblox and Fortnite), who cannot yet accurately compare or understand the real cost of money.

Concerns also exist regarding temporary dark patterns, appointment-based games, FOMO mechanics, or seasonal systems (e.g., battle passes). These practices demonstrate how game design structures and capitalizes on users' playing time, thereby establishing quasi-labor obligations disguised as leisure. The pressure felt by players, especially younger or highly engaged ones, to avoid falling behind often leads to compulsive behaviors that can negatively affect school performance, social relationships, or mental health.

These patterns are interconnected and correlate across different categories, forming networks that hinder critical and autonomous decision-making. All games analyzed incorporate several of these dark patterns, a fact that leads

to significant exposure of the young population to these types of dynamics, the consequences of which are only now coming to light.

The survey results empirically reinforce the theoretical analysis, by showing that players perceive an impact from various dark patterns. Furthermore, the detected correlation between patterns suggests that users do not experience these mechanics in isolation, but rather as interrelated systems. This concurs with the concept of monetization ecosystems identified in the qualitative analysis.

5. Conclusion

The challenge of studying these dark practices transcends video games and extends to other forms of entertainment, such as social media and e-commerce. This demonstrates how the most popular video games among Spanish youth have become a laboratory for behavioral manipulation.

Moreover, survey data provides quantitative evidence that underscores the relevance and scope of these dynamics. These practices are not only widespread, but they also form structures recognizable by users themselves. Thus, the issue extends beyond opaque design mechanisms to include dynamics that are perceived and potentially normalized by a segment of the youth population.

These observations underscore the urgent need for regulatory frameworks and calls for self-regulation that comprehensively address monetization systems, without resorting to behavioral manipulation or the exploitation of cognitive biases. This regulation becomes even more critical, particularly concerning minors and young people.

Another imperative emerging from this analysis is the proposal of longitudinal studies to evaluate the long-term impact of these practices, alongside the design of training initiatives and educational interventions aimed at increasing critical digital literacy.

Ethics and Transparency

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Conflict of Interest

The authors declare no financial interests or personal relationships that could have influenced the work presented in this document.



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Author Contributions

Contribution	Author 1	Author 2	Author 3	Author 4
Conceptualization	X			X
Data curation	X	X		X
Formal Analysis	X	X	X	X
Funding acquisition	X			
Investigation	X	X	X	X
Methodology	X	X	X	X
Project administration	X			X
Resources				X
Software				X
Supervision	X		X	
Validation	X	X	X	X
Visualization	X			X
Writing – original draft	X	X	X	X
Writing – review & editing	X	X	X	X

Data Availability Statement

Data from the cross-sectional survey conducted on 1,000 young people aged 16–25 in Spain (June 2025) which includes gaming practices, exposure to gamblified mechanics, spending, and perceptions of dark patterns, are available at: *Gamblification, Youth and Digital Games: A Dataset on Gaming Practices and Emotional Impacts Among Spanish Young People in Spain* (<https://doi.org/10.6084/m9.figshare.30467558.v3>).

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