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Reigniting the Flame: Sustaining Usage Through Intermittent Releases of In-game Content

Completed Research Paper

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Abstract

Downloadable contents (DLCs) are additional in-game contents that developers release periodically to sustain the interest of users. In this paper, we study the effect of these DLC releases on the usage of a game by analysing actual usage data from 241 DLCs released over a period of 12 years. We use a quasi-experimental analysis to determine the effect on usage, and also investigate the effect of different DLCs categories on usage. We also study the effect of the different categories of game developers, indie and AAA, on the relationship between DLC release and usage. Results indicate that different categories of DLCs have distinct effects on usage. We also find that the release of DLCs of indie games have a greater impact on usage as compared to AAA games. We compare and contrast our results with the extant literature and provide insightful guidelines to game developers on managing DLC releases.

Keywords: video gaming, gaming platforms, downloadable contents (DLCs), in-game content, indie developers

Introduction

Despite the heightened interest in video games post COVID-19 pandemic, gaming companies still face the challenge of maintaining sustained interest from their consumers (Wang et al., 2023). One such example is the video game Evolve which despite a promising start failed to retain its success (Parijat, 2022). This problem is not specific to the gaming domain; indeed, there are many instances of popular software products unable to engage their customers for an extended period, and finally fading out. Some notable examples are Myspace, Orkut, and Google+ (Lee, 2011; Venkat, 2014). One of the most important mechanisms for sustaining interest in a game is through the intermittent release of additional content and features, called downloadable content (DLC) (Montelli, 2021). Such content is also well-accepted within the user community (Clement 2019). EA Games, a leading game publisher, earned approximately $4 billion from sales of DLC in 2022. In a 2023 survey of game developers, 25% of the developers incorporated paid DLCs and/ or updates, and 23% utilised paid in-game items in their business model (Clement, 2023). One of the successful strategies adopted by Fortnite, a popular free-to-play game, to sustain user interest is the periodic release of additional content (Wilkins, 2023).

However, the release of DLCs may sometimes even lead to negative reactions among gamers (Levy, 2015). Two of the most prominent game publishers, EA Games and Activision had to take immediate corrective action for the backlash against their DLC releases. EA Games had to temporarily withdraw its loot box DLC (Montiel et al., 2022) for the game *Star Wars: Battlefront II* when fans reacted negatively (Gilbert, 2018; G. Park, 2017). Similarly, Activision had to release an update to remove the undue advantage that their DLC provided to the paying players (Fischer, 2021; Yin-Poole, 2021).

The release of DLC has been a controversial topic both within and outside the gaming community. DLCs help players by extending and providing more variety to the gameplay, as well as offering the community additional options for support the developers (Amanda, 2023). Some within the gaming community feel that the developers engage in unfair practices of releasing incomplete game in the hopes of monetising via DLCs that should have been part of the base game (Amanda, 2023; Levy, 2015). It has also been observed that online gaming addiction may lead to increased purchase intention of in-game items (Balakrishnan & Griffiths, 2018). This may pose an ethical dilemma as developers have to choose between profitability and social responsibility (Balakrishnan & Griffiths, 2018). The possibility that DLCs may lead to online gambling addiction has been noted in the literature (Brady & Prentice, 2021; Spicer et al., 2022). Governments and regulators across the world have also considered the release of DLCs that promote such behaviour as being problematic and have established regulations intending to curb it (CNBCTV18, 2021; Serin, 2023; The Indian Express, 2021).

Although scholars have studied the impact of in-game content on purchase intention and user intention (Evers et al., 2015; Hamari et al., 2017; Palmeira, 2021; B. W. Park & Lee, 2011; Wang et al., 2023), extant literature is yet to investigate the impact of intermittent in-game content (DLCs) releases on the actual usage. This leads us to our first question:

RQ1: *Does the release of a DLC lead to an increase in game usage?*

Consumers are not always homogenous in their requirements and may have different expectations of a product. Padmanabhan et al., (1997) observed that in the presence of such heterogeneity, the subsequent upgrades to the products should focus more on dimensions of usability. Drawing from the necessity of catering to the changing tastes of consumers to reduce the effect of product obsolescence the firms should focus on upgrades that provide increased usability for the consumers (Le Mens et al., 2015). Such changes could be in terms of improving the usability of the existing features, or in terms of increasing the features available for the consumer to use. Video games bring these changes by providing different types of upgrades in the form of DLCs that can range from pure cosmetic changes to access to newer features and content (Montelli, 2021).

The DLCs are primarily of 4 types: (a) *cosmetic*- items that only improve the aesthetics of the game for the paying player but do not provide any competitive edge over non-paying players, (b) *boosters*- which may skew the balance towards paying players, or allow faster progress in-game that may otherwise be achieved by non-paying players over time, (c) *expansion packs*- these allow for access to additional content that is not a part of the base game, such as different modes of gameplay, or additional character variety, and (d) digital collectibles- these are collectibles for connoisseurs of the game with no effect whatsoever within the game. We explain the four DLC categories in Table 1.

Cosmetic DLCs have been studied in literature and have also been referred to as aesthetic or ornamental (Cai et al., 2022; Palmeira, 2021; Wang et al., 2023) items. We combine the time savers (Cai et al. 2022) and items that provide functional benefits (Wang et al., 2023) into a single category and name it as *boosters*. Based on our categorisation, *expansion packs* are DLCs that unlock newer content (Cai et al., 2022; Hamari et al., 2017), as well as provide character variety (Wang et al., 2023). Some games provide the players an option to purchase the original soundtracks (OSTs) used in the game and/or other artworks. Steam (Rietveld & Ploog, 2022), a leading game distribution platform categorises DLCs that provide access to OSTs as "music". But they do not categorise the other artworks into any such separate category. We combine both types of art into a single DLC category that we refer to as *digital collectibles*.

DLC Category	**Explanation**
Cosmetic	Ornamental DLCs that have no in-game advantage, but are purely aesthetic in nature
Booster	DLCs that provide an in-game advantage or allow faster progress
Expansion packs	DLCs that unlock newer content or allow more variety in characters
Digital collectibles	Music and/or artwork, that have no in-game usage, but are of value to collectors and connoisseurs

Table 1: DLC Categories

Boosters help in unobstructed play and being more competitive, while *expansion packs* help in unlocking content, and in some cases may enable social interaction as well. *Boosters* provide "real advantage" to the players who purchase them and have thus been referred to as providing *functional benefits* in literature (Palmeira, 2021; Shi et al., 2015). *Cosmetic* benefits are linked to personalisation which represents the self-presentation aspect of social interaction (Hamari et al., 2017). *Digital collectibles* do not have any impact on the gameplay but can be purchased as a means of supporting the developers of free-to-play (F2P) games (Hamari et al., 2017). Palmeira (2021) looked at the intention of consumers to play, as well as their purchase intention, in a competitive multiplayer setting. In both cases, the results were similar, with a negative effect associated with functional benefits in a game. In addition, it was observed that spending more time in a game strengthened this effect and the players who had purchased in-game items were more likely to play the game(Palmeira, 2021).

Wang et al., (2023) discuss the effects of product differentiation, consumer values, and fairness on the purchase intentions of consumers of in-game content in the context of MOBA (Multiplayer Online Battle Arena) games. The authors find the presence of dual and opposing antecedents to the purchase intention of premium features of a free application. The purchase intention for in-game items was mediated via the integrated individual values (IIVs), which comprised of monetary, social, and enjoyment values, and perception of fairness of the players as the two paths. Wang et al., (2023) observed that while functional benefits of character competency and character variety led to an over-all increase in the integrated individual values for the players, they had a negative effect on the perception of fairness. This heterogeneity in the effects may be even more pronounced when we consider the impact of the different types of DLCs on each of the individual values of the IIVs and the perceptions of fairness of the players.

Studies have observed contradictory effects of the categories of DLCs on a player's intention to purchase. Evers et al., (2015) observed that though some players have a negative evaluation of functional benefits offered in a game, they still purchase such benefits to either catch up with the competition or try to fit in the group. Palmeira (2021) also observed that some players might have a negative evaluation of functional benefits but still purchase such items. The presence of the dual path mediation sheds some more light on this complex phenomenon (Wang et al., 2023). The effect of the release of a DLC on an individual user's intention to purchase would depend on which of these paths is more important. This leads us to our next question:

RQ2: *What is the influence of different DLC types on game usage?*

Based on employee size and available capital, game developers may be categorised into two primary categories - Indie and AAA developers (B. Lowry, 2017; Whitson et al., 2021). Indie, or independent, developers tend to have a small team size and limited capital, and such games are generally shorter in size and content. AAA games, on the other hand, are developed by a much larger team of developers with a substantial budget and have more content and greater detail (B. Lowry, 2017). While there has been debate on what constitutes an indie developer (Garda & Grabarczyk, 2016; Martin & Deuze, 2009), for the purpose of our study we consider a game as indie, if it has the "indie" tag in its genre list in Steam platform (Lin et al., 2018).

Indie developers have a limited budget and workforce (Garda & Grabarczyk, 2016; B. Lowry, 2017), and the content they create generally tend to be more creative and experiential (Pérez Latorre, 2016). These games tend to focus on unpopular or neglected ideas (Garda & Grabarczyk, 2016; Martin & Deuze, 2009). For example, Zeiler & Mukherjee (2022) found that indie game developers are increasingly giving more importance to cultural aspects of different geographies. The creativity and uniqueness of the games developed by indie developers despite limited access to capital and resources make their continued presence and welfare a concern for the gaming community as a whole (Lin et al., 2018). Indie games allow their audience to engage with specific cultural identities in addition to entertainment (Martin & Deuze, 2009),. But AAA games are identified with the ethos of capitalism: "pursuit of economic benefits over artistic or cultural purposes" (Lipkin, 2013). As such, the games developed by Indie and AAA game developers have inherent differences, and the expectations of the users from the games would be expected to be different as well. Expectedly, gamers have been found to be empathetic to indie developers (Batson et al., 2015).

Indie game developers value sustained collective engagement in the process of creating games much more than achieving growth or making profits (Whitson et al., 2021). Lack of access to resources entails that the developers have to take on multiple roles, including interactions with the entire indie ecosystem. In the

context of indie games, for gamers, the games as an artefact may be of secondary importance compared to the access to the creators' "communities of taste and identification" (Whitson et al., 2021). This serves as evidence of the importance of creativity and diversity that indie developers bring to the gaming community. While profit maximisation or gaining popularity might not be the only objective of indie developers, it is nonetheless important that the gaming community purchase their games and provide funds for their sustenance. The relationship between the indie developers and the gaming community is thus of inter-dependence, which forms a core facet of social exchanges (Molm, 1994).

In such reciprocal social exchanges, there need not be explicit bargaining (Molm, 2001), but rather the behaviour of one party is contingent upon the other party's actions, encouraging better cooperation among both parties. It is a reinforcing loop where the action of one group is reciprocated by a positive reaction by the alternate party, leading to continuous exchanges. This is evident from the fact that more successful indie developers tend to publish more games (Kontus, 2022).

Brands act as signals of quality, and in the absence of any other source of information, they are a credible source of trustworthiness(Erdem & Swait, 2004). In a market that is marked with a large number of providers, a well-known publisher (AAA) can signal a good quality game. Therefore, some gamers would be more keen to spend resources on games that are published by AAA publishers. As we consider the influence of brands along with the importance of indie developers to the gaming community it leads us to our third research question:

RQ3: How does the game developer type influence the impact of DLC release on the usage?

We conducted a quasi-experimental study to examine the effect of the release of a DLC on usage. Since we analyse actual data of the gamers, a quasi-experimental design is an appropriate methodology for this analysis (Meyer, 1995). In particular, we study whether the release of a DLC leads to an increase in the daily active users (DAU). We collected the data on the top played games and the DLCs from the Steam platform. From a 3rd party website, SteamDB (Lin et al., 2018), we collected the data on DAU for each of the games. Our final data consisted of 241 DLC releases for 187 games. DAU count for each of the DLCs was collected from 30 days before to 30 days after the release of the DLC leading to a total of more than 30,000 individual data points. We determine the direct impact of the release of the different types of DLCs on game usage and also study the moderating effect of the developer type. We present our research models in Figure 1.

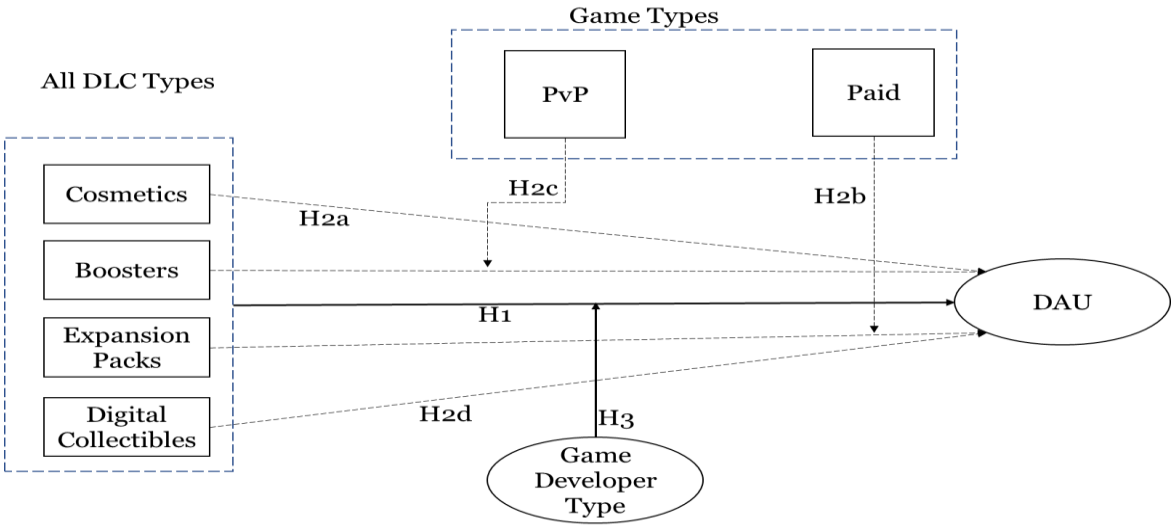

Figure 1. Proposed Research Model

In the extant literature, most studies have been conducted using primary data, such as experiments (Wang et al., 2023) and surveys (Palmeira, 2021; B. W. Park & Lee, 2011). While these studies have been able to elicit information on how users perceive the game, their results are mostly specific to free-to-play games and games that are mostly competitive in nature, i.e., games where players compete against each other. Most studies also judge the perception of the respondents regarding other players who have bought the benefits or their intentions of recommending the game to others. In the context of gaming, Palmeira (2021) observed that in accordance with Shaddy and Shah (2018) time as a resource is a better indication of

commitment than money. As such, it is necessary to look at usage data when we intend to find the effect that the release of a DLC has on the game. We contribute to the extant literature on gaming by investigating how the release of a DLC affects the number of active players using actual data.

Cai et al., (2022) discuss two types of abandonment: temporary and permanent. In this paper, we are more concerned with temporary abandonment. Such consumers leave when their sense of flow is disturbed, or they feel boredom from repetitive gameplay (Cai et al., 2022; Hamari et al., 2017), and it becomes necessary to rekindle their interest in the game. However, determining the success of a DLC in reviving interest in a game is a difficult problem. Extant literature has mostly studied the purchase intention of players, however, as Palmeira (2021) observes, a consumer may have a negative impression towards an in-game item, but would still purchase it to remain competitive. As a result, a consumer who has invested time and resources in a game may report no intention to purchase but may still buy the DLC while playing. The opposing dual-path mediation model of Wang et al., (2023) also provides supporting evidence. A DLC may lead to an increase in purchases, but at the same time may lead to a reduction in the daily active users (DAU). Indeed, for *Star Wars: Battlefront II*, a paid DLC that provided significant advantages to the paying users led to much lower revenues than expected. Therefore, it becomes important to look at the game usage data when such in-game items are released.

Our study is not confined only to the context of free-to-play games, or games having only competitive gameplay. We study a broad spectrum of games ranging from casual free games to paid multiplayer competitive games. We find that the release of DLCs has a positive impact on consumers' usage. We also observe that this impact holds for all the categories of DLC, except *cosmetic* DLCs. This is an interesting result as extant research has shown that *cosmetic* DLC leads to positive purchase intention (Wang et al., 2023). We also find that the release of *boosters* has a positive impact on the DAU. This finding also sheds new light on the impact of DLC as extant research suggests that *boosters* have a negative effect on purchase intention (Evers et al., 2015). One other interesting finding is the positive impact of *expansion packs* of paid games on DAU. This is also contradictory to the conventional ideas of the gaming industry which is apprehensive of negative reactions to *expansion packs* for paid games. Practicing managers of gaming companies can draw from our findings to focus on the relevant DLC categories which can have a positive influence on their customer base.

To the best of our knowledge, there is limited research that looks at the consumers' perceptions of indie games. In this work, we study how the developer type affects the way consumers respond to the release of DLCs. We compare and contrast the results we obtain for indie games with those of AAA games. We find that the release of a DLC has a greater impact on indie games as compared to AAA games. As indie developers tend to create more experiential games (Pérez Latorre, 2016), consumers may adopt a more lenient attitude towards them, suggesting an interdependent relationship between the gaming community and the indie developers. As the developers provide the community with innovative games (Garda & Grabarczyk, 2016), the community reciprocates by adopting their games. Business managers in charge of marketing and distribution of games in large game publishing houses may adopt community-building practices from indie games to leverage their relationship with the gaming community.

The paper is organized as follows. In the next section, we discuss the extant literature and present our hypotheses. In Data and Methodology section, we provide a description of the data and discuss the methodology used in the study. Next, we present our results from the analyses in the Results section and conclude the paper in the Concluding Discussions section.

Terms	**Full forms**	**Meaning**
DLC	Downloadable Content	Add-ons to a game that give it extra features that weren't included with the game's initial release (Montelli 2021)
F2P	Free to Play	Games that are available to be played for free. May have additional features that need to be purchased
DAU	Daily Active Users	Total number of people who engage with a game on a given day
PvP	Player vs. Player	Games where players have conflicting interests and compete against each other

Table 2: Glossary of Commonly Used Acronyms

Related Literature and Hypothesis Development

The extant literature on games have investigated the motivations for purchase of in-game items or DLCs and have found distinct factors that influence such decisions. The theory of consumption values (Sheth et al., 1991) was modified to the context of games (B. W. Park & Lee, 2011). The authors (B. W. Park & Lee, 2011) also introduced the construct integrated individual values (IIVs) to explain how the users value in-game items. The modified theory of consumption values has been used in extant literature to drive insights into consumers' purchase decisions (Hamari et al., 2017; Teng, 2018; Wang et al., 2023). Studies have looked at how the individual values can be further classified into utilitarian and hedonistic values (P. Lowry et al., 2013). In addition, there have been studies on how the values derived from consumption can be divided into individual and community values (Figueiredo & Scaraboto, 2016). In literature, the IIVs have been categorised as being individual values, while the fairness is categorised as a community value (Wang et al., 2023). An individual's purchase decision depends on how much importance they put into the IIVs and the community value of fairness. Each of the DLCs we have discussed in the previous section are perceived differently by the consumers based on these values.

The DLCs which skew the games in favour of those who buy *boosters* would tend to have a negative impact on the opinions of players on the main game (Evers et al., 2015). The adverse effect that "loot boxes", a form of purchasable DLCs, in *Star Wars: Battlefront II* had on the share prices of the parent company (Gilbert, 2018) is a case in point. Extant research has (Evers et al., 2015) observed that the purchase of functional benefits in a game lead to a lower social status within the game, a result which has been corroborated by other studies (Palmeira, 2021; Wang et al., 2023). In the context of the current paper, the DLCs that provide functional benefits have been categorised under the booster type. *Boosters* provide added benefits to the users who purchase it. This would lead to a negative perception of fairness for the other users of the game (Palmeira, 2021; Wang et al., 2023), and have a positive impact on the IIVs (particularly the enjoyment and monetary values) of the users who purchased them (Wang et al., 2023). It has also been observed that boosters help in conforming to the group or remain competitive (Evers et al., 2015).

Expansion packs add more canonical content to the games and as such can be considered as additions to the existing game. Consumers tend to pursue completeness (Barasz et al., 2017) which leads to increased purchase intention. Unlocking content is one of the antecedents to DLC purchase (Hamari et al., 2017). It is difficult to predict the effect the release of *expansion packs* would have on the users' usage intentions as such DLCs are heterogenous in how they affect the gameplay. Expansion packs that do not provide in-game advantage to those who purchase it should have a positive impact on the usage intentions as the negative mediation via the community value of fairness would be minimised. But instances from the real world have shown that certain expansion type of in-game content leads to negative effect on users' intentions to be associated with the game. This is applicable both, when the community value of fairness, in terms of providing added advantage to those who purchase such DLCs, is compromised (G. Park, 2017) as well as when it is not (Levy, 2015). In the presence of such contradictory effects, it would be interesting to observe the effects of *expansion packs* in influencing the usage of games.

Cosmetic DLCs do not provide any in-game advantage to the users who purchase it and have insignificant effect on the community value of fairness (Wang et al., 2023) social, and enjoyment values. Purchase of such DLCs are associated with need for personalisation, conforming with the peer group(s), or giving back to the developers (Marder et al., 2019). Users who have purchased cosmetic benefits would be more likely to play the games frequently in the future as they have made monetary investment in the game.

To the best of our knowledge there has been very limited research on the effect that digital collectibles have on the purchase or usage intentions of users of a game. But, considering that such DLCs have no effect within the game, and are usable outside of the game, we would expect there to be minimal effect of the release of such DLCs on the usage intention of the users of the game. Purchase of such DLCs can be seen as a way that the users can give back to the developers (Hamari et al., 2017) and express their emotional attachment with their favourite games. The extant literature has found multiple antecedents that affect the purchase behaviour of gamers in the context of DLCs. Studies (Hamari et al., 2017) have explored the reasons behind the purchase of in-game items and found six primary motivations: (a) unobstructed gameplay, (b) social interaction, (c) economical reasoning, (d) indulging children, (e) competition, and (f) unlocking content. DLCs allow game developers to help players achieve these goals. Developers may design the game in a way that adds value to the game by selectively introducing products that enhance the

experience of the players (Hamari et al., 2017). Providing intermittent upgrades would also help relieve the boredom arising from repetitive gameplay and help in achieving a flow state for the players(Cai et al., 2022). This argument in conjunction with the profits that game publishers make with sales of in-game items (Clement, 2022), indicates the positive effects of DLCs, leading us to our first hypothesis:

H1: *The release of a DLC would lead to an increase in the number of players playing the game.*

In one study (Palmeira, 2021), DLCs were categorised into primarily two types based on their features: *functional benefits* which provide real (in-game) advantages such as stronger weapons, and *cosmetic benefits* which do not provide any functional advantage and are purely *cosmetic* in nature. The study establishes that the presence of functional benefits leads to a negative impact on the purchase intentions of consumers, while the attitude towards *cosmetic* benefits is positive. In another study (Wang et al., 2023) the authors looked at MOBA games, where the players have conflicting interests and the effect of different types of benefits provided to premium players on the consumer's purchase intention of premium benefits. The authors also introduced a new category of DLCs, *character variety*, that allows the premium players to have access to a greater variety of character differentiation from the non-paying players. The study (Wang et al., 2023) suggested that *character variety* and functional benefits, *character competency,* have a negative relation with perceptions of game fairness. However, *cosmetic* benefits, denoted as *character appearance*, has no influence on the perception of game fairness. The authors (Wang et al., 2023) also observed that the cosmetic items positively impact the IIVs of social identity, monetary values, and enjoyment values. As the community value of perceived game fairness too had a positive impact on purchase intention, it leads us to our next hypothesis:

H2a: *The release of a DLC involving cosmetic benefits would lead to an increase in the number of players playing the game.*

There has been contention on the rationale behind releasing paid additional content for a game that is not available for free (Levy, 2015). Paid games, in contrast to free games, have an initial fee that needs to be paid before consumers can play them for the first time. As such, the developers can recoup their investments through sales of the base game itself. Thus, they are fundamentally different from freemium games where the consumers may decide not to purchase any items. This makes it necessary for developers of freemium games to provide the consumers explicit incentives to purchase in-game items and consumers would also tend to see such in-game items in a positive light (Hamari et al., 2017). Consumers would have a negative outlook toward games that lock content behind paywalls even after having to purchase the base game (Levy, 2015). Locking content for paid games may make the consumers believe that their monetary value (Wang et al., 2023) is reduced as even after purchasing the base game, they do not get all the content associated with it. Thus, we propose the following hypothesis:

H2b *For paid games, the release of an expansion pack would lead to a decrease in the number of players playing the game.*

Player versus player (PvP) games involve competition among the players, and thus allowing for purchase of *boosters* would lead to a perception of unfairness in the game (Evers et al., 2015; Wang et al., 2023). Following the theory of consumption values (B. W. Park & Lee, 2011), *boosters* would have a positive effect on the IIVs, but we would expect the negative effect on the community value of fairness to be more prominently observed. As such, there should be an over-all negative effect on the players when functional benefits are provided for premium players. Such functional benefits could be in terms of items that give a competitive edge to the players who purchase such benefits (*boosters*). This gives us our next hypothesis:

H2c: *For PvP games, the release of a DLC involving boosters would lead to a decrease in the number of players playing the game.*

Digital collectibles are DLCs that are designed for connoisseurs of the game. A study (Hamari et al., 2017) proposed "giving back to developers of F2P games" as an antecedent to purchase intentions of DLCs. In addition, *digital collectibles* may enhance the feelings of emotional attachment and associate monetary and social value to the game (Wang et al., 2023) post their purchase. But in the context of our study, such content do not have any in-game effect, but rather may be utilised outside of it. As such we expect it to be unlikely that *digital collectibles* have any impact on usage intentions. Thus, we present our next hypothesis:

H2d: *The release of a DLC involving digital collectibles would not have an impact on the number of players.*

There are limited studies in the gaming literature on how the purchase or usage decisions of gamers are influenced by the characteristics of the game developers. Among the six primary reasons for the purchase of DLCs (Hamari et al., 2017) of particular interest is the economical reasoning, which also talks about "giving back to the developers". The study was conducted in a freemium context and doesn't take into consideration specific characteristics of game developers. The brand behind the product plays an important role in the way consumers perceive a product. Particularly in our case, developer type may also have an impact on the effect of DLCs. Adding new features to an existing product would have a greater positive impact in the case of a relatively unknown brand than in the case of a well-known brand (Nowlis & Simonson, 1996). Additionally, there is an interdependent relationship between indie developers and the gaming community.

For indie game developers the end goal is not profit maximisation, but rather the process of creating games (Whitson et al., 2021). The developers lack the resources necessary for creation of the games, while the gaming community wants access to the creators' community (Whitson et al., 2021) that brings the diversity and creativity to the industry. This leads to social exchanges being formed between the gamers and the indie developers (Molm, 1994) where there need not be explicit bargaining (Molm, 2001). Thus, the relationship between the indie developers and the gaming community may be explained with the help of the social exchange theory (Emerson, 1976), where the gamers provide the resources necessary for the indie developers to keep on developing the creative and experimental games that the community wants. Acknowledging the creativity that indie games offer and assuming that the same would be observed in their DLCs, leads us to our third hypothesis:

H3: *The type of game developer will moderate the relationship between DLC release and the number of players playing the game, such that the impact of the release of DLC will be positive and higher for an indie game.*

Data and Methodology

The data on games were downloaded from the gaming platform Steam, which is the current market leader for digitally distributed games. Data from the Steam platform has been widely used in gaming literature (Li & Zhang, 2020; Lin et al., 2019; Rietveld & Ploog, 2022). Steam also provides a game's player base in real-time. We operationalise the number of players playing a game with the DAU, which we obtained from Steam. The historical DAU of the games was collected from a 3rd party website that scrapes data from Steam at regular intervals, SteamDB (Lin et al., 2018) The Steam platform provides details of the game such as a description of the game, categories and genres of the game, developer and publisher information, price of the game, and whether the game is free to play.

The Steam platform also provides the rating of the game as provided in Metacritic (Metacritic n.d.), a review aggregator website. Any game having a rating greater than or equal to 75 Metacritic is categorised as Good, a rating below 50, is categorised as Bad. We also included games without any rating score into the Bad

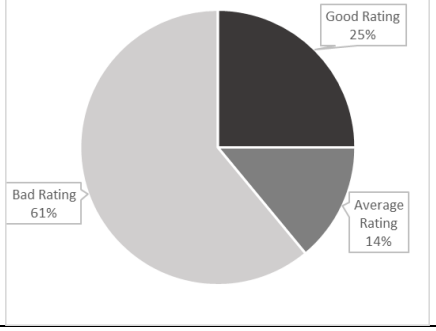

Figure 2: No. of DLCs Based on the Rating of their Base Games.

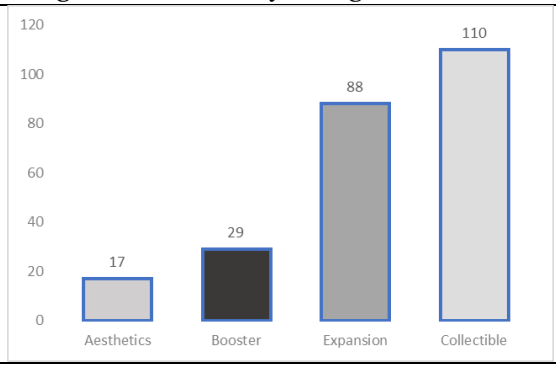

Figure 3: No. of DLCs Based on their Category Types.

category as it typically denotes games with poor quality (Rietveld & Ploog, 2022). The games which have a rating between 75 and 50 are categorized as Average games. These categories are taken from the Metacritic's own categorisation system (Metacritic, n.d.). We adopted the rating criteria of Metacritic for our study. Figure 2 provides the distribution of the game ratings.

Steam categorises the type of DLCs into "music" or "dlc". We manually categorised the DLCs based on their description available on Steam into the four types of DLCs mentioned in the Introduction section. For DLCs that have multiple characteristics and satisfied more than one criterion, we allotted those to multiple classes. Figure 3 shows the distribution of the different categories of DLCs in our data.

In this study, we use the publisher details, the game details, and the list of DLCs for a game that has been released on the Steam platform along with the dates of release on Steam. The top played games list, consisting of 5902 games, was downloaded from the SteamDB website in the first week of December 2022. We observed that the earliest DLC release was observed in the year of 2010 in our data, giving us a total of 12 years of information. For each of these games, the list of all the DLCs released on Steam was collected along with their release dates. The data set was divided into two, consisting of games for which DLCs have been released (our treatment group), and those for which DLCs were not released (our control group). All those games that did not have the DAU information on the day the DLC was released for it, were dropped from our list. There were some games, for which multiple DLCs were released over time. For such games, we checked if there were multiple DLCs released within a month of the release of a previous DLC for the game. Such games were also dropped from our consideration, to avoid the effect of the release of the previous DLC. We took into consideration only those games in the treatment set, that had -30 to +30 days of daily average player count information. Any games in the potential control set, that had missing data on those days were dropped from our analysis.

We did an exact matching of the games remaining in the data set with those of the control set (games for which DLCs were not released), based on the following features - the presence of player versus player (PvP) component, multiplayer mode, whether the game is casual or action game, type of developer, and whether the game is free to play or has to be purchased outright. The presence or absence of these elements would affect the perception of the players, so we ensured that we consider only those games in the control set that would exactly match the ones in the treatment set. We also ensured that the potential control groups thus found for each of the games in the treatment set had an average DAU within 20% of the average DAU of those in the treatment group. Finally, we did a propensity score matching with replacement for each of the games in the treatment group with their potential control groups, based on the daily average player count, Metacritic rating, and the days since the game was released. The last variable measured the number of days that have passed since the release date of the game till the date the daily active player count is taken.

In the end, we are left with 187 unique games in the treatment set and a cumulative of 241 DLCs released for them. Since we are concerned with the effect of DLC release on the user base of a game, we took the standard normal values of the DAU. The standard deviation and mean were taken in the -30 to +30 days range for each of the DLC releases. Next, we took the average of DAU for each of the games before and after each DLC release, getting a total of 964 data points, 482 each for the treatment and control data sets. This makes our unit of analysis at the monthly level, i.e., monthly average of the daily active users. But for the sake of simplicity, we refer to our dependent variable as the DAU. To check whether the DAU were similar for our control and treatment groups prior to the release of the DLCs, we conducted a t-test for the mean differences of the groups and found them to be insignificant (Table 6, provided in the appendix).

On the above data set, we conducted a difference-in-differences (DID) analysis to get the average treatment effect of the DLC release on the average player count. In a DID analysis, the effects of the confounding variables are controlled as the changes in the treatment group are compared with the changes in the control group (Wang et al. 2023). We found the DID analysis method to be suitable for our study as we had the pre-treatment and post-treatment data for our treatment and control groups.

$$Y_{it} = \alpha + \beta X_i + \gamma T_t + \theta P_i + \omega(T_t * P_i) + \varepsilon_i$$

where, i identifies the individual DLC, Y is the outcome variable, X refers to the individual DLC characteristics, P is the time dummy, which takes the value 1 in case it is after the DLC release, 0 otherwise, T is the treatment dummy, which takes the value of 1 if the observation belongs to the treatment group, and 0 otherwise. We are interested in the coefficient of post-treatment, i.e., ω, as it informs whether there is any effect in the treatment group, post the application of the treatment.

We created multiple models to test our hypotheses by segregating the data set. Our first model is the entire set of treatment and control variables. Next, we segregated the data based on the game types and types of DLC released. The below table (Table 3) provides the list of the models we created.

Model	Game type and DLC type in Model		Hypothesis	Results	Number of DLCs
	Game Type	**DLC Type**			
Model 1	All	All	H1, H3	H1 (positive), H3 (positive)	241
Model 2	All	Cosmetics	H2a	Not significant	17
Model 3	Paid	All	H2b	Positive	214
Model 4	Player vs. Player	All	H2c	H2c (not significant)	56
Model 5	All	Digital Collectible	H2d	Positive	110

Table 3: Details of Models Used in the Analysis

Brief explanation of some variables in the model:

- game_is_free: takes a value of 1 if game is free; else 0
- is_bad: takes a value of 1 if game has bad or no rating; else 0
- is_good: takes a value of 1 if game has good rating; else 0
- treatment: takes a value of 1 if element belongs to treatment group; else 0
- dlc_released: takes a value of 1 if element is post-release of DLC; else 0
- post_trt: dlc_released*treatment
- indie_flag: takes a value of 1 if game is indie; else 0
- post_trt_aesthetics: post_trt *(aesthetic type DLC flag); To check the interaction effect of post_trt and aesthetic DLC
- post_trt_booster: post_trt *(booster type DLC flag); To check the interaction effect of post_trt and booster DLC
- post_trt_collectible: post_trt *(collectible type DLC flag); To check the interaction effect of post_trt and collectible DLC
- post_trt_expansion: post_trt *(expansion type DLC flag); To check the interaction effect of post_trt and expansion DLC
- good_post_treat: post_trt *is_good
- indie_postTrt: post_trt indie_flag
- multi_post_treat: post_trt *(1, if multi-player game; else 0)
- bad_post_treat: post_trt *is_bad
- _cons: constant term

Results

Our initial analysis (see Table 4), of results from Model 1 supports the hypothesis that the release of a DLC positively affects the player base of a game (H1). This increase in the user base could be due to newer players joining the game or the resumption of play by former players who might have stopped playing the game due to some reason. Another reason could be the increase in the frequency of play by existing players.

We studied the impact of different categories of DLCs and find that the release of DLCs has a significant impact on usage, except for *cosmetic* DLCs (*H2a*) (Model 2) (Table 5). Extant literature emphasizes the importance of *cosmetic* related in-game purchases in a multi-player PvP setting. Our results show that the presence of *cosmetic* elements need not lead to an increase in DAU. While we have not captured the purchase intention of the existing consumers, our results suggest that the *cosmetic* benefits may not bring in newer consumers or lead to the revival of a declining game.

One interesting finding is the positive impact of *expansion packs* on DAU for paid games (*H2b*) (Model 3). Therefore, our results do not support H2d and are contrary to our expectations. One would expect consumers to be less inclined to pay for each additional feature if they have already purchased the game outright (Levy, 2015). This may be explained by the fact that consumers would tend to complete their collection of the game (Barasz et al., 2017), and that paying customers would "want to get their money's worth" (Rietveld & Ploog, 2022).

	All games (Model 1)	Multi-player games	Non-multi-player games	Indie games	AAA games	Free games	Paid games (Model 3)	PvP games (Model 4)
game_is_free	-0.0257	-0.0200	0.0020	-0.0130	-0.0363	0		-0.0098
is_bad	0.0387	-0.0646	0.0776	-0.0293	0.0776	0	0.0308	-0.1414
is_good	0.0149	-0.0784	0.0462	-0.0718	0.0659	0	0.0127	-0.1511
treatment	-0.3471 ***	-0.465 ***	-0.2959 ***	-0.4966 ***	-0.2447 ***	-0.2572 **	-0.3586 ***	-0.4011 ***
dlc_released	-0.1218 ***	-0.2146 ***	-0.0806	-0.2208 ***	-0.0539	-0.0894	-0.1258 ***	-0.1579 *
post_trt	0.6127 ***	0.5305 **	0.6694 ***	0.6685 ***	0.6306 ***	0.1443	0.6569 ***	-0.145
indie_flag	-0.0495	-0.0052	-0.075 *			-0.0671	-0.0475	-0.0107
post_trt_aesthetics	0.0128	0.1087	-0.085	0.1064	-0.0135	0.3262	-0.0698	0.0572
post_trt_booster	0.1101	0.1623	0.0571	0.2021	0.0512	0.5574 *	0.1179	0.1728
post_trt_collectible	-0.0078	0.1415	-0.0767	0.0992	-0.043	-0.3038	-0.0387	0.1604
post_trt_expansion	0.2490 ***	0.3177 **	0.1759	0.3614 **	0.1789	0.2959	0.1961 **	0.4125 ***
good_post_treat	-0.0156	0.2032	-0.1034	0.2152	-0.1655	0	-0.0116	0.6517
indie_postTrt	0.1523 **	0.0282	0.2258 ***			0.4747 *	0.1354 *	0.0590
multi_post_treat	0.0126			-0.067	0.0987	-0.3961	0.0479	
bad_post_treat	-0.1504	0.0904	-0.259 **	0.0354	-0.2676 **	0	-0.1232	0.5986
_cons	0.0555	0.1789	0.0096	0.1563	-0.0379	0.063	0.0615	0.2209
Prob > F	0	0	0	0	0	0.0117	0	0
R-squared	0.2017	0.3026	0.1721	0.3187	0.1310	0.2019	0.2114	0.2584
Adj R-squared	0.1891	0.2679	0.1543	0.2952	0.1108	0.1196	0.1982	0.2087
Number of obs	964	296	668	392	572	108	856	224

Table 4: Effect of DLC Release on DAU Based on Type of Game

*Note: *p<0.1; **p<0.05; ***p<0.01. See appendix for the details of the variables*

The release of a *booster* also does not have an impact on the usage in the case of PvP games (*H2c*). *Boosters* allow for a player to quickly catch up with their peers, and remain competitive. Time as a resource investment was alluded to by Palmeira (2021), and there might be players who prefer to invest money to remain competitive in lieu of the additional time required to hone their skills. This may be the reason for the prevalence of such items in popular PvP games even though extant research suggests that players generally tend to have a negative sentiment towards them. Consumers would want to maintain their flow in a game and to achieve that, they may have to purchase DLCs that would enable them to bypass repetitive gameplay as well as try to remain competitive (Cai et al., 2022). Firms need to ensure that this flow is not disturbed, failing which there are chances that a player may abandon the game.

	Booster Packs	Expansion Packs	Cosmetics DLCs (Model 2)	Digital Collectibles (Model 5)

game_is_free	-0.0334	0.0033	-0.0686	0.0075
is_bad	0.0666	0.0101	-0.0023	0.0599
is_good	0.0368	0.041	-0.0184	-0.0042
Treatment	-0.44 ***	-0.5290 ***	-0.3229 **	-0.1969 ***
dlc_released	-0.1999 *	-0.1507 **	-0.1255	-0.0367
post_trt	0.9081 ***	1.0286 ***	0.5269	0.4353 ***
indie_flag	-0.0399	-0.0441	-0.023	-0.0254
good_post_treat	0.0892	-0.1835	-0.3346	0.0709
indie_postTrt	0.1416	0.1784 **	0.0947	0.1164
multi_post_treat	0.1061	-0.0077	0.373	0.0776
bad_post_treat	-0.1738	-0.0419	-0.0630	-0.2113
_cons	0.0604	0.0792	0.0984	-0.0094
Prob > F	0.0004	0	0.2786	0.0001
R-squared	0.2662	0.4163	0.1969	0.0863
Adj R-squared	0.1886	0.3974	0.0391	0.0629
Number of obs	116	352	68	440

Table 5: Effect of DLC Release on DAU Based on Type of DLC

*Note: *p<0.1; **p<0.05; ***p<0.01. See appendix for the details of the variables*

Interestingly, we find that the release of *digital collectibles* (Model 5) has a positive impact on DAU (Table 5). We hypothesised that there should not be any effect of *digital collectibles* (*H2d*) as they have no direct impact on the product's performance or features and may even be utilised outside of the product itself. However, we found a positive impact on the DAU post release of *digital collectibles*. Nostalgia could be one explanation for this effect (Holbrook & Schindler, 1994) which inspires users to return to their favourite games.

We study the interaction of game developer type with the release of the DLCs (Model 1). We find that the impact of DLC release is more prominent for indie games than AAA games (H3). In line with our thoughts of the reciprocal interdependence that the gamers' community has with the indie developers, we find that the release of *expansion packs* has a high impact on indie games, while such an interaction is absent in AAA games (H3). Our finding may be explained by considering the social exchanges between the gamer community and the indie game developers who create experimental and culturally unique games. Such an exchange becomes more prominent and stronger when the DLC provides access to additional content that satisfy the gamers' experiential interests and curiosity.

Robustness Checks

As a robustness check, we conducted a random-effects panel regression for our data. For this regression, we considered the last 3 years' data (2020-2022). Compared to our initial dataset, which comprised of DLC releases from the year 2010-2022 the time-period from 2020-2022 has more than half of the DLCs in our dataset. As we considered weekly level data for this analysis, considering the entire dataset for a panel regression may have skewed the results.

Since our observations had multiple instances where a single game had multiple DLCs, we also considered the effects the games may have on our results. For this purpose, we clustered the games based on their genres and categories. Primarily 10 distinct genres and categories were observed in our dataset, of which three were related to the possible type of interaction among the players in the gameplay (massively multiplayer, co-operative game, PvP games), and seven were related to the type of game it was (adventure, strategy, sports (includes racing), simulation, action, role-playing (rpg), and causal games). We conducted a K-means cluster analysis on the games in our data based on the genres and categories of the games and obtained 6 clusters.

All our results from the main analysis were substantiated in the panel regression. We obtained a different result only for H2c which hypothesised that the release of a *booster pack* for a PvP game would lead to a decrease in the number of players. In the panel regression it was observed that for PvP games, the release of *booster packs* had a positive impact on usage. In our DID analysis it was observed to have no significant effect on the DAU. This result from panel regression follows the observations of prior literature that functional benefits may have a positive impact on the users' intentions to purchase and use the games. Being mediated via two distinct pathways, functional benefits would have an inverted U-shaped relationship with purchase behaviour (Wang et al., 2023). A separate study (Evers et al., 2015) had also observed that while users may have a negative impression of functional benefits, in order to remain competitive, they may eventually purchase such benefits. Once the users have invested in such DLCs, they would be more likely to increase their monetary value (B. W. Park & Lee, 2011; Wang et al., 2023) by engaging more with the game.

Concluding Discussions

In this paper, we investigate the impact of in-game content, also termed DLCs, on the usage of games. The extant literature has studied DLCs as primarily two different categories – functional and cosmetic. We extend the literature by studying DLCs at a much granular level and distinguishing between four different types of DLCs. We also add to the literature by studying the actual usage data of games post the release of a DLC in contrast to determining the purchase intentions or usage intentions of users. To the best of our knowledge, this is the first study that investigates the effect of developer type on the impact of DLC release.

As expected, we find that release of DLCs leads to an increase in usage for all games. However, when we study the different categories of DLCs we find interesting insights which challenge our conventional understanding of the gaming industry. For example, our results indicate that *cosmetic* DLCs may not lead to an increase in usage which is contradictory to the findings in the extant literature (Palmeira, 2021). We also find that *boosters* lead to an increase in usage which also contradicts the extant literature. We checked the effect of *booster* specifically for Player vs Player (PvP) games and find no significant effect on usage. The extant literature on *boosters* has looked at PvP games and results based on purchase intention suggest that *boosters* negatively impact usage (Palmeira, 2021). Our results indicate that *expansion packs* have a positive impact on usage which resonates with the findings of Hamari et al., (2017), but contradicts conventional wisdom that *expansion packs* are expected to have a negative effect for paid games (Levy, 2015). We find that *digital collectibles* for all games have a positive impact on DAU. In our study of game developer types, we find that the positive effect of DLCs is higher for indie games as compared to AAA games. This suggests that the gaming community considers indie developers and AAA developers differently and reacts very differently to their DLC releases.

Due to organizational constraints and limited budget, indie games have lesser visibility than AAA games that are backed by large publishers. This disparity has been reduced to a certain extent due to lower publishing and distribution costs owing to digital distribution (Garda & Grabarczyk, 2016; Martin & Deuze, 2009). Nonetheless, we would still expect a lower level of acceptance for indie games. However, our results show that there is an inherent difference between the way the users perceive the release of a DLC for an AAA game versus that of an indie game. Indie games have a different artistic and conceptual style than AAA games (Pérez Latorre, 2016), and their player base perceives them differently. This is reflected in the effect that *expansion packs* have on indie games, as players are more likely to be positive about *expansion packs* in indie games than that of AAA games. At the same time, the users are more likely to be lenient in their criticism, and more accepting of indie games to show their support. This is also consistent with the extant literature (Nowlis & Simonson, 1996) which states that the effect of new features would be more prominent in the case of the products with (arguably) inferior existing features, such as those in indie games.

We make several significant contributions to the extant literature on gaming. Most papers have focused on the purchase intention of consumers, and it has been measured using primary data. In this paper, we look at the actual usage data of 241 DLCs. We also contribute to the literature by distinguishing between indie developers and AAA developers. The extant literature has not looked at how the game developer type influences the response of users to DLCs. Indeed, we find that the dynamics of the industry, in terms of how the gaming community reacts to DLC releases for indie and AAA games are completely different. We also contribute to the literature by highlighting the importance of *digital collectibles* and the possibility of further exploring the role of nostalgia (Holbrook & Schindler, 1994) in the study of *digital collectibles*.

We contribute to practice by demonstrating the importance of releasing intermittent DLCs to sustain the interests of users. Our research provides data-based validation that managers of game publishers can focus more on *expansion packs* as they have a significant positive impact on daily active users. This is a particularly important insight for developers as *expansion packs* are known to act like a buffer between two successive major releases and reduces lay-offs of developers post completion of a game by allowing them to work on interim upgrades (Levy, 2015). Our research work explores the role of developer type (indie or AAA) on usage and professional practitioners, particularly of AAA firms can consider the importance of experimental and innovative DLCs to keep users interested in their games. Finally, we draw attention to the role of nostalgia in rekindling the interests of users through the release of *digital collectibles*. Game developers can use this to remind their past consumers of what made them users of their product and capitalise on it to try and bring them back to playing the game (Sierra & McQuitty, 2007). In addition to providing an additional way of monetising, they also have a positive impact on the usage of the game, and releasing such content at a suitable time might help sustain the players' interest in the game.

We believe the learnings from the current study may be extended to other software applications as well. To provide some examples, cosmetic benefits would be analogous to the different themes that can be customized for the web-browsers, media players, even office productivity suites, such as Microsoft Office, or even for chat and messaging apps like WhatsApp. Boosters are akin to providing an additional advantage, such as faster progress, say ad-free experience while viewing videos as in YouTube, or better quality of products, say Full HD video options as some OTTs and video streaming services offer. Expansion packs allow for greater content and features being accessible for use, such as premium templates in Microsoft Office, or internet protection in addition to the offline protection as provided by some anti-virus software.

Our study has a few limitations which will hopefully provide directions for future research. Although we have collected data from the leading game distribution platform, this research could be enriched by analysing data from other similar platforms. We have not been able to consider the heterogeneity of the users because of the limitation of the data that we have analysed. For example, the age group of the users may provide deeper insights into the dynamics of the gaming market. We believe that slicing the data on age groups may lead to interesting comparisons with the extant literature. Also, the data that we have analysed does not allow us to consider an increase in the number of hours played per day. This may have some importance for certain categories of DLCs, for example, *cosmetic* DLCs, where a player may start playing for a greater number of hours per day after purchasing (or downloading) a *cosmetic* DLC. The increase in the number of hours will not reflect in the DAU data that we have analysed.

There could be interesting extensions to our research. Future work may study the optimal time interval between DLC releases to ensure that the interests of the users are sustained over a period of time. Our study demonstrates that *expansion packs* have the most positive impact on usage for both paid and free games. Game developers may want to provide a few free *expansion packs* to rekindle the interests of the users and keep the rest behind a paywall for earning profits. It would be interesting to investigate the right mix of free and paid content for *expansion packs*. One other interesting study could be to explore the effects of releasing DLCs of related games from the same game publisher on the daily active users. In particular, it could be insightful to verify if the *cosmetic* DLCs of related games have a complementary effect on usage. It would also be of interest to empirically test the generalisability of our findings to other digital artifacts and compare and contrast the results obtained.

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Appendix

T-test results:

Group	**Observations**	**Mean**	**Std. err**	**Std. dev**
0	241	488.2843	95.33205	1479.951
1	241	564.8641	67.1812	1042.933
Combined	482	526.5742	58.27827	1279.47
Difference		-76.57985	116.6255	
t-value	-0.6566	Degrees of freedom	480	
Ha: diff>0	0.7441	Ha: diff<0	0.2559	
Ha: diff!=0	0.5177			
Table 6: t-test for game-player count of matched samples in treatment set and control set				