



Profiling the Potential Risks and Benefits of Emerging “Play to Earn” Games: a Qualitative Analysis of Players’ Experiences with Axie Infinity

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Accepted: 25 July 2022
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Abstract

The invention of blockchain technology, coupled with the growing interest in cryptocurrencies, has given rise to a new form of monetised gaming known as “Play to Earn” (PTE). “Axie Infinity” (AI) is currently the most popular PTE game, occupying a large portion of the online gaming market. In this paper, we profile the risks and benefits of PTE gaming, with a specific focus on AI. Qualitative data in the form of online chat threads was evaluated via a Thematic Analysis (TA) approach. The analysis revealed a number of themes including the dominance of extrinsically motivated gameplay in conjunction with negative appraisals of game quality, the benefits and costs of play, and the potential for PTE scholarship models to be associated with exploitation. The results did, however, indicate awareness of potential consumer risks. The findings have implications for informing consumer education, regulation, as well as areas of focus in future quantitative research.

Keywords Play to Earn · Axie Infinity · Online gaming · Cryptocurrency

“Play to Earn” (PTE) is an emerging branch of online gaming, whereby individuals receive monetary rewards for gameplay (Absolute Reports, 2022). In some earlier games (e.g. *Diablo* series and others), this emerged in the form of in-game currencies, enabling players to accumulate value that could be used to purchase various digital items. This was soon followed by the ability to buy and sell in-game artefacts or player “skins” on third party sites or use them as assets for gambling (Abarbanel et al., 2019). Increasingly, such gaming assets are being deployed using modern blockchain technology (e.g. VGO skins) which has the advantage of providing a more secure and definitive ownership model for gaming participants. Such assets increasingly take the form of non-fungible tokens (NFTs) or in-game cryptocurrencies (Aguila et al., 2022) that can be traded on exchanges in return for fiat currency (e.g. USD and AUD). NFTs are non-interchangeable assets that rely on decentralised blockchain technology to maintain their digital value (Chohan & Paschen, 2021) and can include characters, avatars, entry tickets, tools, or weapons that generate value in the game. The PTE model usually involves

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the purchase of a quantity of in-game currency, some quantity of the Layer 1 blockchain currency (e.g. Solana, Ethereum, or Harmony) for gas/transaction fees, and the purchase of certain “genesis” NFTs to enable full engagement with the game.

The public’s interest in the potential of PTE and blockchain technology most prominently emerged in late 2017, with the short-lived popularity of *Cryptokitties*. This competitive PTE game enabled players to earn in-game currency, breed kitties, and trade them via the Ethereum blockchain (Jiang & Liu, 2021). The overall concept of PTE gaming is an attractive business model from both a consumer and industry perspective. For players, PTE provides earning potential which may be particularly attractive for otherwise unemployed or low-income earning individuals (Nadini et al., 2021) or those that reside in the Philippines and other third-world nations (Francisco et al., 2022). For the industry, money is made through the sale of NFTs and appreciation of the in-game currency, which is usually privately sold (at a very low price) to early investors and the development team prior to the games release. Although there are currently 200 PTE and metaverse games in operation or in the early stages of development, the market is largely dominated by a few top performers. The most popular PTE game within the current market is Axie Infinity (AI), an NFT-based online game residing on the Ethereum blockchain (Aguila et al., 2022).

Similar to *Cryptokitties*, AI involves players purchasing NFT characters called “Axies” and battling them against each other to earn currency, in this case, Smooth Love Potion (SLP). SLP is an in-game currency and the primary source of income for AI players, which can be traded or exchanged for real fiat currency (Aguila et al., 2022). Whilst AI was originally designed by Sky Mavis to be an accessible introduction to NFT based gaming, its popularity has risen exponentially since late 2020 (The Game Statistics Authority, 2022) (see Fig. 1). AI has a market capitalisation (total circulating token supply \times current market price) of \$3.12b USD, which is many times larger than its nearest rival, e.g. *Illuvium* (\$500 m), *Thetan Arena* (\$129 m), *Gods Unchained* (\$29 m), or *Alien Worlds* (\$93 m). Beyond the financial element, AI’s popularity can be attributed to its visually appealing graphics and simple card-game format, attracting a wide audience, irrespective of skill level (De Jesus et al., 2022).

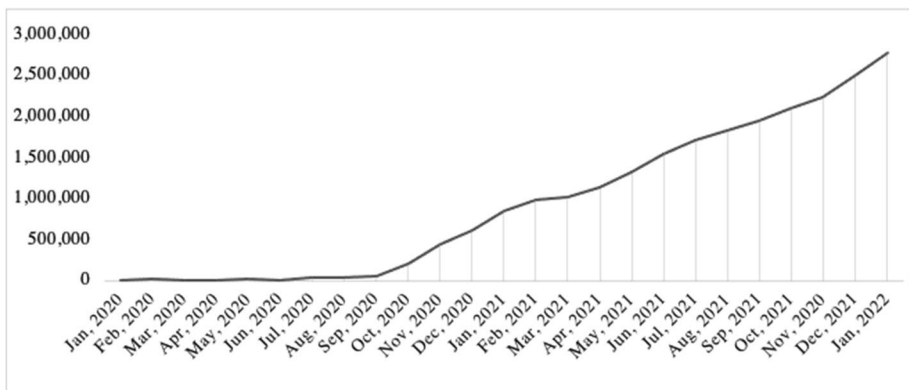


Fig. 1 Growth in the Axie Infinity user base

Consumer Issues Relating to PTE Games

Despite PTE games' popularity amongst consumers, there have been some concerns raised about the potential impact of this technology on gaming experiences, as well as its potential for harm (De Jesus et al., 2022). The first important issue is whether requiring players to buy NFTs contributes to concerns regarding the increasing monetization of gaming (e.g. Darakjian, 2015; Macey & Bujic, 2022; Tregel et al., 2020). As these authors point out, when players can pay money to improve their in-game performance, skilled play may no longer be the sole determinant of player success. It also means that income and affordability could potentially advantage wealthier players and make the game less accessible to lower income groups.¹ The second issue (harm) relates to whether these games and strongly monetized structures may be more appealing to higher risk gamblers, who are already experiencing issues relating to internet gaming disorder (Delfabbro et al., 2021). Several studies have demonstrated a significant positive association between the purchase of loot boxes and financial harm which suggests that these features may be appealing to people with problems relating to gambling (Carey et al., 2021).

In theory, loot boxes are a gambling-like feature included in many current online games, in which players earn or buy mystery boxes, which contain various in-game prizes. These share some elements in common with PTE gaming, as both are a form of monetization in which game assets can be obtained by making expenditures. These kinds of purchases have been associated with sunk cost effects, where players feel obliged to continue gameplay due to prior investment of time or money (King & Delfabbro, 2018). Although evidence supporting a link between loot box participation and higher risk gambling is correlational (i.e. people who gamble will be attracted to “gambling-like” features in games rather than being encouraged to gamble by playing loot boxes), it is consistently observed that loot boxes are more popular amongst gamers who report problems associated with gambling (Zendle & Cairns, 2018; Zendle et al., 2019, 2020). These individuals generally indicate a stronger involvement in the game, as based on willingness to spend money in order to improve game status and performance. PTE creates the possibility of individuals being motivated to extend their purchases to NFTs and often highly volatile cryptocurrencies, to fund their gambling. Therefore, it is possible that PTE games may be an anathema to many committed gamers who dislike monetized features and the idea of “grinding” out micro-rewards (Macey & Bujic, 2022). Such games may instead appeal to gamers who are already interested in cryptocurrency, although this remains an issue for further research as this market develops.

A particularly important element of PTE games which is a feature of AI is the concept of scholarship programs. Similar to the rental system evident in *Cryptokitties*, scholarship programs involve wealthy players known as “managers” lending their Axies to “scholars”. This allows gamers, particularly those of a poorer demographic, the opportunity to play for free. In return, the managers obtain a portion of the scholar's gaming income by devoting their capital (their NFT or Axie) to obtain a return on the labour of others. Such schemes theoretically offer opportunities for those who may not have the funds to pay for the entry cost into the game. However, a potential risk of these schemes is that they might lead to a form of exploitation in which people from less-advantaged countries provide a cheap form of labour and many hours of effort to benefit those with the wealth to afford the NFTs. Long hours of play may contribute to fatigue and stress if the scholarship recipients do

¹ One way this is being addressed in gaming is the creation of guilds in which the cost of entry is spread across a number of players. Rental and scholarship systems are another method being used.

not meet a certain level of performance (De Jesus et al., 2022), but this is a topic which requires additional investigation. Similar concerns have been raised about the so-called practice of “gold farming” in which young people have been observed playing games in factory like conditions to earn in-game rewards which are sold for profit by the management of the operation (see Dubbell, 2015; Tai & Hu, 2018; Woodcock, 2018).

Conversely, the benefits of PTE games is that they may allow players to build an online community and socialise without face-to-face interaction (King et al., 2020). This was found to be particularly important amidst the global pandemic, with engagement in PTE games identified as a coping strategy during extended lockdowns (De Jesus et al., 2022). In addition to the social benefits, PTE games, by design, present an opportunity for financial gains. Individuals residing in third-world countries appear to benefit most from the PTE structure, with the potential to attract incomes far greater than the national average wage (De Jesus et al., 2022).

The Present Study

Despite the early insights, relatively little is known about these newly emerging games, the major issues that should be considered, and whether they are a topic in need of greater regulatory scrutiny and research interest. Accordingly, the aim of the present study was to examine player perceptions of PTE gaming using AI as a particular focus. The following research questions were examined: (a) What are the risks and benefits associated with engaging in PTE games? (b) What attitudes do people have towards PTE gaming and what are their experiences? (c) In what ways does PTE differ from traditional online gaming? These insights may provide a starting point for more detailed quantitative studies of PTE gaming and provide some early guidance concerning potential consumer protection and regulation of this emerging class of activities.

Methods

Data Source

To gain an understanding of players' interactions with AI, Reddit, *Twitter*, *Bitcoin Talk*, *Axie Infinity* and *Smogan*: *Axie Infinity* were utilised. This captured two of the major general online comment sites as well as the relevant game-specific sites. Initially, the subreddit page “r/AxieInfinity” was monitored over 2 weeks. From the 5th to the 20th of January 2022, the most popular daily threads were collected. Following this, Twitter's most trending tweets including the phrase “Axie Infinity” were collected from the 9th to the 15th of February 2022. To avoid coding the same content twice, this excluded several threads which overlapped with previous days' highest trending terms. All threads from the online chat forums “Bitcoin Talk; Axie Infinity” and “Smogan; Axie Infinity” were collected from the 5th to the 20th of January 2022. The final data source comprised a combined text block of (22,785 words) copied verbatim into a Word document.

Analysis Framework

Data analysis involved an inductive approach to identify key themes, in the absence of pre-defined theories or assumptions (Hsieh & Shannon, 2005). Specifically, themes were developed

at a semantic level, with meaning derived explicitly from the data (Braun & Clarke, 2006). Further, an overarching realist epistemological approach was taken, whereby individuals' experiences and understandings of the world were considered equally valid constructions of reality.

Given the subjective nature of the chosen qualitative research approach, it is important to acknowledge the researchers' potential influence on the data. The first researcher is a Caucasian, 21-year-old female university student who has previously worked with children with gaming disorders and has insight into the potential impact of PTE gaming. To mitigate these potential biases, data was cross-checked with another senior researcher.

Data Analysis Procedure

Braun and Clarke's (2006) methodological approach to Thematic Analysis (TA) was utilised to guide analysis. This approach was most appropriate as it allowed for flexibility of understanding players' experiences, whilst still organising the data into well-defined themes (Pietkiewicz & Smith, 2014). Initially, the entire data set was read multiple times, to gain a broad understanding of the content. In this early phase, general notes were created, including phrases such as "it looks like many players don't actually like the game" and "there are a lot of players originating from the Philippines". Following this, the transcript was converted into the qualitative data analysis software program "NVivo". This allowed for the next phase of coding, which involved identifying and grouping relevant and consistent themes in the data. Due to the absence of preconceived theories, multiple passes of the data were required before any codes were identified. Consequently, the codes changed significantly from the first to last pass, as with each pass new ideas became apparent.

Once codes were developed, a thematic map was created via the software program "DisplayR". This allowed for early insight towards how the codes relate to one another and the identification of patterns. Within this phase, numerous codes were reconfigured due to their overall insignificance or irrelevance towards the research question.

Ethical Considerations

Despite this study being relatively low risk, ethical precautions were taken. Data collection only occurred within platforms where users provided consent to having their responses become publicly distributed upon signing up. In addition, confidentiality was maintained with all data de-identified and personal information replaced with alpha-numeric codes.

Results

Overview of Themes

In total, fourteen coded themes were identified as listed in Table 1, with the most common including "Ambivalence", "Negatively Influencing Mental Health" and "Likening the Game to a Job". For example, whilst divergent cases of "Extrinsic Motivation" were initially recorded, this code only attracted 0.88% of coverage and was therefore deleted. Finally, after numerous passes and restructures, five themes were identified:

“Enjoyability of Gameplay”, “Importance of the Financial Component”, “Scholarship Program”, “Mental Health and Wellbeing Outcomes”, and “General Understanding of AI and PTE”. To assess the inter-rater reliability of codes, 14% (50 out of 350) of the statements and the resultant categories were given to a second rater. Overall, the classifications were very similar (a mean $k=0.82$ was obtained across all the categories as based on coding of the statements within or outside of the relevant category) (McHugh, 2012). More specifically, raters agreed on 41 occasions. To manage the inconsistencies and reach consensus, a new, more appropriate sub-category was developed.

Five primary themes along with multiple subthemes were identified within the current data (Table 2). These themes best capture the experiences, beliefs, and attitudes expressed within the data, directly addressing the research questions.

Theme 1—Enjoyability of Gameplay

One of the most prevalent themes within the data was the discussion of AI’s gameplay. Players often exhibited ambivalence, describing both positive and negative elements of the game in the same blog post. This was divided into two subthemes: “Enjoy” and “Dislike”. Many respondents who posted on Reddit reported disliking the gameplay. For example, many regular players drew attention to the structural and visual characteristics of the game and described it as basic, repetitive, and often boring.

But then again, matches started to stay very boring, I mean, veeeery boring, idk if the SLP prices down have a huge impact in the game felling that I have while playing, or the game simply ins’t interesting anymore...

Whilst there were far fewer instances of player enjoyment overall, the Twitter data set attracted the most positive comments. These were directed towards enjoyment of AI’s graphics and the sense of community PTE games provide.

I love the look of Axies, the plant my favourite

Table 1 Frequency (%) of initial codes identified using NVIVO

Code	Brief description	<i>n</i>	%
(1) Ambivalence	Positive and negative descriptions of AI	42	9.91
(2) Dislike Game Play	Negative elements of gameplay	26	4.74
(3) Enjoyable Game Play	Positive elements of gameplay	9	1.63
(4) Extrinsic Motivation	Money as a primary incentive for gameplay	40	5.96
(5) Feeling Ripped Off	Feeling deceived by the market or managers	35	9.23
(6) Financial Outcomes	Explicit reference to financial gains or losses	44	8.14
(7) Likening the Game to a Job	Players describing the game as employment	21	4.95
(8) Money Dictating Enjoyment	Money influencing a player’s game enjoyment	27	5.74
(9) Negative Mental Health	Negative mental health from engaging with AI	31	3.91
(10) Opportunities Provided by AI	Social and financial opportunities provided by AI	4	1.64
(11) Market Awareness	Players’ level of knowledge towards the market/game	6	1.54
(12) Scholarship Split	Explicit reference to scholarship/manager split	13	2.74
(13) Sunken Cost Effect	Sustained engagement in AI due to prior investment	6	1.58
(14) Unhealthy Gaming Habits	Gaming causing neglect to a players life/work	13	2.59

Table 2 Summary of themes and subthemes identified

Theme	Subthemes	Initial codes	<i>n</i>	%
(1) Enjoyability of Gameplay	(a) Enjoyed (b) Disliked	Ambivalence Dislike Game Play Enjoyable Game Play	77	16.63
(2) Importance of the Financial Component	(c) Incentive for Play (d) Income (e) Wealth = Enjoyment	Extrinsic Motivation Money Dictating Enjoyment Financial Outcomes Sunken Cost Effect	85	15.75
(3) Scholarship Program	(f) Benefits (g) Risks	Scholarship Split Feel Ripped Off (Manager) Opportunities Provided by Scholarships	46	10.26
(4) Mental Health and Wellbeing Outcomes	(h) Negative Wellbeing (i) Novel Behaviours	Negatively Influencing Mental Health Unhealthy Gaming Habits Likening the Game to a Job	64	11.60
(5) General Understanding of AI and PTE	(j) Ripped Off (k) Market Awareness	Feeling Ripped Off (Market) Precautions of the Volatile Market	32	8.64

Quantitative data in the form of a Reddit poll supports the overall trend in the data and indicated that 57% ($N=1713$) of players did not find AI enjoyable.

Theme 2—Importance of the Financial Component

Money and the financial component of AI was a frequent topic of discussion. The first sub-theme “Incentive” indicated gaming behaviour was highly reward-driven and extrinsically motivated. Therefore, whilst players did find some enjoyment from AI, this was secondary to the financial incentive.

The idea of earning while playing has made me like the game itself. When I first discovered it, I was hesitant to put out money since I’m not yet sure how I could make it all back but ever since I have purchased it, I didn’t regret it either way

The second subtheme “Income” reflected the financial losses and gains of players. Although the profitability of AI was the primary motivator towards gameplay, many players reported financial losses. Indeed, only 44% ($N=1313$) of players on a Reddit poll reported making money from the game. As a result, numerous players indicated a level of financial harm, desire to break even, chase their losses, or continue playing until prior investments were earned back.

I dont wanna quit yet cuz I invested in this game and i wanna have ROI before I quit

Due to the importance of money within AI, wealth or greater financial success often appeared to be associated with gaming enjoyment. Money facilitated the purchase of better Axies which in turn created a more profitable and enjoyable gaming experience. Equally, those who were less financially inclined described a poorer gaming experience, less ability to explore different teams, and experiencing greater frustration towards losses.

The main problem with Axie for me is that Axies are too expensive and there is no way to test out builds. Due to this reason people are stuck with what they have and can’t experiment with builds.

This theme suggests that, although the appeal of PTE games heavily surrounds the financial component, many players do not make money, and this may result in negative responses from players.

Theme 3—Scholarship Programs

The new concept of scholarship programs attracted divided opinions. These were separated into “Risk” and “Benefit” subthemes. Respondents that resided in third-world countries or had poor gaming knowledge were identified as most at risk of unfair scholarship splits. Whilst the average split was approximately 50/50, these vulnerable players described some falling as low as 20/80. This resulted in a strong manager-scholar power imbalance.

I get paid 20% no matter the slp price and if I stop playing for a day a get a warning (3 warning and I am out) only so I guess there so different splits

In contrast, some players described the benefits of scholarships and of the ability to earn more money within the game than the average national income in their country. Although

this “Benefits” subtheme was relatively infrequent, some players viewed AI as providing unemployed individuals an income, even during the current global pandemic.

The good thing about crypto world (or just internet, since freelancing online is a thing since forever) is that you are not screwed by your geographical location -- or less screwed, cuz taxes and etc from your online earning is still a thing. But at least you are provided with more opportunities to get something than having to rely on solely real life job.

This data suggests that, although scholarships do provide an opportunity for players that would otherwise not be able to play, these schemes are unregulated and leave open opportunities for exploitation.

Theme 4—Mental Health and Wellbeing Outcomes

Many comments related to the negative mental health outcomes are associated with game-play. The “Negative Wellbeing” subtheme reflected descriptions of intense anxiety, stress, and fatigue directly associated with AI gameplay. Whilst there are numerous player modes within AI, “Arena” appeared to evoke the most anxiety. This may be attributable to the increased potential for loss within the Arena which carried greater financial and emotional consequences than other play modes.

Playing arena is so mentally exhausting, its not worth getting anxiety attacks just for mere cents

Further, players often described unhealthy gaming behaviours. For this study, “unhealthy” was defined as extended gameplay which resulted in other areas of the players’ life being neglected.

I have played 40 energy for almost 8 months nonstop. Haven’t stopped playing a single day even on Christmas day, my birthday etc

Eh, I run and manage 50 scholarships while balancing university, military life, and my family. Get about 3 hours of sleep a day (not that I would recommend this)

In addition, players described a particular series of problematic behaviours as categorised under the “Novel Behaviours” subtheme. A number of players likened AI gameplay to employment. This included references to AI being a chore, playing being a “job”, players being “employees”, and managers describing the game as a “company”.

If you are a manager w/ scholar, lets be real, this is a company w/ employees. And the last thing we want to be is turn into a corporation that don’t value their employees

This implied that Conceptualising AI as a job may have been associated with poorer mental health outcomes. Specifically, players reported lower enjoyment and attributed greater emotional distress towards losses than those who played AI for entertainment.

Theme 5—General Understanding of AI and PTE

The final theme identified within the data set involved players understandings and attitude towards the PTE gaming structure, specifically in relation to AI. The “Market Awareness”

subtheme reflected many players distrust for the cryptocurrency market, expressing caution towards its volatile nature.

AXS is the worst performing crypto today as it crashed by 13%. That should give you an idea. And yes, things are looking pretty bad for this game and if they don't listen to the community and find a good solution, this game will pretty much die

Player's knowledge of the market in addition to the significant initial investment and ongoing costs associated with AI caused many to feel that the game can take advantage of players. This was especially true for unsuccessful players who made little or no returns on their initial investment. More extreme examples of this theme were observed amongst the second "Ripped Off" subtheme, where players likened AI to a "pyramid scheme".

Yes, Play to Earn is a lie, for now. Axie infinity is now Win to Earn + Pay to Win so it's on an edge to be a pyramid scheme right now, but it still has potential because we "believe" land game is coming

Within this subtheme, some players also expressed feelings of AI the game being designed so players were "set up to fail/lose". This was directed towards specific elements of AI, including the 800mmr update and critical strikes ("crits") in Arena. Further, players seemed distrustful towards the randomisation element of gameplay and discussed the potential for AI to employ deceptive tactics which reduce wins.

I gave up on arena a few weeks ago, it feels rigged. Everytime since the july update whenever i started to go past 1000 with my shitty team (with which i was keeping around 1300 before) the game starts the "f--k you stay down

Discussion

This exploratory qualitative study aimed to investigate the experiences of PTE gamers by profiling the risks and benefits of AI. The results indicated five principal insights. First, it appears that player attitudes towards the game are mixed. Although some players expressed enjoyment in playing the game and, in particular, opportunities for social interactions, the majority reported not enjoying the game. In other words, the level of intrinsic motivation to play appears to be low. Second, and related to the first point, it appears that much of the gameplay (true the name PTE) is extrinsically motivated, despite the fact that 44% of participants in online surveys report not obtaining income from gameplay. Third, although scholarship programs presented an opportunity for income, the data suggests that they are unlikely to be a viable long-term replacement for conventional employment. In particular, although players from third-world countries were identified as being the most likely to benefit from scholarships, they also were the most vulnerable to being taken advantage of by these schemes. A fourth issue was that negative mental health outcomes appear to be common, with many players frequently reporting feelings of anxiety, stress, and depression along with various novel behaviours such as likening gameplay to employment. A final insight was that many players exhibited in-depth market knowledge of the game and its financial dynamics. This indicated that they were aware of the ways in which the game could be unfair or disadvantageous. In other words, players appeared to show some degree of consumer awareness and were able to identify the potential risks and benefits associated with gameplay.

Theoretical and Policy Implications

Despite the current popularity of AI (Aguila et al., 2022), the results show that players frequently reported a dislike for gameplay and that they were largely playing for extrinsic rewards. This observation suggests that the introduction of PTE may lead to differences in the nature of gaming interactions, namely, financial returns rather than enjoyment. This may pose some potential risks, in that previous gaming research has identified intrinsic motivations like enjoyment, as a protective factor against negative mental health outcomes (Peracchia et al., 2019). Consequently, players who lack any genuine game enjoyment may not obtain the usual benefits of gaming (e.g. relaxation and enjoyment). Instead, their gaming experiences may be increasingly dictated by their performances and outcomes. These observations are consistent with issues raised in previous research and commentaries (Dubell, 2018; Macey & Bujic, 2022; Tregel et al., 2020).

In addition to such experiences being less likely to alleviate anxiety and depression (Peracchia et al., 2019), they may, in fact, only serve to exacerbate these problems. This is in line with the Self-Determination Theory which recognises individuals' need for autonomous fulfilment (Mills & Allen, 2020). These findings lead to the potential speculation that players increased rates of anxiety and depression might be observed within this style of gaming as a result of the differences in motivation and possible dependency of their emotional reactions to the game being dictated by factors which they are unable to control (e.g. more skilled opponents). This may be particularly so if the players have a strong financial need to win and earn an income or if they have an existing history of problems associated with gambling, involving chasing outcomes to recoup earlier losses or financial investments. Surveys suggest that less than half of AI players appear to report making a profit, despite the fact that many PTE gamers report, on average, spending 4 h a day for 2–3 months to receive return on their initial investment (Francisco et al., 2022).

The scholarship programs offered by AI appear to be one of the most contentious areas. Although emerging literature has focused primarily on the concepts of scholarships and identifying theoretical benefits (Aguila et al., 2022), the current study found that their real-life application may also attract some potential for harm. Players may initially be attracted to these schemes because they liken them to a job, but conceptualising gameplay in this way can also cause players to attribute greater emotional distress towards losses than those who played AI for entertainment. Unlike real-work-place scenarios, players are not protected by safeguards, regulations, or any true labour contract. Consequently, exploitation is likely to be common, with frequent reports of unfair income splits of as low as 20/80, poor working environments, and unrealistic expectations to meet daily quotas (De Jesus et al., 2022). Players in the Philippines and other third-world countries, for example, were identified as the highest risk of exploitation, due to the frequency of unfair profit division and financial over-dependency on AI. These observations confirm what has been previously noted about South East Asia and the issues associated with “gold farming” (Dubbell, 2015; Tai & Hu, 2018).

Players also raised concerns about the declining benefits associated with the game. This is consistent with similar issues raised about the short-term mania associated with the *Cryptokitties* blockchain game in 2017–2018. As Jiang and Liu (2021) observed, this game only proved to be profitable for the majority of players for a very short period of time. The game was quickly flooded by too many players and kitties (many players left soon afterwards), income declined, the costs of using the Ethereum blockchain became too expensive, and the game became overly dominated by high value players and considerable

inequality in the returns achieved. For these reasons, the overall profitability of PTE gaming is an area that requires future research attention.

The fact that AI gamers exhibited high levels of market knowledge or awareness of the risks is important, but it is not clear whether this information was available to them when they first commenced playing. For this reason, an important consumer protection measure would be to provide new players with greater access to materials relating to (a) the expected returns associated with AI playing, (b) the benefits and costs of the scholarship program, (c) insights into the barriers to entry (only early adopters would have been able to buy the Axies or NFT animals at a cheaper price), and (d) the potential risks associated with excessive playing.

Limitations and Future Directions

The first limitation of this study surrounded the use of online forums. Although Reddit, Twitter, and the various other discussion platforms provided easily accessible data in the absence of participant bias, it captured only a specific demographic of gamer; that shares their experiences of gameplay publicly and is interested in others' experiences. Due to the high frequency of players reporting dislike towards gameplay, it is possible that this cohort overrepresents player dissatisfaction and underrepresents gamer enjoyment. Second, due to the nature of the data set, information regarding participant age, gender, country of origin, culture, and other descriptive characteristics was not accessible. For this reason, it will be important that the themes identified in this preliminary qualitative work are extended using larger quantitative findings. For example, it would be useful to conduct a survey of gaming forum participants to capture more detailed demographics, measures of gaming disorder, motivation, and gaming habits that could be matched up with qualitative data. Using this type of quantitative analysis, it would be possible to measure differences in motivation associated with PTE games more formally using validated measures and whether these differences pose a greater risk for psychological harm and gaming disorder. It would also be important to examine whether people who have an existing interest in gambling or who report problems with gambling are more likely to be attracted to these activities.

Conclusion

New models of gaming based on blockchain have the potential to benefit players by providing a financial return and more definitive ownership over their assets. It may also create opportunities for income earning in situations where no other employment is available. However, PTE gaming must also be monitored carefully to avoid the prospect of labour exploitation and harmful consequences for vulnerable players, who may be tempted to spend time grinding out rewards rather than playing for enjoyment. Profitable and ethical business models for PTE games will need to provide greater accessibility to gaming opportunities for all players, balance the play and earn elements, and be mindful of how game structures might lead to excessive gaming or the unethical use of the gaming platforms to exploit vulnerable populations.

Declarations

Ethics Approval This research, involving archival data sources, was considered negligible risk under the NHMRC National Statement.

Conflict of Interest The authors declare no competing interests.

References

- Abarbanel, B., & Macey, J. (2019). VGO, NFT, OMG! Commentary on continued developments in skins wagering. *Gaming Law Review*, 23(1), 23–25.
- Absolute Reports (2022). Global play to earn games market growth: Status and outlook 2022–2028. www.absolutereports.com. Accessed 16/7/22.
- Aguila, D. A., Bartolata, J. M., & Estrañero, J. G. (2022). *AXEing the Axie Infinity (AI): The AI of modern gaming, business model strategem, and global economy towards Cryptocurrency Era* [College Of Liberal Arts And Sciences]. Research Gate. <https://www.researchgate.net/profile/>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Carey, P. A. K., Delfabbro, P., & King, D. (2021). An evaluation of gaming-related harms in relation to gaming disorder and loot box involvement. *International Journal of Mental Health and Addiction*, 20(2), 1–16. <https://doi.org/10.1007/s11469-021-00556-5>
- Chohan, R., & Paschen, J. (2021). What marketers need to know about non-fungible tokens (NFTs). *Business horizons*, 1(1). <https://doi.org/10.1016/j.bushor.2021.12.004>
- Darakjian, S. (2015). Online gaming and the pay-to-win problem: Legal deterrence or industry self-regulation. *Loyola of Los Angeles Entertainment Law Review*, 36, 213.
- De Jesus, S. B., Austria, D., Marcelo, D. R., Ocampo, C., Tibudan, A. J., & Tus, J. (2022). Play-to-Earn: A qualitative analysis of the experiences and challenges faced by Axie Infinity online gamers amidst the COVID-19 pandemic. *International Journal of Psychology and Counseling*, 1(12), 291–424.
- Delfabbro, P., King, D. L., & Carey, P. (2021). Harm severity in internet gaming disorder and problem gambling: A comparative study. *Computers in Human Behavior*, 124, 106898. <https://doi.org/10.1016/j.chb.2021.106898>
- Dubbell, J. (2015). Invisible labor, invisible play: Online gold farming and the boundary between jobs and games. *Vanderbilt Journal of Entertainment and Technology Law*, 18, 419.
- Francisco, R., Rodelas, N., & Ubaldo, J. E. (2022). The perception of Filipinos on the advent of cryptocurrency and non-fungible token (NFT) games. *International Journal of Computing Sciences Research*, 6, 1005–1018. <https://doi.org/10.25147/ijcsr.2017.001.1.89>
- Hsieh, H.-F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15(9), 1277–1288. <https://doi.org/10.1177/1049732305276687>
- Jiang, X-J., Liu, F. (2021). Cryptokitties transaction network analysis: The rise and fall of the first blockchain game mania. *Frontiers in Physics*. <https://doi.org/10.3389/fphy.2021.631665>.
- King, D. L., & Delfabbro, P. H. (2018). Predatory monetization schemes in video games (e.g. ‘loot boxes’) and internet gaming disorder. *Addiction (Abingdon, England)*, 113(11), 1967–1969. <https://doi.org/10.1111/add.14286>
- King, D. L., Delfabbro, P. H., Billieux, J., & Potenza, M. N. (2020). Problematic online gaming and the COVID-19 pandemic. *Journal of Behavioral Addictions*, 9(2), 184–186. <https://doi.org/10.1556/2006.2020.00016>
- Macey, J., & Bujić, M. (2022). The talk of the town: Community perspectives on loot boxes. *Modes of Esports Engagement in Overwatch* (pp. 199–223). Palgrave Macmillan.
- McHugh, M. L. (2012). Interrater reliability: The kappa statistic. *Biochemia medica*, 22(3), 276–282. <https://doi.org/10.11613/BM.2012.031>
- Mills, D. J., & Allen, J. J. (2020). Self-determination theory, internet gaming disorder, and the mediating role of self-control. *Computers in Human Behavior*, 105, 106209. <https://doi.org/10.1016/j.chb.2019.106209>

- Nadini, M., Alessandretti, L., Di Giacinto, F., Martino, M., Aiello, L. M., & Baronchelli, A. (2021). Mapping the NFT revolution: Market trends, trade networks, and visual features. *Scientific Reports*, 11(1), 20902–20902. <https://doi.org/10.1038/s41598-021-00053-8>
- Peracchia, S., Presaghi, F., & Curcio, G. (2019). Pathologic use of video games and motivation: Can the gaming motivation scale (GAMS) predict depression and trait anxiety? *International Journal of Environmental Research and Public Health*, 16(6), 1008. <https://doi.org/10.3390/ijerph16061008>
- Pietkiewicz, I., & Smith, J. A. (2014). A practical guide to using interpretative phenomenological analysis in qualitative research psychology. *Psychological Journal*, 20(1), 7–14. <https://doi.org/10.14691/CPPI.20.1.7>
- Tai, Z., & Hu, F. (2018). Play between love and labor: The practice of gold farming in China. *New Media & Society*, 20, 2370–2390.
- The Game Statistics Authority. (2022, March 16). *Axie Infinity*. <https://activeplayer.io/axie-infinity>
- Tregel, T., Schwab, M. C., Nguyen, T. T. L., Müller, P. N., & Göbel, S. (2020, November). Costs to compete-analyzing pay to win aspects in current games. In *Joint International Conference on Serious Games* (pp. 177–192). Springer.
- Woodcock, J. (2018). Digital labour and workers' organisation. In *Global Perspectives on Workers' and Labour Organizations* (pp. 157–173). Springer.
- Zendle, D., & Cairns, P. (2018). Loot box spending in video games is linked to problem gambling severity. *PLoS ONE*, 13(11), 0206767–0206767. <https://doi.org/10.1371/journal.pone.0206767>
- Zendle, D., Cairns, P., Barnett, H., & McCall, C. (2020). Paying for loot boxes is linked to problem gambling, regardless of specific features like cash-out and pay-to-win. *Computers in Human Behavior*, 102, 181–191. <https://doi.org/10.1016/j.chb.2019.07.003>
- Zendle, D., Meyer, R., & Over, H. (2019). Adolescents and loot boxes: Links with problem gambling and motivations for purchase. *Royal Society Open Science*, 6(6), 190049. <https://doi.org/10.1098/rsos.190049>

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