

The Implications of Loot Boxes and Their Involvement in the Possible Development of Childhood Gambling Disorders

Arlin Bhattacharjee, MD, Gino Mortillaro, MD

“I refuse to promote the gacha system in this game anymore.” This was a comment made by a 13-year-old YouTuber named Michael “@mtashed” Tash with over 600,000 followers. Many of his followers are children who were likely drawn to his entertaining commentary on popular games such as *Destiny*, *Dark Souls*, and *Genshin Impact*. While the concept of a “gacha game” is likely unfamiliar to many clinicians, this phenomenon has significant relevance to child and adolescent psychiatry.

As of January 31, 2021, according to appfigures.com—a website that measures app usage among other metrics—the top 30 grossing apps on mobile operating system IOS mostly consisted of dating, streaming, and video game apps. Within those apps, *Genshin Impact* ranked 26 and *Raid Shadow Legends* ranked 25. Despite not being ranked in the top 5, these games still made a relatively substantial gross income. Games such as these are “free” to play, but according to Sensor Tower, a mobile analytics firm, *Genshin Impact* makes more than 6 million dollars per day¹ from the mobile version alone, which does not include income generated from those playing on consoles or computers. Comparatively, an individual casino makes on average around \$630,000 USD per day according to businessinsider.com.² So, how does a “free” game make 10 times the earnings of a single casino?

Background

Gacha games are games that implement a “loot box” mechanism in which a player may purchase a loot box for desirable items. The items the player receives when they open the loot box are random, with some items being significantly rarer than others with a possible monetary value of up to a thousand dollars or more. The

term ‘gacha’ originates from Japanese toy machines where an individual, usually a child, pays a small sum of money to obtain a capsule containing a toy. As with the video game loot boxes, gacha capsules contain some toys which are rarer than others, and thus may be exchanged for money. The purpose of this article is to bring attention to a potentially negative impact that gacha games may have on a susceptible population, specifically children, and to discuss how these types of games may follow similar models of gambling.

Loot Box or Childhood Gambling?

In 1958, a study on intermittent reinforcement in children aged 4 to 8 was done by Long *et al.*, which found that variable ratio schedules, compared to fixed and variable interval schedules, produced the most effective reinforcement behaviors.³ The study had 200 children work by operating a particular device and would reward them with certain reinforcers. It was noted that the “reinforcers,” particularly the trinkets which were used, would lose their reinforcing effects if they lost their variation such as when the child had already received each trinket. However, introducing new trinkets revived the reinforcing effect. This study also noted that these effects found in children, translated over to animals, indicating that studies on reinforcement and reward performed with animals, may be relatively applicable for children.

The variable ratio reward mechanism is when an average number of actions returns a reward. This average can be 3 or a thousand, but regardless, the subject may receive the reward either on the first action or on the sixth action in either case, with the likelihood of that occurring higher in the first scenario notwithstanding. Previous research completed in the 1950s by B.F. Skinner, first showed this

effect.⁴ The randomness of rewards appears to make humans and animals consistently complete actions that bring about these rewards. This research supports that notion of the powerful effects of variable ratio reinforcement on childhood behaviors, raising concerns around the potential impacts of video games, particularly ones that utilize loot boxes (that appear to mirror a variable ratio reinforcement strategy).

In a study comparing 222 adult pathological gamblers and 714 controls, who did not have other addictive behaviors (including substance abuse), it was found that 50.9% of those with a gambling disorder had the Taq A1 variant of the DRD2 gene whereas 25.9% of the controls had the same variant. This study suggests that the dopamine receptor, specifically the Taq A1 variant, is linked to gambling disorders.⁴ Another study by Linnet *et al.* showed that individuals who were diagnosed as pathological gamblers, appeared to have a significantly increased excitement level in correlation to dopamine release in the ventral striatum when compared to controls,⁵ suggesting that the severity of the gambling behaviors may be associated with the intensity of this dopaminergic response.⁶ As such, dopamine is released upon reward, and that rewards at random rate can solidify gambling behaviors.

Many of the core features of loot boxes have similarities to gambling. For example, when a player opens a loot box, they may receive random items of varying worth up to \$100,000 USD.⁷ These items range from being purely aesthetic to those that may help players complete games more easily. Especially for a young child whose social life may revolve around time being spent on online games, this may all be appealing, and there may be a surge of dopamine that occurs when a random reward is received. In turn, this may encourage the child to continue opening an increasing amount of loot boxes in the hopes of receiving that single \$100,000 item, or an item that helps them complete the game; thereby, increasing the child's risk of developing a gambling disorder.

Five main components for gambling disorder exist within the *DSM V-TR*: a preoccupation with gambling, the desire to use more money for more excitement, the inability to cut back or stop behaviors, restlessness or irritability when attempting to cut back, and using gambling as an escape such as to minimize a depressed mood. Based on their design, gacha games may increase a child's proclivity to anyone, if not all these symptoms.

The increased use of internet games comes with many risks, especially for minors, and potential areas for future inquiry. Moving forward, it may be wise to investigate what exactly these risks are and how they interact with one another. Are these games a gateway to developing addictive behaviors or gambling disorders? The gaming and scientific communities have begun looking at these associations and have begun to show increased risk.⁹⁻¹¹ With this increased risk, can a child develop such disorders at a young age? If so, how can a clinician assess and identify such behaviors or disorders? Finally, if these game designs truly have a negative impact on a child's development should there be legal regulations around such games that implement loot boxes?

Relevance in a Post-COVID World

Since COVID 19, youth appear to be spending an increasing amount of time engaged in digital media and online activities, especially internet gaming, and the emergence of virtual reality games may compound this trend. About 16 hours a day is being spent on digital media by the average adult, compared to the pre-pandemic 12 hours a day,⁸ and if these trends are paralleled in children, this does not bode well, especially for those children who may have a developmental vulnerability to addictive behaviors. Childhood vulnerability to addictive behaviors may be exploited by video games that promote gambling behavior like gacha games. Therefore, it is important to understand the significance and impact of such issues moving forward, as early identification and intervention may help minimize gambling addictions throughout the lifespan.

References

1. Hersko T. Why the Year's Biggest Blockbuster Is a Mobile Game Called "Genshin Impact." *IndieWire*. Published December 10, 2020. Accessed February 15, 2023. <https://www.indiewire.com/features/commentary/genshin-impact-video-game-industry-analysis-1234603048/#:~:text=There%20are%20a%20handful%20of>
2. John S. 9 tricks casinos use to keep you spending your money. *Business Insider*. Published June 9, 2019. Accessed February 15, 2023. <https://www.businessinsider.com/casino-tricks-make-you-spend-money-2019-6>
3. Long ER, Hammack JT, May F, Campbell BJ. Intermittent reinforcement of operant behavior in children. *J Exp Anal Behav*. 1958;1(4):315-339. <https://doi.org/10.1901/jeab.1958.1-315>
4. Comings DE, Rosenthal RJ, Lesieur HR, et al. A study of the dopamine D2 receptor gene in pathological gambling. *Pharmacogenetics*. 1996;6(3):223-234. <https://doi.org/10.1097/00008571-199606000-00004>
5. Linnet J, Møller A, Peterson E, Gjedde A, Duet. Dopamine release in ventral striatum during Iowa Gambling Task performance is associated with increased excitement levels in pathological gambling. *Addiction*. 2011;106:383-390. <https://doi.org/10.1111/j.1360-0443.2010.03126.x>
6. Joutsa J, Johansson J, Niemelä S, et al. Mesolimbic dopamine release is linked to symptom severity in pathological gambling. *NeuroImage*. 2012;60(4):1992-1999. <https://doi.org/10.1016/j.neuroimage.2012.02.006>
7. The Top 7 Most Expensive Skins in Counter-Strike: Global Offensive. *dbltap.com*. Published February 16, 2017. <https://www.dbltap.com/posts/4589925-the-top-7-most-expensive-skins-in-counter-strike-global-offensive>
8. Nicklin LL, Spicer SG, Close J, et al. "It's the Attraction of Winning That Draws You in"—A Qualitative Investigation of Reasons and Facilitators for Videogame Loot Box Engagement in UK Gamers. *Journal of Clinical Medicine*. 2021;10(10):2103. <https://doi.org/10.3390/jcm10102103>
9. Brady A, Prentice G. Are Loot Boxes Addictive? Analyzing Participant's Physiological Arousal While Opening a Loot Box. *Games and Culture*. 2019;16(4):155541201989535. <https://doi.org/10.1177/1555412019895359>
10. Xiao LY, Henderson LL, Nielsen RKL, Newall PWS. Regulating Gambling-Like Video Game Loot Boxes: a Public Health Framework Comparing Industry Self-Regulation, Existing National Legal Approaches, and Other Potential Approaches. *Current Addiction Reports*. Published online July 26, 2022. <https://doi.org/10.1007/s40429-022-00424-9>

Take Home Summary

Mechanics implemented in modern day gaming systems may pose a risk for the development of addictive behaviors. It may be warranted for providers to monitor and potentially screen for such behaviors, particularly in a behaviorally susceptible population such as children and adolescents.

About the Authors

Arlin Bhattacharjee, MD, is a fourth year psychiatry resident at Kaiser Permanente Fontana, CA. He is interested in psychiatry for underserved populations.

Gino Mortillaro, MD, is the assistant chief of psychiatry at Kaiser Permanente in San Bernardino County and an assistant clinical professor at the Kaiser Permanente School of Medicine. He is core faculty for the general psychiatry residency and child and adolescent fellowship and serves as clinical lead for Kaiser Permanente's Presence of Mind Initiative.

The authors have reported no funding for this work.

Disclosure: Drs. Bhattacharjee and Mortillaro have reported no biomedical financial interests or potential conflicts of interest.

Correspondence to Arlin Bhattacharjee, MD; e-mail: Arlin.X.Bhattacharjee@kp.org

This article was edited by Adam Sagot, DO.