

Opening Pandora's loot box: Weak links with problem gambling and player opinions on probability disclosures in China

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Conflict of Interests Statement

LYX was employed by LiveMe, a subsidiary of Cheetah Mobile (NYSE:CMCM) as an in-house counsel intern from July to August 2019 in Beijing, People's Republic of China. LYX was not involved with the monetisation of video games by Cheetah Mobile or its subsidiaries. TCF declares no conflict of interest. PWSN is a member of the Advisory Board for Safer Gambling – an advisory group of the Gambling Commission in Great Britain, and was a special advisor to the House of Lords Select Committee Enquiry on the Social and Economic Impact of the Gambling Industry. In the last three years PWSN has received research funding from Clean Up Gambling, and has contributed to research projects funded by GambleAware, Gambling Research Australia, NSW Responsible Gambling Fund, and the Victorian Responsible Gambling Foundation. In 2019 PWSN received travel and accommodation funding from the Spanish Federation of Rehabilitated Gamblers, and in 2020 received an open access fee grant from Gambling Research Exchange Ontario.



Background Info: What are loot boxes? Are they harmful?

- Virtual items in video games that contain **randomised** rewards.
- Some loot boxes are **purchased with money**: our research focuses on these.
- Some loot box rewards can be sold to other players for real world money and therefore have real world monetary value.
- Loot boxes are **structurally and psychologically akin to gambling**.^[1]
- Prior research using **Western** samples repeatedly found that loot box purchasing is **positively correlated** with **disordered gambling**.^{e.g., [2]–[11]}
 - Generally, the **more severe** a participants' problem gambling severity was, the **more they spent** on loot boxes.
- This raises concerns as to whether people with gambling problems may be at particular **risk of overspending** on loot boxes.
- This also raises concerns as to whether **children are being exposed to gambling** or quasi-gambling activities, and may be harmed as a consequence.
- Causation (or lack thereof) between loot box purchasing and disorder gambling has yet to be established by empirical research.
- Regulation of loot boxes is a **global public health issue** that is being scrutinised by regulators and policymakers: e.g., the US Federal Trade Commission.
- Certain countries have already enforced their laws and **banned** loot boxes citing gambling-related concerns: e.g., Belgium and the Netherlands.
- This research extends the loot box literature to **a non-'Western' context**, the People's Republic of **China**, and contributes **a world-first perspective** on the **effectiveness** of regulation.

Background Info: Weaknesses of Prior Research on Loot Boxes

- **Reliance on Western samples:** 15 previously published studies on the correlation between loot box purchasing and disordered gambling all used Western samples.
 - This severely **limits the ability to generalise** the literature's findings to other non-Western countries.
 - Research with a cross-cultural perspective comparing the strength of this correlation in three Western countries (Australia, Aotearoa New Zealand and the US) found that the strength of the correlation differed: e.g., the correlation is weaker in the New Zealand sample than in the US sample.
- We know that video game **markets are structurally very different** across the world:
 - **Loot boxes are prevalent** in video games on all hardware platforms (PC, console and mobile):
 - **59%** of top-grossing iPhone games implement loot boxes in **the UK**.^[12]
 - However, **91%** of to-grossing iPhone games implement loot boxes in **China**.^[13]
 - A binomial test revealed that this was statistically significantly higher ($p < .001$).
- Vulnerable groups, such as **children**, are also exposed to loot boxes:
 - Of top-grossing **UK** games deemed suitable for children aged 12+, **59%** contained loot boxes.^[12]
 - However, there is again structural difference: **91%** of such games in **China** contained loot boxes.^[13]
 - Indeed, **23%** of 11–16-year-olds in the UK have paid money to open loot boxes.^[14]
 - The % of Chinese children spending money on loot boxes is **not known** but is likely to be higher.

Project Objectives: Why this research? Why China?

- There are significant differences between Western countries (e.g., the UK) and China in addition to video game market structure and prevalence of loot boxes:
 - Gambling activities (e.g., casino games; sports betting) are regulated but generally **legal** in the UK.
 - In contrast, gambling activities are **prohibited** by law in China: only the lotteries are allowed.
- **No prior research** has used a non-Western sample to assess this correlation.
- Developed and developing countries across the world are considering whether to regulate loot boxes, including in non-Western countries, e.g., Brazil. The existing Western literature is **unhelpful**.
- Further, China is the **only country** to regulate loot boxes using a **consumer protection** measure.
- China requires video game companies to **disclose the probabilities** of obtaining randomised rewards. Similar measures are imposed in relation to gambling in other countries, including the UK.
- Other countries are **considering** adopting this measure in relation to loot boxes to reduce harm.
- Video game companies generally support adopting this measure as **industry self-regulation**.
- However, whether this measure is effective at reducing spending on loot boxes is **not known**.

Method: Large-Scale Preregistered Survey ($n = 879$)

- A survey was circulated to Chinese video game players through online forums.
- Participants were asked whether they **participated in gambling** in the **past year**.
- A validated Chinese translation of the Problem Gambling Severity Index (**PGSI**) was given **only** to participants who **self-reported gambling in the past year**.
- We anticipated a lower gambling participation rate in China which may reduce the effective sample size; therefore, a validated Chinese translation of the Barratt Impulsiveness Scale-Brief (**BIS-Brief**) was given to **all participants**.
 - **Impulsiveness** has been shown to be **correlated** with **problem gambling**.^[15]
- The survey asked for the participant **past year spending on loot boxes**.
- The survey also asked whether the participant has **seen** loot box probability disclosures, and if so, how their **purchasing behaviour has changed** as a result of seeing them (no change; spent less; or spent more).
- Participants were predominantly male (80.7%) and young ($M_{age}=23.0$, $SD=5.9$).
 - This is similar to previous studies, which recruited predominantly (~90%) males.^{[9], [10]}

Preregistered Hypotheses

- Hypothesis 1: **Loot box expenditure** and **problem gambling** will be positively correlated amongst people who have gambled in the previous 12 months.
- Hypothesis 2: **Loot box expenditure** will be positively correlated with **engagement with gambling in the previous 12 months**.
- Hypothesis 3: **Loot box expenditure** will be positively correlated with **impulsiveness**

Gambling, video game and loot box participation

- Only a small minority, 87 participants (**9.9%**), self-reported **gambling participation** in the previous 12 months, with **0.9%** of the overall sample meeting the **problem gambling** score threshold: see Table 1.
- Almost all participants self-reported playing video games in the previous week (**96.8%**), and spending money on video games in the previous 12 months (**85.9%**).
- Just under half of all participants (**48.7%**) self-reported purchasing loot boxes in the previous 12 months.

Problem gambling severity category	% of Participants	% of gamblers ($n = 87$)	Loot box expenditure (previous 12 months; Chinese Yuan); Mean (SD)
Non-gamblers	90.1	N/A	1099 (4437)
Non-problem gamblers	5.0	50.6	1211 (3839)
Low risk gamblers	3.5	35.6	1512 (4530)
Moderate risk gamblers	0.5	4.6	775 (932)
Problem gamblers	0.9	9.2	538 (735)

Table 1: Problem gambling severity categories

Results: Confirmatory Analyses: Weaker Links with Gambling

- Hypothesis 1 was tested, for participants who self-reported as gamblers, via the Spearman's Rank Correlation between rank-transformed loot box expenditure and the summed PGSI score (one-tailed test, $p = .05$).
 - A Spearman's test was used, following previous literature, to reduce the potential impact of outliers on the open-ended loot box expenditure question.^{[3], [4], [9], [10]}
 - Results: loot box expenditure and problem gambling were **unrelated** ($r_s(85) = .07, p = .259$).
- Hypothesis 2 was tested via the Spearman's Rank Correlation between rank-transformed loot box expenditure and past-year gambling participation (one-tailed test, $p = .05$).
 - Results: **a statistically significant correlation** ($r_s(877) = .06, p = .030$), although it was **weak** in size.
- Hypothesis 3 was tested via the Spearman's Rank Correlation between rank-transformed loot box expenditure and the summed BIS-Briefs score (one-tailed test, $p = .05$).
 - Results: **a statistically significant correlation** ($r_s(877) = .06, p = .038$), although it was **weak** in size.

Descriptive Statistics: Probability Disclosures

- 362 of 428 loot box purchasers (**84.6%**) reported seeing loot box probability disclosures. Of which:
 - 262 participants (**72.4%**) reported that their purchasing has not been affected by probability disclosures;
 - 70 participants (**19.3%**) reported buying fewer loot boxes and spending less; and
 - 30 participants (**8.3%**) reported buying more loot boxes.

Exploratory Analyses

- Post-hoc power analysis: G*Power determined that the sample of 87 past-year gamblers achieved a **post-hoc power of .79** for replicating a correlation between loot box expenditure and problem gambling of $r = .26$, which is the average value of previous loot box studies determined by a meta-analysis.^[16]
- Pearson's Correlation between **the summed PGSI and BIS-Brief scores** was calculated (one-tailed test, $p = .05$).
 - Results: **a statistically significant positive correlation** between problem gambling and impulsiveness ($r(85) = .29, p = .003$), replicating previous findings from the gambling literature.^[15]
- An analysis of the **incomplete (and excluded)** responses from the 610 participants who quit the survey before completing it revealed that only 20 participants (**3.3%**) **quit** upon seeing the question asking them to self-disclose past-year gambling participation, or, if an affirmative answer was given to said question, quit during the subsequent PGSI question block.
 - This is evidence that participants **did not drop out** of the survey due to cultural hesitations around responding to gambling-related questions, contrary to the literature's suggestion that Chinese participants may be unwilling to respond to stigmatised gambling-related questions.^{e.g., [17]}

Discussion

- Previous Western studies have found overall evidence for a positive correlation between loot box purchasing and problem gambling. Our study largely **failed** to replicate this effect in China. Possible explanations follow:
 - **Low rate of past year gambling participation:** the rate in China (**9.9%**), compared to international rates of **40%–60%**,^[18] reduced our effective sample size; however, post-hoc power analysis suggests that we achieved sufficient power for replicating the effect.
 - Our sample **skewed heavily towards young males**, two risk factors for increased problem gambling severity,^[18] and therefore should have been expected to return a **higher** problem gambling participation rate than the international averages, **contrary to our results**.
 - **Methodological issues with previous studies:** all previous loot box research **gave the PGSI to all participants**, regardless of whether they gambled in the past year. This may have biased results because non-gamblers may have provided **nuisance responses** to the non-applicable gambling-related questions.
 - Non-gamblers should respond '0' to all PGSI questions: any other response would bias the results to show a stronger estimate of the positive correlation.
 - **Self-exclusion biasing the sample:** Participants did **not** quit the survey and exclude themselves when they encountered gambling questions: therefore, our results are **unlikely to have been biased** for this reason.
 - **Variations in the availability of legal gambling products:** gambling products that are more akin to loot boxes, e.g., Electronic gambling machines, are **not available legally** in China.
 - Young video gamers may **not want to participate** in the only available form of legal gambling in China, the lotteries, which may be perceived as outdated and unexciting.
 - Loot box purchasing may **only be correlated with specific types of gambling** (e.g., playing slot machines) rather than with gambling participation as a whole, even in Western contexts.
- Despite previous research suggesting that loot box probability disclosures are implemented in ways that are difficult for players to access,^[13] our results suggest that the vast majority of loot box purchasers (**84.6%**) did manage to see them. However, only a small minority (**19.3%**) consequently spent less money.

Conclusion & Recommendation

- Future loot box research should consider cultural differences and methodology: **further replication** is needed.
- Loot box probability disclosures are **unlikely to be effective** at reducing spending. **Stronger interventions** may be required by law or self-regulation to effectively reduce harm.

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