

Global review of assessments of online video gaming policies affecting young people: Loot boxes, age ratings, gameplay time restrictions, and beyond

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ABSTRACT

Online video gaming is a highly popular activity, especially amongst young people (aged ≤ 25), with entertainment, emotional, and social benefits. However, stakeholders are also concerned about potential risks and harms, including exposure to inappropriate (e.g., violent and sexual) content; excessive use (i.e., 'addiction' and 'gaming disorder'); and overspending, particularly in relation to gambling-like products (e.g., loot boxes). Various regulatory policies have been adopted worldwide in response. We reviewed empirical evaluations of the implementation of these policies. Results showed that age rating systems that provide information on the suitability of a game's content are widely adopted; however, many young people and their parents do not follow the guidance. Restrictions on how long and when young people can play video games in Asia could be easily circumvented and are not obviously beneficial. Regulations governing gambling-like loot boxes and in-game monetary spending in Europe and Asia are poorly complied with and enforced, leaving significant consumer protection concerns unaddressed. Many aspects of the adopted policies remain untested, and the regulatory situation in many countries remains unreported in the English academic literature. Stricter enforcement of pre-existing regulations, which has not occurred, may address many concerns. More research is needed to ensure all adopted policies are regularly monitored and tested: effective policies should be considered for adoption elsewhere, whilst ineffective policies should either be improved or repealed. Governments should fund more research into countermeasures to reduce the unwanted psychosocial effects of video games.

1. Introduction

Online video gaming has gained significant popularity across the world in recent years. The video game industry trade body in Europe reports that 53% of people aged between 6 and 64 years in Germany, Spain, France, Italy, and the UK play video games [1]. Young people are more likely to play: 70% of 6–10-year-olds, 83% of 11–14-year-olds, and 78% of 15–24-year-olds, compared to 62% of 25–34-year-olds, 51% of 35–44-year-olds, and 32% of 45–64-year-olds [1]. As with any novel technology, video games can both potentially provide benefits and pose

harms. This review focuses on the regulatory policies that respond to the risks involved with young people's participation in online video gaming. However, the many advantages of engaging with online video gaming cannot be understated: for example, developing social relationships [2]; reducing stress and anxiety [3]; and helping with better learning [4].

We define 'young people' as those aged 25 or under, in alignment with an increasingly broader recognition of young adults' continuing developmental vulnerabilities beyond adolescence [5,6]. This review's focus on them is justified on two bases. First, as the figures cited above demonstrate, a higher percentage of young people play video games

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when compared to older adults [1], so the issue affects a larger proportion of the demographic. Second, policymakers and the public, including parents, are (justifiably or not) significantly more concerned about children's engagement with video games than they are with adults' engagement [7], leading to significantly more debate and research on under-18s' video gaming in particular [8] and regulatory policies that specifically target and therefore only affect young people and not older adults.

The potential risks involved with online gaming that stakeholders are concerned about can be summarised into four categories. Firstly, there is concern about the impact of problematic content (including both interactive game mechanics that allow players to roleplay violent or illegal acts and narrative-related themes, such as profanities and nudity) on young people's development. This has mostly focused on whether violent content (e.g., a video game allowing players to shoot guns at each other) may cause young people to become more aggressive. The current evidence base suggests only weak longitudinal associations between engaging in violent video games and subsequent physical aggression [9], whereas other risk factors—such as parenting practices and mental health—appear far more consequential. Other studies found no association and that this link may reflect selection effects [10,11]. Beyond potential causal effects specifically in relation to physical violence, concerns have also been raised as to, *inter alia*, whether exposure to violent video games affects young people's normative beliefs about aggression (thus normalising violent behaviour) [12], verbal aggression, hostility towards others in social environments, and anger management [13], which are more subtle, complex, and arguably harder to track and research. Regardless of potential negative consequences, it remains open for parents to decide that certain content (e.g., sexualisation, substance use, and bad language) shall be viewed as inappropriate for their child between a specific age range and thus should not be accessible until they become older. Many countries have an age rating system that advises parents and players as to the potentially problematic content that can be found in video games [14].

Secondly, there is concern about over-engagement, which ostensibly means playing video games for 'too long' and spending 'too much' time. More recent research suggests that, generally, extended time spent playing video games is not inherently harmful to wellbeing [15–18], although this does not preclude the possibility that certain players may experience harm [19]. Regarding potential 'addiction' concerns, the World Health Organization has now recognised both 'hazardous gaming' and 'gaming disorder' in the *11th Revision of the International Classification of Diseases* (ICD-11), despite some controversy and critique ([20]; cf. [21]). Such wider conceptualisations, including 'internet gaming disorder' under the *American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders* (DSM-5-TR), go beyond mere time spent and encompasses impaired control over one's playing, prioritising video gaming over other activities, and experiencing negative consequences in other aspects of life [22], such as health, educational and work-related performance, and social relationships [23]. Responding to these growing concerns, policies have been adopted in Asia to limit the amount of time young people can play video games with the aim of reducing the potential harm due to over-engagement [24].

Thirdly, there is concern associated with the (over)spending of money on video games. This is a comparatively more recent issue because, in the past, the monetary costs associated with purchasing a copy of the video game software were generally clearly disclosed and reasonably affordable. However, more recently, many games are made available for free but then offer players the opportunity to spend significant sums of money to unlock additional content by making in-game purchases [25]. It is often unclear how much would need to be spent because new updates present even more offers, and many purchases are randomised, meaning that different players would be spending different amounts of money to obtain the same items. Indeed, these gambling-like monetisation mechanics, known as 'loot boxes' [26] and 'gacha' [27], have been the most prominent issue in the video game monetisation

context due to their similarities to traditional gambling. Several countries have implemented regulations ranging from prohibiting their sale in Belgium [28] to requiring companies to disclose certain information and provide more transparency [29].

Fourthly, in contrast to offline and generally single-player games, specific concerns arise or are exacerbated by the multiplayer nature of online gaming engagement due to the involvement of many other players who are relatively anonymous and unaccountable, because they may reside in other countries beyond the jurisdiction of local law enforcement. Players interact with each other, often with large and potentially problematic age gaps between them. These concerns include radicalisation [30], cyber-bullying, grooming [31], and fraud [32], which all cause mental health harms to young people. Existing (criminal) laws should encompass these problems; however, as online gaming represents a new context within which these issues may arise, pre-existing laws might not be as easily enforceable.

Considering various concerns surrounding video games, particularly in relation to young people, policies in the form of laws, industry self-regulations, and platform rules have been adopted to address them, or pre-existing policies have been applied to this relatively novel context in an attempt to combat these issues. The effectiveness of some of these policies has been empirically assessed. However, there has been no review of all such empirical studies, which would help advise policymakers as to which policies have been effective and why, thus ensuring future policymaking is supported with an evidence base. We thus aimed to synthesise the available evidence on the effectiveness of online video gaming regulatory and policy frameworks adopted globally, as well as the challenges faced in their implementation.

2. Method

2.1. Systematic search strategy

We searched the titles, abstracts and keywords of the papers in three databases, Web of Science, Scopus, and PubMed, using the following search string: "(regulat* OR polic* OR legislat* OR law*) AND ('microtransaction*' OR 'loot box*' OR 'lootbox*' OR 'online gambl*' OR 'video gam*' OR 'videogam*' OR 'online gam*' OR 'internet gam*' OR 'computer gam*' OR 'mobile gam*' OR 'digital gam*' OR 'gaming')." The last search was done on 29 December 2024. Our search string included both online gambling- and online video gaming-related terms to efficiently produce two separate but complementary reviews using the same method (see [33]), and reflects the fact that some gambling-related texts are relevant to gaming. 'Gambling' is sometimes described as 'gaming,' so this approach also prevented possible incorrect omissions and misclassifications due to vocabulary choices [34]. The records were later separated as explained below.

Identified papers were screened for duplicates using Mendeley, a reference management software [35], and Rayyan.ai, an online application for systematic reviews [36]. The abstracts and titles of papers were screened by two independent reviewers, followed by a full-text screen of the remaining papers by one reviewer. All inclusion decisions were confirmed by two independent reviewers.

2.2. Inclusion and exclusion criteria

We included all peer-reviewed English language journal articles in the review regardless of their year of publication that met the following inclusion criteria: (i) empirical studies that (ii) evaluated policies, legislations, or regulations on (iii) online video gaming (iv) relevant to the mental health of young people aged 25 or under (i.e., any paper that includes this age group). Many policies affected everyone or all those aged over 18 and were therefore included because they could potentially impact someone aged 25 or under.

We excluded from our review those papers that dealt with (i) creative media policy in terms of economic and cultural benefits (e.g., [37]); (ii)

intellectual property law issues, including preserving heritage (e.g., [38]); (iii) taxation (e.g., [39]); (iv) contract law (e.g., [40,41]); (v) torts (e.g., [42,43]); (vi) data protection and privacy law (e.g., [44,45]); and (vii) esports policy, such as integrity and cheating (e.g., [46]), because these 'policies' broadly defined do not directly impact upon young people's mental health, although there might be tangential connections, e.g., the wider societal benefits of a strong digital culture education (see [47]) and the reduction of harm if consumers have more legal remedies against misbehaving companies, which would mean that those companies must act more socially responsibly (see [43]).

Our review focused on empirical evaluations of policy implementation that assessed product offerings, consumer experiences, and the opinions of stakeholders on those policies. Papers that only discussed policy, including those that critically examined policies but only based on argumentation (e.g., traditional doctrinal legal research), were excluded as these do not obviously present empirical evidence on the effectiveness of the adopted policies. Future research with fewer resource- and time-related constraints could consider including those

broader perspectives. We did not aim to comprehensively state what policies have been implemented, *inter alia*, based on reviews of the laws of different jurisdictions (e.g., [48]), because that aim cannot be achieved based on a review of the scientific literature as the adopted policies of many countries would not have been mentioned even once.

3. Results

3.1. Record selection

Fig. 1 details the selection process. We identified a total of 9283 records, 2979 from the Web of Science, 4979 from Scopus, and 1325 from PubMed. After removing duplicates using Mendeley and Rayyan.ai, 5622 records remained. At the initial screening stage, two independent reviewers agreed to exclude 5014 records after reviewing their titles and abstracts. In 5007 excluded records, there was no discussion of online video gaming or online gambling policy, legislation, or regulation (the vast majority of records claimed that the results have 'policy'

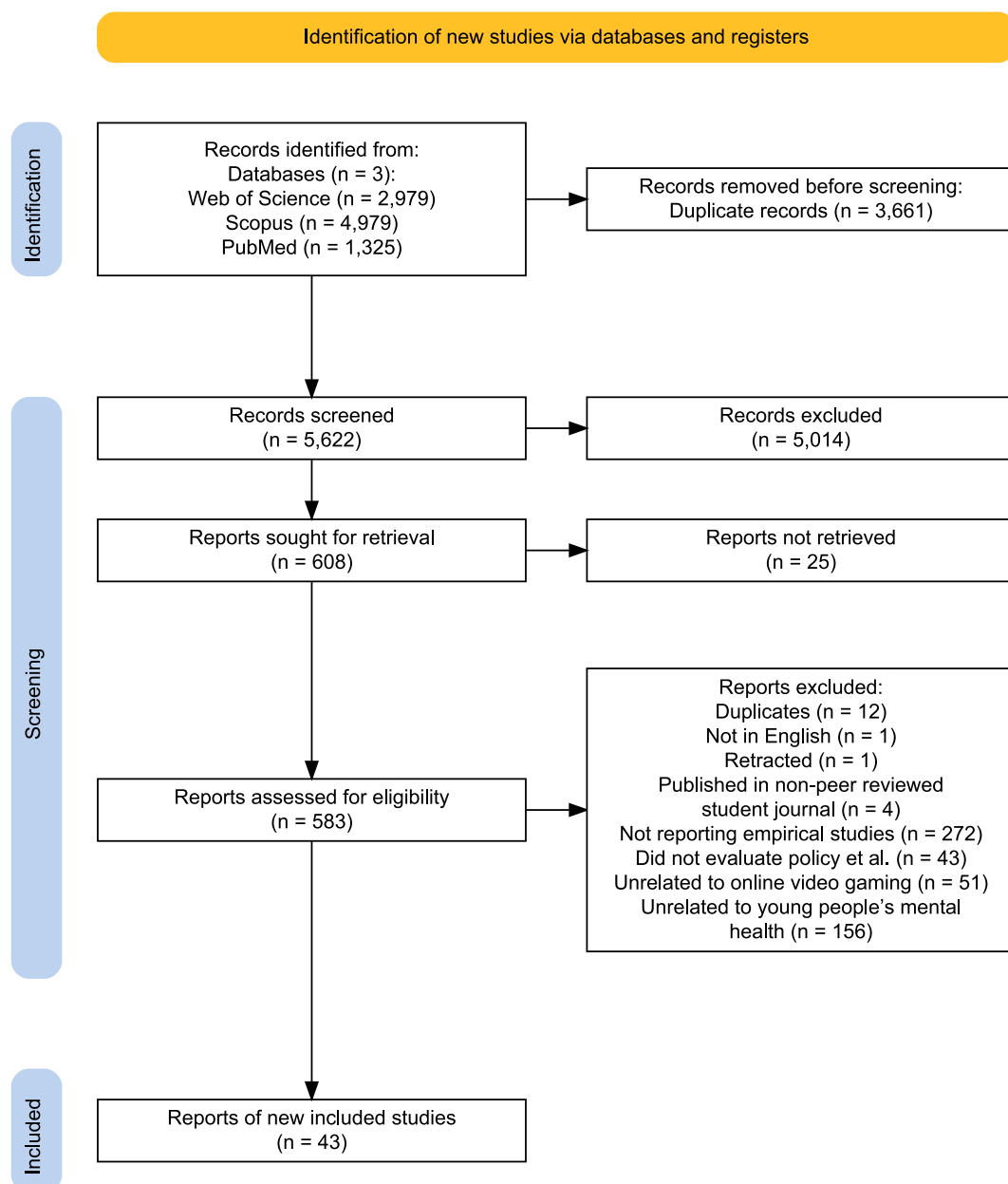


Fig. 1. PRISMA diagram of the report selection process.

implications or referred to 'regulation' in psychological and emotional contexts, which are irrelevant for present purposes but inevitably caused these records to be returned as a result using the search string, which could not have been improved to resolve this problem without risking missing relevant records that should be included). Further, four records were not empirical studies; two records were not in English; and one record was retracted, all of which were excluded.

We sought to retrieve the full text of 608 records. We could not retrieve 25 records nor determine that they should be excluded; these were mostly book chapters that were unlikely to have reported original empirical evaluations of online gaming policy. Of the remaining 583 records that were assessed for eligibility, 12 were excluded for being duplicates; one was excluded for not being in English; one was retracted; four were published in non-peer reviewed student journals (*i.e.*, US law journals); 272 did not report empirical studies; 43 did not evaluate policy, legislation, or regulation; and 51 were unrelated to online video gaming; and 156 were unrelated to young people's mental health. Many of the records that were excluded could have been excluded on multiple aforementioned bases, but were recorded as having been excluded under only one for accounting purposes. This left a final sample of 43 records that were included.

3.2. Record characteristics

The records' main characteristics are shown in Table 1. Amongst the 43 included records, 13 dealt with in-game purchases and loot boxes specifically (30.2%); 12 dealt with age rating systems (27.9%); seven dealt with in-game misconduct and crime (16.3%); six dealt with restrictions on gameplay time (14.0%); two dealt with the gambling law implications of the video gaming and gambling convergence (4.7%); two dealt with various online gaming policies in Vietnam (4.7%); and one dealt with EU consumer protection law (2.3%). There is some overlap between these themes: for example, one loot box issue (presence disclosures) is partially addressed through the age rating systems.

As to the jurisdiction(s) that the policy concerned, nine records were international (20.9%); eight concerned Mainland China (18.6%); one Mainland China, Japan, EU, and US (2.3%); six North America, *i.e.*, US, Canada, and Mexico (14.0%); three South Korea (7.0%); three the UK (7.0%); two Belgium (4.7%); two Vietnam (4.7%); one Germany; one Germany, other parts of Europe, and North America; one Europe and North America; one Australia; one European countries; one EU and EEA countries; one Norway; one Spain; one Taiwan, China (2.3%, respectively).

Although 16 studies (37.2%) directly involved consumers' or players' perspectives, few involved other stakeholders, such as parents and other family members (6 studies; 14.0%), child development professionals (1 study; 2.3%), industry members (1 study; 2.3%), and government officials (2 studies; 4.7%).

The policies identified are discussed by country and region—starting with individual countries, followed by broader regions such as Europe for policies that are more broadly applicable, and concluding with international studies that provide global coverage.

4. China

4.1. Restrictions on gameplay time

In 2019, Mainland China limited the amount of time under-18s can play online video games to 1.5 h per day and 3 h for public holidays, citing concerns about video game 'addiction' [49]. In 2021, this rule was then further tightened to one hour only, specifically between 8 and 9 PM on Fridays, Saturdays, Sundays, and public holidays. There has been no evaluation of whether online games duly implement this rule.

Conflicting evidence has been presented as to whether the game time restriction measure was effective at reducing video game play. Zendle et al. [49] analysed the gameplay patterns of over 2.4 billion user

accounts and found no evidence that either the 2019 or the 2021 rules reduced heavy video game play. In contrast, Yang et al. [50] found that the 2021 rule reduced mobile game playtime and smartphone addiction, and Zhou et al. [51] also found a reduction in gameplay time amongst the vast majority (84.7%) of 430 young people who allegedly complied with the restrictions. Some children are known to circumvent the rule by, *e.g.*, using their family member's (adult) identity to play without restrictions; renting others' (adult) accounts; or playing games that were unaffected by regulation [51]. Following the restrictions, a majority (59.3%) of children reported watching short videos, TV shows, or anime as an alternative to playing video games, casting doubt on whether the measure reduced screen time in general [51]. Notwithstanding, a sizeable minority did instead engage more often in non-digital screen-related activities, such as listening to music (45%), studying (41%), spending time with friends and family (38%), playing sports (36%), and sleeping (32%), that may be deemed as more 'healthy' or 'desirable' [51].

4.2. Restrictions on in-game spending

In 2019, Mainland China also limited the amount of money under-18s can spend on in-game purchases in each individual transaction and per month (*e.g.*, buying in-game items, including but not limited to loot boxes) using a tiered system based on the players' age, with older children being allowed to spend more [52]. However, neither the policy's implementation nor its impact has been evaluated.

4.3. Loot box probability disclosures

From 2017, Mainland China required video game companies to disclose the probabilities of getting different rewards from in-game purchases involving randomisation, such as loot boxes [29]. Basic compliance with this measure was found to have been high and nearly perfect, at least in terms of whether the most obvious loot box mechanics disclosed some probability-related information [29,53]. However, although the information was technically made available, it was often difficult for players to access the information because it was not clearly displayed [29]. This was due to the regulation not setting out specific requirements and instead giving companies wide discretion as to how to comply [54]. Some disclosures provided too much detail and may have overloaded players with information, whilst others failed to provide sufficient detail [29,54]. A uniform, industry-standard disclosure access format may be more helpful for players [29,54]. The accuracy and truthfulness of the probability disclosures also could not be independently verified by players and other stakeholders [29]: for example, whether the rare reward really has a 5% chance of being obtained in practice, as disclosed by the company. For context, many major South Korean companies have been fined by their consumer regulator for misleading players with false probability disclosures [55].

Amongst 24 interviewed players, 45.8% advocated for companies to provide more detailed probability disclosures than they currently do, although a small minority (8.3%) commented that increased transparency might reduce the excitement of purchases [56]. The majority (74.3%) of 879 Mainland Chinese players reported seeing loot box probability disclosures in the games they play [57]. However, only 19% of 362 players who bought loot boxes reported reducing their loot box spending after seeing probability disclosures, whilst 72% of players reported that their spending was unaffected, and 8% reported spending more money [57].

5. Japan

5.1. Loot box probability disclosures

Since at least 2012, the Japanese video game industry self-regulates by urging companies to publish loot box probabilities [53]. Perfect

Table 1
Characteristics of the selected records ($N = 43$).

	Author(s)	Publication Year	Policy	Jurisdiction(s)	Method(s) of Evaluation	Sample Characteristics	Sample Size(s)	Key Findings
1	Walsh & Gentile	2001	Age rating	North America	Panel study	Parents, grandparents, and child development professionals	55	Parents disagreed with age ratings and considered them to have been too low.
2	Gray & Nikolakakos	2007	Age rating	North America	Reviewing product characteristics	Games on PlayStation and Xbox in 2003	10	Age ratings did not accurately highlight all problematic content and display relevant content descriptors.
3	Kutner et al.	2008	Age rating	North America	Focus groups	12–14-year-olds (boys) and their parents/legal guardians	21 each	Most parents were aware of age ratings, and some used them, despite not understanding them.
4	Miller	2010	Age rating	North America	Reviewing product characteristics	Game magazine articles published between 1989 and 2004	110 games as shown in magazine articles	Implementing an age rating system did not stop or reduce the portrayal of violent and sexual content.
5	De Kervenoael et al.	2013	Age rating	UK	Focus groups	Divided between mobile and non-mobile game players	62	Consumers were dissatisfied that PEGI did not assess games' technical and entertainment qualities and provide more information.
6	Dogruel & Joeckel	2013	Age rating	Germany; Europe; North America	Reviewing age rating decisions and survey	Games rated by USK, PEGI, and ESRB	USK = 5612; PEGI = 3392; ESRB = 7054	A quarter of US and German adolescents played games rated unsuitable for their age and listed them as 'favourites.' Three systems (USK, PEGI, and ESRB) gave broadly consistent age ratings.
7	Jöckel et al.	2013	Age rating	Germany	Experiment	Top 50 selling games (EU and USA) 12–13-year-olds (US and German) 12–13-year-olds (boys) and their parents	USA = 344; Germany = 400 55 boys; 52 parents	Physically larger age ratings with better colour contrast were more visually prominent, but mere perception may not affect opinions on whether a game is age appropriate.
8	Laczniak et al.	2017	Age rating	North America	Survey	Parent-child (8–12-year-olds) pairings	220	Self-perceived use of ESRB age ratings by parents was related to reduced violent video game play by their child.
9	Walker et al.	2018	Age rating	North America	Survey	Parent-child (8–12-year-olds) pairings	207	Knowledge of the ESRB was related to more frequent positive co-playing between parent and child.
10	Handsley & Warburton	2022	Age rating	Australia	Reviewing age rating decisions	appeal decisions	29	Appeal decisions regarding age ratings were preoccupied with realistic violence and blood volume. Industry appeals demanded lower age ratings, whilst government and public appeals aimed to raise them.
11	Azam	2023	Age rating	Norway	Stakeholder interviews	Families with 9–17-year-olds	13	Parents took PEGI into account but also flexibly exercised discretion. The adult-only PEGI 18 rating is given more weight by parents.
12	Rial-Boubeta et al.	2024	Age rating	Spain	Survey	10–17-year-olds	2083	32% of 10–17-year-olds did not follow age rating guidance and played PEGI 18 games.
13	C. Lee et al.	2017	Restricting gameplay time	South Korea	Survey	13–18-year-olds	116,908	Late night online gaming shutdown led to negligible benefits (e.g., 1.5-min increase in daily sleep).
14	Choi et al.	2018	Restricting gameplay time	South Korea	Survey	12–18-year-olds	243,957	Late night online gaming shutdown initially negligibly reduced internet usage and later had no effect.
15	Jo et al.	2020	Restricting gameplay time	South Korea	Analysis of gameplay data shared by the industry	Under-16s and 16+ (players of a specific online game)	7218	Late night online gaming shutdown reduced gaming amongst players generally, but not amongst heavy players.
16	Yang et al.	2023	Restricting gameplay time	Mainland China	Survey	10–18-year-olds living in rural areas	459	Restrictions on gameplay time reduced mobile game playtime and smartphone addiction.

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Table 1 (continued)

	Author(s)	Publication Year	Policy	Jurisdiction(s)	Method(s) of Evaluation	Sample Characteristics	Sample Size(s)	Key Findings
17	Zendle et al.	2023	Restricting gameplay time	Mainland China	Analysis of gameplay data shared by the industry Survey	Unique user accounts of games made with Unity, a game engine	2,486,192,234	No evidence that restrictions on gameplay time reduced heavy play.
18	Zhou et al.	2024	Restricting gameplay time	Mainland China		9–18-year-olds (played ≥ 2 h daily)	430	Restrictions on gameplay time reduced game playtime but increased short video watch time and other digital screen use.
19	Whitson & French	2021	Video gaming and gambling convergence	International	Reviewing product characteristics	Daily fantasy sports and <i>Pokémon GO</i>	unreported	Pre-existing gambling law struggles to address the blurring of line between video games and gambling.
20	Zhang	2023	Video gaming and gambling convergence	Mainland China	Reviewing product characteristics	Skin gambling websites	4	Players participate in illegal gambling using in-game items that can be transferred between players.
21	Drummond et al.	2020	Ban on loot boxes as illegal gambling	International	Analysis of gameplay data that were publicly available Survey	Transactions of in-game items via the Steam Community Market	1,450,000,000	Certain loot boxes satisfy the legal definition of gambling under pre-existing law.
22	Denoo et al.	2023	Ban on loot boxes as illegal gambling	Belgium		11–18-year-olds (players)	443	Young people circumvented the country's ban on loot boxes.
23	Xiao	2023b	Ban on loot boxes as illegal gambling	Belgium	Reviewing product characteristics	iPhone games	100	Most popular games continued to sell loot boxes despite the country's ban.
24	Xiao & Henderson	2024	Ban on loot boxes as illegal gambling	Europe	Reviewing product characteristics	Steam games implementing the Steam Community Market	165	Certain loot boxes satisfy the legal definition of gambling under pre-existing law.
25	Garrett et al.	2023	Loot box presence disclosure	North America; Europe	Experiment and survey	Undergraduate psychology students 18+ (US and UK English speakers) 18+ (UK)	100 160 203	Consumers did not understand the current ESRB/PEGI loot box presence warning, which also failed to sufficiently convey potential harms. Another proposed but not adopted warning overstated potential harms.
26	Xiao	2023a	Loot box presence disclosure	International	Reviewing product characteristics	Games labelled as containing loot boxes by either the ESRB or PEGI (or both) Android games containing loot boxes	74 100	Many games failed to disclose loot box presence in their age ratings.
27	Xiao	2025	Loot box presence disclosure	UK	Reviewing advertising	Ads for games containing loot boxes on Meta-owned platforms Ads for games containing loot boxes on TikTok	185 130	Nearly all social media ads for games with loot boxes failed to disclose their presence.
28	Xiao	2022a	Loot box probability disclosure	Mainland China	Reviewing product characteristics	iPhone games	unreported	Loot box probability disclosures were suboptimally implemented, providing too much or too little information.
29	Xiao, Henderson, et al.	2023	Loot box probability disclosure	UK	Reviewing product characteristics	iPhone games	100	Many games failed to provide loot box probability disclosures required by industry self-regulation.
30	Xiao, Fraser, et al.	2023	Loot box probability disclosure	Mainland China	Survey	18+ (players)	879	Most players reported seeing probability disclosures but few reported subsequently spending less.
31	Sato et al.	2024	Loot box probability disclosure	Japan; Mainland China; EU; US	Reviewing product characteristics	Games developed in Japan, China, EU, and USA divided by region	40 each	Games developed in Asia, where relevant regulations applied, disclosed probabilities more often than European and American games.
32	Wen et al.	2024	Loot box probability disclosure	Mainland China	Stakeholder interviews	Players of games with loot boxes who spent money	24	Most players wanted probability disclosures to be provided and for even more details to be disclosed.
33	Xiao et al.	2024	Loot box probability disclosure	Mainland China	Reviewing product characteristics	iPhone games	100	Loot box probability disclosures were generally present but suboptimally implemented,

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Table 1 (continued)

	Author(s)	Publication Year	Policy	Jurisdiction(s)	Method(s) of Evaluation	Sample Characteristics	Sample Size(s)	Key Findings
34	Sax & Ausloos	2021	Consumer protection	EU and EEA	Reviewing product characteristics	<i>Fortnite</i>	1	lacking visual prominence and accessibility. Many aspects of <i>Fortnite</i> 's design were manipulative and potentially breached consumer protection law.
35	Chen et al.	2005	In-game misconduct and crime	Taiwan, China	Reviewing police records	Criminal cases	613	Non-violent crimes were committed through and in relation to online games, primarily theft and fraud.
36	MacInnes	2006	In-game misconduct and crime	International	Reviewing product characteristics	End-user license agreements (EULAs)	8	Companies may regulate the transfer of in-game items using their contracts with players, but these terms differed between games and may not have been enforced.
37	Threadgall & Horsman	2019	In-game misconduct and crime	International	Reviewing product characteristics	Data retention policies	40	Failures to retain data and cooperate with law enforcement made online game-related crimes difficult to police.
38	Ruberg	2021	In-game misconduct and crime	International	Reviewing product characteristics	Twitch policy documents	6	Livestreaming platform rules showed social bias, e.g., against women.
39	Faraz et al.	2022	In-game misconduct and crime	International	Reviewing product characteristics	Gaming platforms	5	Safety features varied across platforms, with only some providing parental controls.
40	Grace et al.	2022	In-game misconduct and crime	International	Reviewing product characteristics	Codes of conduct of online multiplayer games	32	Codes of conduct were written in inaccessible language that players may struggle to understand.
41	Saltman & Karhili	2024	In-game misconduct and crime	International	Reviewing product characteristics	Game and game-adjacent platforms	5	Different platforms have inconsistently made available a variety of safety features.
42	Phan	2019	Various policies	Vietnam	Stakeholder interviews	Industry and governmental stakeholders	16	Various online gaming policies were adopted in Vietnam, but implementation and enforcement were difficult.
43	Phan	2021	Various policies	Vietnam	Stakeholder interviews	Governmental stakeholders	4	Various online gaming policies were adopted in Vietnam, but implementation and enforcement were difficult.

(100%) compliance was observed amongst 10 popular Japanese games [53]. There has been no evaluation of the policy's impact on players.

6. South Korea

6.1. Restrictions on gameplay time

Between 2011 and 2021, under-16s were prohibited from playing online games on PC platforms (but not mobile platforms, although console platforms were also restricted) between midnight and 6 AM the next day [58–60]. Immediately following imposition (*i.e.*, within 14 weeks of implementation), the policy reduced players' gameplay time and worked well at preventing players who did not already play heavily from playing more [59]. However, the policy was not effective at reducing excessive play amongst players who were already playing heavily [59]. Therefore, this policy had only very limited effects. However, even though Choi et al. [58] also found a statistically significant reduction in internet usage (and, importantly, not specifically gaming) time during the first year of implementation, this was a reduction of less than 5 min per day, which was viewed as practically insignificant. This reduction also disappeared within three years of policy enforcement [58]. Adolescents' sleep time did not increase, and thus one of the main aims of the policy was not achieved [58]. The policy's failure may be attributed to its limited scope (only targeting certain hours of the day and only targeting certain types of video games) and easy circumvention (*e.g.*, by using the ID of anyone aged 16 or above) [58]. C. Lee et al. [60] presented broadly similar evidence that

although there were statistically significant changes within one year of policy implementation, the reduction in the probability of experiencing 'internet addiction' (0.7 percentage points) and the increase in sleeping time (1.5 min per day) are both practically insignificant.

7. Vietnam

7.1. Various restrictions and regulations

Online video gaming is regulated with a number of laws in Vietnam that were successively published in the last two decades [61,62]. Reportedly, these included, *inter alia*, restrictions on gameplay time to 5 h per day; bans on foreign games; bans or restrictions on specific genres of video games (specifically, shooter and card games); increasingly stricter regulation of online games, including a licensing system; bans on under-14s from using Internet cafés without parental consent; bans on Internet cafés opening overnight during late night and early morning hours; and a content and age classification system for video games [61,62]. However, according to stakeholders, these rules were not necessarily enforced effectively and often were not enforced, and the piece-meal process through which these regulations were gradually adopted meant that there were often regulatory gaps and delays in addressing them [62]. Companies reported experiencing delays when applying for a license because the process was complicated such that it did not meet the timeline advertised by the regulator [61]. Players reportedly experienced difficulties accessing video game content as a result of these regulations [62]. The possible legal ownership status and

any associated monetary value of in-game items purchased by players remain unclear under existing regulations [61]. There has been no research empirically assessing companies' compliance with these policies or the policies' impact on players.

8. UK

8.1. Loot box presence disclosure

On the basis of consumer law and advertising regulations, video game advertising is required to disclose, if relevant, the presence of in-game purchases generally and also the presence of in-game purchases involving randomisation, e.g., loot boxes, specifically: non-disclosure means that the ad is misleading for failing to provide important information to the consumer [63]. Only 7% of 185 social media ads published on Meta-owned platforms (e.g., Facebook and Instagram) and 100 TikTok ads for games with loot boxes disclosed their presence, and most of the few disclosures made were also not sufficiently visually prominent [63].

There has been no evaluation of the policy's impact on players, although the warning label is often the same as or highly similar to the one adopted by PEGI, the regional age rating organization as explained below, ('In-Game Purchases (Includes Random Items)') that fail to convey the potential harms of in-game purchases involving randomisation and consumers do not understand [64].

8.2. Loot box probability disclosure

Platform rules, such as that of the Apple App Store, require loot box probability disclosures as a form of industry self-regulation [65]. A third of the 100 top-grossing games did not make probability disclosures as required, and the disclosures that were made were visually hard to find and difficult to access [65]. There has been no evaluation of the policy's impact on players.

8.3. Other video game advertising rules

Advertising regulations prohibit other forms of misleading advertising (e.g., ads that show purported gameplay that cannot in fact be found within the game) and socially irresponsible advertising (e.g., glorifying gambling; sexualising young characters; and objectifying women). However, ads breaking these rules were observed as having been recently published to promote popular video games [63]. There has been no assessment of companies' compliance or evaluation of the policy's impact on players.

9. Belgium

9.1. Ban on loot boxes

Applying pre-existing gambling law, the Belgian gambling regulator determined in 2018 that in-game purchases involving randomisation in video games constitute unlicensed and therefore illegal gambling [28,66]. This interpretation of the law has been confirmed by the Enterprise Court of Antwerp in January 2025 in the case of *LS v Apple* (ECLI:BE:ORANT:2025:JUG.20250116.1); the Court of Justice of the European Union was asked to decide whether Apple as the app store platform that hosted the video game containing illegal loot boxes and took payment for those illegal transactions as well would be liable for damages (i.e., refund of money spent on illegal gambling). However, as the parties have since settled their dispute out of court, no judgment will be rendered and published.

In terms of compliance, amongst the 100 highest-grossing iPhone games on the Belgian Apple App Store, 82 games still sold illegal loot boxes in 2022 [28]. This is because the law has not been enforced by the regulator due to a lack of resources [28]. Very few games took technical

measures to prevent loot boxes from being purchased by Belgian users, and certain other games were removed or not published in the country; however, these access restrictions were easily circumventable, meaning that Belgian players could still spend money on illegal loot boxes in those games if desired [28]. In terms of the policy's impact, Denoo et al. [66] found that at least 13.3% of 453 Belgian 11–18-year-olds admitted to circumventing the ban on loot boxes: methods included changing the user account's country setting and using VPNs to bypass IP checks [66]. Young people who circumvented restrictions were more at risk of potential harm and engaged more often with risky adjacent behaviours (e.g., skin gambling).

10. Germany

10.1. Video game age rating system: generally

Unlike other parts of Europe that use PEGI as explained below, Germany has its own video game age rating system: the Unterhaltungssoftware Selbstkontrolle (USK) [14,67]. Games are rated through the USK playtesting the actual software [14]. The five available self-explanatory age ratings based on § 14 of the Jugendschutzgesetz (JuSchG; Protection of Young Persons Act) are: USK 0+, 6+, 12+, 16+, and 18+ [14]. A game may also be denied an age rating. The USK must act on the basis of the JuSchG and thus can be categorised as a form of co-regulation, as the USK is independent but the German government is able to require the USK to act in certain ways [14]. For example, since 2023, the German government has required the USK to consider the presence of loot boxes when giving games age ratings, resulting in games with loot boxes being generally rated at least USK 12+, even when they otherwise contained no objectionable content that is unsuitable for younger children [29,68].

Dogruel and Joeckel [14] compared the age rating decisions of the USK with those of the ESRB and PEGI used in North America and Europe respectively (as explained below) and found broad agreement: this consistency is arguably some evidence supporting the accuracy of the decisions. As to the visual implementation of the age rating, a 2008 reform of the JuSchG required an improvement to visual prominence [67]. Jöckel et al. [67] found, through an eye-tracking experiment, that a physically larger label with better colour contrast that conformed to the required and standardised placement (of being on the front cover of the game's packaging) was perceived more by adolescents and parents and thus more salient than an older label from before the law reform. However, helping consumers to better perceive these age ratings labels may not affect their views about the age-(in)appropriateness of the video game and whether the advice is followed.

In terms of adherence by consumers (e.g., parents or children), there is little reported evidence. Dogruel and Joeckel [14] found that when asked to list their three favourite games, a quarter of German adolescents self-reported games that the USK had rated as not appropriate for them, suggesting a degree of non-compliance with age rating advice.

11. Australia

11.1. Video game age rating system: generally

Australia has its own legally binding video game age rating system operated by the Australian Classification Board [69]. The Guidelines for the Classification of Computer Games 2023 (Cth) are the up-to-date version of the guidance on how games should be rated. The possible age ratings are: 'G' or 'General' for suitable for everyone; 'PG' or 'Parental Guidance' for not recommended for children under 15 without parental guidance; 'M' or 'Mature' for not recommended for children under 15; 'MA 15+' or 'Mature Accompanied' for legally restricted to people aged 15 or above; and 'R 18+' or 'Restricted' for legally restricted to adults aged 18 or above only [70]. Consumer advice is also provided in relation to the six classifiable elements upon which the age rating was

based: 'themes, violence, language, drug use, nudity and sex.'

There has been no empirical assessment of the Australian video game age rating system's implementation, except in relation to applications before the Australian Classification Review Board appealing for either a higher or lower age rating than what was previously given in relation to the violent content in video games [69]. The industry would apply to lower an age rating, whilst the government and the public would apply to heighten an age rating. Handsley and Warburton [69] found that there was a focus on how realistic the violence was and how much blood there was in these appeal decisions, even though psychological research may not support such a preoccupation. Further, these decisions were not necessarily made by entirely following the rules that were in force at the time: certain aspects were taken into account or given more weight when they should not have been and *vice versa*. More detailed guidance as to what should or should not be considered as relevant would make the decisions more consistent and objective.

12. Europe

12.1. Video game age rating system: generally

PEGI (Pan-European Game Information) is the European industry self-regulatory body that provides age ratings for video games based on their content, e.g., the amount and intensity of violence and sexualisation [71,72]. The system is widely used in Europe [71], except in Germany and parts of Austria, where the equivalent USK is used instead [14,67,72]. The PEGI age ratings are either advisory only or incorporated into national media law depending on the individual jurisdiction ([71], p. 1158; [14]): for example, the ratings are legally enforceable in Lithuania on the basis of Resolution No. 1121 of 21 July 2010 (Žin, 2010, Nr. 90-4779). The eight content categories that are moderated (and arguably censored) are 'violence, sex, bad language, discrimination, drugs, gambling, fear, and in-game purchases,' and the five possible age ratings are '3, 7, 12, 16, and 18' ([71], p. 1158). The 'PEGI!' (with only an exclamation mark) or 'Parental Guidance Recommended' rating is exceptionally used against *Roblox*, which is 'considered as a platform with diverse content rather than an individual game product' [73] due to the large amount of third-party, user-generated content in that game or gaming platform ([72], p. 25).

PEGI is primarily intended to inform parents of underage video game players as to (i) what type of potentially problematic content is found within a specific game and (ii) what age group of young people a specific game is suitable for [71]. For physically released games (e.g., as a disc for console games), the rating decision is manually made by PEGI. However, for games that are only digitally released (e.g., on the Google Play Store for Android), the rating decision is made automatically after the game company completes a questionnaire through the IARC (International Age Rating Coalition) system, although this may be manually updated by PEGI later if necessary [72]. A notable exception is that the Apple App Store for iOS games (e.g., iPhone and iPad) did not adopt the PEGI system and instead uses Apple's own proprietary age rating system [72,74].

There has been no assessment as to how accurate the PEGI age ratings are (whether games with certain problematic content have been given a high enough age rating), except that they are generally consistent with ESRB and USK age ratings, except that sexual content is viewed more permissively under PEGI [14]. This consistency circumstantially suggests reasonable accuracy.

In practice, Norwegian parents expressed that they did take PEGI age ratings into account but were willing to exercise discretion and be flexible based on their own experience [71]. The highest PEGI 18 age rating, signifying that the game is suitable for adults only, is more strictly respected, and the system is generally used the most by parents to address concerns with violent content [71]. Rial-Boubeta et al. [75] reported that 32% of 2083 Spanish 10–17-year-olds did not follow age rating guidance and played PEGI 18 games, increasing to 47% amongst

those participants who played games monthly. Boys were more likely to have played PEGI 18 games than girls, as were older children compared to younger ones [75]. Playing PEGI 18 games whilst underage was linked to bullying, cyber-bullying, and victimisation [75]. (However, it must be highlighted that this cross-sectional study could not establish causation: playing PEGI 18 may not have been the cause of any negative social behaviours; both might have been caused by potentially confounding variables that were unaccounted for, such as a lack of parental monitoring.) Combined, these results suggest that engagement with and adherence to the PEGI age rating system may differ across and within European cultures. A substantial number of underage players and their parents may not be following the age rating guidance.

12.2. Video game age rating system: in-game purchases specifically

As mentioned, one aspect that PEGI considers is the presence of in-game purchases, including the presence of in-game purchases involving randomisation (e.g., loot boxes) specifically [64,71,72]. However, notably, up until June 2026, although their presence would be explicitly mentioned in the age rating information provided for specific games, neither the presence of generic in-game purchases nor the presence of loot boxes is taken into account when deciding which specific age rating a game should be given (*i.e.*, PEGI 3, 7, 12, 16, or 18). This is unlike other categories of potentially problematic content (e.g., violence and sexual content), which do affect the 'age' part of the age rating. PEGI only denotes the presence of in-game purchases generally and loot boxes specifically and does not use them as a basis for deciding whether a game is suitable for younger children. This means that a game containing loot boxes may be rated the lowest possible PEGI 3, because their presence is irrelevant to that 'age' aspect of the age rating decision [72]. For context, in contrast, the German USK and Australian age rating systems are required by law to consider the presence of loot boxes and give games higher age ratings (e.g., 'USK 12' and 'M' or not recommended for under-15s) per § 10b(3) of the JuSchG and the Guidelines for the Classification of Computer Games 2023 (Cth), respectively [76,77].

As to compliance and enforcement, for games intended for physical release that were manually rated by PEGI, compliance is high, although isolated cases of mistakes were identified, where a game containing loot boxes were not declared as such by the game company causing PEGI to fail to label their presence as part of the age rating [72]. For digitally released games that were automatically rated through the IARC questionnaire, compliance is much lower: 71% of 100 popular games with loot boxes were found to have failed to disclose their presence in their product listing page on the Google Play Store [72]. The identified mistakes were corrected, but many other cases remain likely uncorrected [72]. Parents can more confidently rely on the in-game purchase-related information provided by PEGI for physically released games (e.g., on console platforms) than on the ratings of digitally released games (e.g., on mobile phone platforms).

Garrett et al. [64] found that the loot box presence warning label of 'In-Game Purchases (Includes Random Items)' is poorly understood possibly because the label does not explicitly reference 'loot boxes,' 'gacha' or similar terms that players and parents might be more familiar with. In addition, the current label fails to convey to consumers a sufficient level of potential harm, *i.e.*, fails to deter consumers from participation as strongly as would be viewed as appropriate [64]. For comparison, a warning label that was considered for adoption (but ultimately was not adopted) in the US state of Illinois was found to have, in comparison, overstated the potential harm of loot boxes [64].

UK consumers have also noted their dissatisfaction that neither PEGI nor any other system assesses the technical and entertainment quality of video games (e.g., whether a game is of satisfactory quality, in terms of not suffering from too many software bugs, and whether a game is sufficiently 'fun,' which would be subjective) and fails to advise players as to the total monetary cost that may be associated with playing online games [78]. The lack of such quality control means that potential

breaches of consumer law by video game companies are not monitored and more effectively deterred.

12.3. Consumer protection law

EU consumer protection law, such as the Unfair Commercial Practices Directive 2005, prohibits companies from using certain practices that might harm consumers. Sax and Ausloos [79] analysed the popular video game *Fortnite* and argued that many aspects of the game are manipulative and may be in breach of consumer law, such as abusing psychological biases and irrational thinking. For example, the game gave the false impression that certain items are only available for a limited amount of time using a countdown timer, thus taking advantage of the player's fear of missing out (FoMO) and putting pressure on them to make an immediate and possibly impulsive purchase, even though the product would in fact be offered again for purchase later [80]. The Dutch consumer regulator has since taken enforcement actions against *Fortnite* by fining the company more than €1.1 million [81,82]. The company's appeal remains pending [83].

13. North America

13.1. Video game age rating system: generally

The Entertainment Software Rating Board (ESRB) is the industry self-regulator that provides age ratings for video games based on their content, e.g., the amount and intensity of violence and sexualisation [84]. The ESRB system is widely used in North America (i.e., the US, Canada, and Mexico) but is also informally used in other places around the world [72]. The eight content categories that are moderated (and arguably censored) are: substances; blood/gore; humor; violence; gambling; language; nudity; and sexuality. If an element falling within one of those aforementioned categories (e.g., 'use of drugs' or 'partial nudity') is present, a 'content descriptor' referencing that element will be attached to the game's age rating [14]. The five possible ratings are: E for 'Everyone'; E 10+ for 'Everyone 10+' (which was introduced a while after the others); T for 'Teen' or ages 13 and above; M for 'Mature 17+' and AO for 'Adults Only 18+'. The ESRB also highlights the presence of certain mechanics, although they do not affect the age rating: in-game purchases; in-game purchases including random items; user interaction; sharing location; and unrestricted internet [85]. The ESRB age ratings remain advisory only in the US after attempts to formally legalise them failed due to the court finding that such restrictions would infringe free speech [86,87], but some of its aspects (the higher age ratings) are legally enforceable in certain Canadian territories: for example, in Ontario based on the Film Content Information Act 2020. Similar to PEGI, in North America, the ESRB manually rates video games intended for physical release but only based on recordings of gameplay submitted by the company [14], whilst games that are released only digitally are automatically rated through the IARC system based on the questionnaire answers provided by game companies [72]. Again, the exception is that iOS games on the Apple App Store do not use the ESRB age ratings as Apple applies its own system [72,74].

About twenty years ago, Gray and Nikolakakos [88] examined two games in depth and found that the ESRB listed only very few content descriptors and thereby failed to identify all problematic content: for example, even though 'mature sexual themes' and 'use of drugs' were present in *Grand Theft Auto* games, they were not identified using the relevant content descriptor; instead, only 'blood,' 'strong language,' and 'violence' were identified. These significant omissions and discrepancies may have been due to the ESRB making 'manual' age rating decisions based merely upon reviewing footage of the game that the company presented as representative (see [14]), and not by actually playing the game to identify potentially more hidden content [88]. Certain 'socially questionable content,' such as ethnic stereotyping and racism, which are also problematic and concerning to parents, is not specifically

highlighted [88]. (In contrast, Europe's PEGI age rating system currently has a dedicated 'Discrimination' content descriptor designed to specifically address such issues [89], as compared to only based on a broad interpretation of 'violence' or 'strong language' under the ESRB system.) Gray and Nikolakakos [88] also cited the US Federal Trade Commission's research indicating that 85% of underage children were able to access M-rated games. It is unknown whether more recent age rating decisions have become more accurate and comprehensive in terms of content descriptors.

Early research published in 2001 found that parents often disagreed with the age ratings given by the ESRB to video games [84]. Generally, parents thought that the ratings were too low, i.e., certain content that was rated as appropriate for a certain age group was deemed to have been inappropriate for that age group by parents. The 17+ (M for 'Mature') and young children (E for 'Everyone') age ratings are generally agreed with by parents, whilst the teen rating is controversial. Violence was the key area of disagreement. More than two decades have passed since then, so it is unclear whether those findings are still applicable today as the rating decisions may have improved and are now better calibrated with parents' expectations. In particular, it should be highlighted that the more middle ground 'Everyone 10+' age rating was added after Walsh and Gentile [84] conducted their study (see [86]), possibly alleviating some of the concerns raised.

Kutner et al. [86] conducted a survey asking both US parents and male children about, *inter alia*, their experience with the ESRB age ratings. Most parents were aware of them, and some reported using them to make decisions, which most often was to disallow all M-rated games. But parents often did not have a good understanding of what the ratings meant and what the differences between various ratings might have been. Male children reflected that their parents kept a closer eye on M-rated games and potentially removed access, but often only after those games have already been rented or purchased by the boys. They also reported gaining access to restricted games by visiting friends or relatives. Both parents and sons agreed that monitoring video game play and exposure to inappropriate content is difficult, with restricting access being the most common mediation strategy. Some parents watched gameplay to assess them, but very few boys reported their parents or adult relatives playing the games with any regularity.

Miller [87] retroactively assessed whether the implementation of the ESRB age rating system since 1994 may have been associated with a reduction of violent and sexualised content. Causation could not be proved, and the investigation was based on articles in video game magazines rather than actual gameplay. Results indicated that video games became significantly more violent from 1994 to 2004, so the implementation of the ESRB age rating system or rather the new threat of receiving a higher age rating (e.g., M) did not deter companies from implementing such content. In contrast, sexualised content did not increase as obviously. This suggests that the ESRB age rating system, besides informing consumers, may not be effective at *reducing* problematic content or preventing it from being created, which arguably is not its aim.

Assessment on whether North American young people and parents respect and adhere to ESRB age ratings remains lacking. Dogruel and Joeckel [14] found that a quarter of US adolescents self-reported playing games that were rated as not appropriate for them by the ESRB when asked to list their three favourite games, indicating a degree of non-compliance with age rating advice. Lacznik et al. [90] reported self-perceived use of the ESRB age rating system by parents is related to reduced video game play, reduced violent video gameplay, and even reduced negative behaviours in school. A different study by the same research group found that a parent's knowledge of the ESRB age rating system was related to how often they played video games with their child ('co-playing'), which might help to reduce potential harms [91]. The research on PEGI age ratings discussed above is relevant due to the two systems' similarities (see [71,75]).

13.2. Video game age rating system: in-game purchases specifically

Similar to PEGI, in North America, the ESRB draws the consumers' attention to the presence of in-game purchases and those involving randomisation, e.g., loot boxes, using the label 'In-Game Purchases' and 'In-Game Purchases (Includes Random Items),' respectively. Games intended for physical release are manually rated by the ESRB, whilst digitally released games are rated through the IARC system, just like with PEGI in Europe.

As to compliance and enforcement, isolated cases of mistakes were also identified in relation to manual rating decisions made by the ESRB: this was likely caused by the video game company failing to disclose the presence of loot boxes to the ESRB, and the ESRB subsequently failing to notice their presence [72]. Because the IARC system, which includes both the ESRB and PEGI, applies globally in relation to many digital game distribution platforms, like the Google Play Store, Xiao's findings that many popular Android mobile games failed to disclose loot box presence on their product listing page is also applicable to North America [72].

14. Worldwide

14.1. Codes of conduct and safety features of platforms and games

Misconduct by players inside video games may cause mental health harms to young people playing those games: for example, the publishing of terrorist, violent extremist, and child exploitation content through video games [30]; cyberbullying; grooming; and sexting [31]. These are generally regulated and enforced through the codes of conduct of games and the platform rules of livestreaming platforms [92,93]. Research has identified that these rules are inconsistent [30,31]; phrased in inaccessible language that players might struggle to understand [92]; and show social bias, e.g., against women [93]. A few games state in their privacy policies that in-game activities, such as chats, will be moderated either manually or automatically; however, insufficient detail about the process was provided [74]. Different platforms provided varying safety features, with only some providing parental controls, including monthly spending restrictions and screen time limits [31].

14.2. 'Traditional' crimes are committed in and through online games

It was reported as early as 2002 that crimes committed through or in relation to online games, including theft and fraud, were rapidly growing in Taiwan, China [32]. These were generally non-violent but were certainly capable of causing financial and mental health harms. Both victims and offenders tended to have been young men aged between 15 and 25. Failure on the part of companies to retain relevant data and cooperate with authorities might make law enforcement difficult [74]. Game companies have attempted to regulate virtual items and economies in different ways, with the end user licensing agreement (EULA) between the player and the company taking different stances across various games [94]. In-game items being transferable between players means that those items consequently gain a real-world monetary value and thus become relevant to criminal activities. Some games prohibit in-game items from being sold to other players in exchange for real-world money, whilst others do not forbid it or even encourage it; however, even the games that prohibit trading in-game items for real-world money do not necessarily enforce those rules, rendering their legal status unclear [94].

14.3. Blurring of lines between video games and gambling

Broadly, it has been observed that video games are increasingly implementing gambling-like mechanics that cost real-world money. Simultaneously, certain gambling-like products (e.g., fantasy sports) purport to be based on skill in order to position themselves closer to

skill-based games, rather than chance-based gambling. This blurring of lines between video games and gambling makes pre-existing gambling law that did not envision such developments difficult to apply and enforce, requiring these laws to be updated, until which time certain novel products may not be sufficiently regulated to ensure player protection, particularly in relation to young people [28,95,96]. Players can, and many do, participate in illegal gambling by using in-game items as the stake because the virtual items from some games can be transferred between players [97].

14.4. Failure to enforce gambling law in relation to loot boxes in video games

Empirical reviews of product characteristics revealed that certain implementations of loot boxes in video games legally constitute 'gambling' in many countries [96,98]. Specifically, these are the mechanics that (i) cost real-world money to engage with; (ii) are randomised; and (iii) offer rewards that are transferable between players (i.e., can be sold to another in exchange for real-world money, thus possessing economic value). In contrast, video game mechanics that do not satisfy all three criteria are not regulable as gambling in most countries. Most loot boxes that the public is concerned about can escape scrutiny because they do not fulfil criterion (iii) above because the rewards obtained cannot be transferred between players.

Gambling regulators in various countries, particularly in Northern Europe, have published interpretations of the law affirming the above (e.g., [99]). However, they have generally not subsequently enforced the law. On the Steam platform for PC games, 35 games were identified as offering loot boxes that would constitute illegal gambling. These included some of the most popular games in the world with hundreds of thousands of concurrent players at any given time, such as *Counter-Strike* and *Dota 2* [96].

15. Discussion

Several countries have adopted regulation (e.g., laws, industry self-regulations, and platform- and game-level rules) to address mental health concerns associated with video games. However, generally, the implementation of these measures has rarely been empirically assessed in terms of compliance by companies and efficacy at influencing consumer behaviour in the desired direction and protecting young people. Four main categories of regulation were identified.

Firstly, in terms of age rating systems, which have been widely adopted globally, research has identified benefits but also suggested that they might not be followed by a substantial number of parents and young people. Concerns have also been raised about the accuracy of those ratings.

Secondly, in terms of restrictions on video game playtime and certain specific mechanics, research generally suggests that these measures are ineffective because they can be easily circumvented. Some very limited positive changes have been found, but these were practically insignificant; dissipated after some time; or even wholly disputed by other studies.

Thirdly, in terms of regulations dealing with in-game purchases involving randomisation (e.g., loot boxes) specifically, there has been significantly more policy research, in comparison to other regulations. However, the results generally indicate poor compliance and enforcement in many cases. The measures' efficacy has also either been untested or found to have been unsatisfactory. Many of these studies were led by one researcher, who also led this review, thus limiting the number of perspectives involved in this debate.

Fourthly, crimes and other problematic behaviours (that may not necessarily constitute crimes but would harm young people's mental health) can be committed in the online gaming context. However, pre-existing laws and enforcement regimes struggle to deal with these technological developments. The platform and game rules designed by

companies also do not adequately assist because these are often unclear, inconsistent, inaccessible, or unenforced, thus rendering them ineffectual.

As to the effectiveness and costs of the current regulatory and policy frameworks, for example, we cannot comment with confidence as to the age rating system due to a lack of assessments: some families follow the guidance, whilst others do not. A cost-benefit analysis has never been conducted. Different countries' age rating systems also vary. The industry tends to bear the costs associated with the age rating process and funds the overall operation. However, this also means that the design of the age rating system may be subject to industry influence and commercial pressure, *e.g.*, what risky elements are highlighted (or not) and to what degree. The efficacy (or lack thereof) of the in-game purchase- and loot box-related measure adopted by the ESRB and PEGI may have arguably been curtailed due to industry conflicts of interest [64,72].

This type of potentially biased industry self-regulation gives rise to ethical concerns, particularly when heavily or even exclusively relied upon by governments to deal with public health concerns. The co-regulation approach in Germany and the government regulation approach in Australia, where the government retains (some) control over the age rating criteria, may be more advisable. Indeed, pending PEGI changes that will take effect only from June 2026, these are the only two jurisdictions in the world where a minimum age recommendation has been placed on loot boxes (12+ in Germany and 15+ in Australia), thus showing how more active government involvement might enable a more rapid and effective response, leading to better outcomes for child protection. More government intervention is necessary in the online gaming space to address various concerns, including better enforcement of existing laws and the adoption of new laws. However, this must be done cautiously and with due deference to both the psychological and policy-implementation evidence bases.

Five common barriers faced by various categories of online gaming regulations can be identified. Firstly, the imposition of some measures (*e.g.*, strictly restricting gameplay time) was not necessarily supported by scientific evidence, meaning that, unsurprisingly, post-implementation evaluations revealed that they provided little to no practical benefit to young people. Secondly, some measures (*e.g.*, age ratings, a loot box ban, gameplay time restrictions) could be (easily) circumvented by young people because they are either advisory only and not legally binding or due to a lack of robust age verification and enforcement. Thirdly, certain measures required multiple parties to collaborate to ensure proper implementation, but they have failed to consistently cooperate. For example, displaying a loot box presence label on an app store requires the video game company to declare it, the age rating organization to confirm it and police any non-disclosures, and the app store to publish it. However, any one party could render the measure ineffectual if they fail to do their part. Indeed, fourthly, parts of the industry, either by choice or due to a lack of awareness, have poorly implemented several measures or failed to implement them at all (*e.g.*, the requirement to disclose the presence of loot boxes in advertising [63]), thus reducing their efficacy. Fifthly, globally, there has also been a lack of enforcement by regulators against the industry for failing to implement required measures and therefore not complying with regulations, so there were no repercussions for not following the law.

Looking ahead, the better enforcement of pre-existing gambling, consumer protection, and advertising laws can already provide more protection to young people. Consumer regulators in the EU and the advertising regulator in the UK, for example, have taken action to publish advice for companies as to how to better comply with regulations to ensure higher consumer protection [100–102]. Other countries' regulators are encouraged to similarly proactively address novel problems and potential mental health harms posed by the online video gaming industry.

Governments are advised to fund more video game-related research if they are concerned about mental health problems associated with video games, because policymaking should be evidence-based. The UK

Video Game Research Framework, which provides official government advice on how to conduct video game research, is an admirable prototype, but it could be improved with earmarked research funding dedicated to key policy focus areas [103]. All countries would benefit from mutual cooperation and learning from each other's experiences. If one country adopted a certain rule, evidence as to the implementation of that rule in that country should be considered when making policy decisions in other countries. Good examples should be emulated, but mistakes must be avoided and not repeated.

16. Limitations

Although we used a systematic search strategy to identify relevant records, we did not strictly follow any systematic or scoping review protocols due to resource constraints. Our country-by-country summary is an alternative and arguably more practically useful method for reporting the results that can be more easily understood by policymakers and non-legally trained researchers, amongst others. Following established systematic or scoping review protocols (*e.g.*, [104,105]), future studies should conduct quality assessments on the included empirical studies and otherwise identify and organise emerging topics and themes.

We cannot say that there is no policy dealing with either online video gaming or online gambling in the countries that have not been mentioned; however, we were unable to find any empirical assessments of the implementation of any such policies in the English academic literature. We can only conclude that there is a lack of relevant research, which might be partly due to the lack of any relevant policies in certain countries but may also be due to some countries not having as much research funding to support the empirical evaluation of policies that have indeed been adopted.

We took the descriptions of the policies mentioned in and evaluated by the scientific literature at face value and as read. It is possible that the description of a certain policy was inaccurate or even incorrect in the academic literature, as is known to have occurred in some previously published peer-reviewed works (*e.g.*, [106], pp. 1–2; see [107], p. 119). We did not conduct independent legal research to verify whether the policies were correctly described or were updated since the original research was published due to research resource constraints, except that we did rely upon our pre-existing expertise and knowledge of the policies in certain jurisdictions that we were already familiar with to ensure accuracy and completeness.

Our description of the regulatory position of certain jurisdictions (*e.g.*, Vietnam) hinged on only one or two secondary sources authored by the same single researcher and without us having consulted the primary source (which has not been duly referenced or archived), which is not ideal. Those sections are generally less detailed and arguably less dependable than other sections (*e.g.*, on China), that relied upon multiple independent sources that corroborated each other. The publications we reviewed often failed to identify and reference the specific policy document from which the policy being evaluated originated from (*i.e.*, the primary source), making it difficult for other researchers like us to later verify the information. We would have had to conduct independent legal research, which would have been highly time-consuming and likely required foreign language and local research skills. Future research should ensure that any relevant policy document is properly referenced and ideally archived in a data deposit repository for public sharing without any access restrictions. Comprehensive reviews of relevant legislation and regulatory documents should also be conducted, following the example set by traditional gambling research [108].

17. Conclusions

Stakeholders are concerned about the potential harms online video gaming may cause to young people. Various policies have already been adopted in different countries. However, the compliance, enforcement, and efficacy of many video game regulatory measures remain entirely

untested and unknown. More research must be conducted, and governments should duly fund them to ensure evidence-based policymaking that respects the interests of all stakeholders, including young people and the industry. Certain older studies from, *e.g.*, more than two decades ago, are informative, but they have not been conducted again to assess any subsequent changes, so it is difficult to justify heavily relying on them. Continued monitoring is recommended: after a rule has been adopted, various facets of its implementation should be regularly assessed. Rules that work well can always be improved, and rules that do not work must be reconsidered either for repeal or significant amendment.

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CRediT authorship contribution statement

Leon Y. Xiao: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Supervision, Visualization, Writing – original draft, Writing – review & editing. **Andrea Czako:** Conceptualization, Funding acquisition, Methodology, Project administration, Resources, Software, Supervision, Writing – review & editing. **Callum Deery:** Investigation, Validation, Writing – review & editing. **Conor Heath:** Investigation, Validation, Writing – review & editing. **Orsolya Kiraly:** Conceptualization, Funding acquisition, Methodology, Writing – review & editing. **Daniel King:** Writing – review & editing. **Zsolt Demetrovics:** Conceptualization, Funding acquisition, Methodology, Project administration, Supervision, Writing – review & editing.

Conflicts of Interest

L.Y.X. has provided paid consultancy and research services for (i) Public Group International Ltd (t/a PUBLIC) (Companies House number: 10608507), commissioned by the UK Department for Culture, Media and Sport (DCMS) to conduct independent research on understanding player experiences of loot box protections (October 2024 – May 2025); (ii) the Council of Europe International Cooperation Group on Drugs and Addiction (the Pompidou Group) on a project concerning the risks of online gambling and gaming to young people co-funded by the European Union via the Technical Support Instrument and implemented by the Council of Europe, in cooperation with the European Commission (December 2024 – May 2025); and (iii) the Institute of Public Health on a report concerning the advertising of harmful products to children funded by the Irish Department of Health and intended for its Online Health Taskforce (July 2025). L.Y.X. was supported by a PhD Fellowship

funded by the IT University of Copenhagen [IT-Universitetet i København] (December 2021 – November 2024). L.Y.X. was employed by LiveMe, then a subsidiary of Cheetah Mobile (NYSE: CMCN), as an in-house counsel intern from July to August 2019 in Beijing, China. L.Y.X. was not involved with the monetisation of video games by Cheetah Mobile or its subsidiaries. L.Y.X. undertook a brief period of voluntary work experience at Wiggin LLP (Solicitors Regulation Authority number: 420659) in London, England, in August 2022. L.Y.X. has contributed to research projects enabled by data access provided by the video game industry, specifically Unity Technologies (NYSE:U) (October 2022 – August 2023). L.Y.X. has been invited to provide advice to the UK Department for Digital, Culture, Media and Sport and its successor (the Department for Culture, Media and Sport; DCMS) on the technical working group for loot boxes and the Video Games Research Framework. L.Y.X. was the (co-)recipient of three Academic Forum for the Study of Gambling (AFSG) postgraduate research support grants (March 2022, January 2023, and July 2024) and a minor exploratory research grant (May 2024) derived from 'regulatory settlements applied for socially responsible purposes' received by the UK Gambling Commission and administered by Gambling Research Exchange Ontario (GREO) and its successor (Greo Evidence Insights; Greo). L.Y.X. accepted funding to publish open-access academic papers from GREO and the AFSG that was received by the UK Gambling Commission as above (October, November, and December 2022, November 2023, and May 2024). L.Y.X. was the recipient of an Elite Research Travel Grant 2024 [EliteForsk-rejsestipendium 2024] awarded by the Agency for Higher Education and Science of the Danish Ministry of Higher Education and Science [Uddannelses-og Forskningsstyrelsen under Uddannelses-og Forskningsministeriet] (February 2024). L.Y.X. has accepted conference travel and attendance grants from the Socio-Legal Studies Association (February 2022 and February 2023); the Current Advances in Gambling Research Conference Organising Committee with support from GREO (February 2022); the International Relations Office of The Jagiellonian University (Uniwersytet Jagielloński), the Polish National Agency for Academic Exchange (NAWA; Narodowa Agencja Wymiany Akademickiej), and the Republic of Poland (Rzeczpospolita Polska) with co-financing from the European Social Fund of the European Commission of the European Union under the Knowledge Education Development Operational Programme (May 2022); the Society for the Study of Addiction (November 2022, March 2023, and November 2024); the organisers of the 13th Nordic SNSUS (Stiftelsen Nordiska Sällskapet för Upplysning om Spelberoende; the Nordic Society Foundation for Information about Problem Gambling) Conference, which received gambling industry sponsorship (January 2023); the MiSK Foundation (Prince Mohammed bin Salman bin Abdulaziz Foundation) (November 2023); and the UK Gambling Commission (March 2024). L.Y.X. has received honoraria from the Center for Ludomani for contributing parent guides about mobile games for Tjekspillet.dk, which was funded by the Danish Ministry of Health's gambling addiction pool (Sundhedsministeriets Ludomanipulje) (March and December 2023), the Fundació Pública TecnoCampus Mataró-Maresme (TecnoCampus Mataró-Maresme Foundation) for a guest lecture (November 2023), the Young Men's Christian Association (YMCA) of Greater Toronto Youth Gambling Awareness Program for a presentation, which was funded by the Government of Ontario, Canada (March 2024), Lunds universitet (Lund University) for the right to translate parent guides about mobile games into Swedish for Kollaspelet.se, which was funded by Mediamyndigheten (the Swedish Agency for the Media) and Barnahus Stockholm (December 2024); Shenkar College of Engineering, Design and Art for a guest lecture (December 2024); and DiGRA Korea and the Game-n-Science Institute [게임과학연구원] under the Game Culture Foundation [게임문화재단] under the Ministry of Culture, Sports and Tourism of South Korea [문화체육관광부] for participating in an academic research survey (January 2025). L.Y.X. received royalties by virtue of the copyright subsisting in some of his publications from the Authors' Licensing and Collecting Society (ALCS) (Companies House number: 01310636) (March 2023,

2024, & 2025). A full gifts and hospitality register-equivalent for L.Y.X. is available at: <https://www.leonxiao.com/about/gifts-and-hospitality-register>. The up-to-date version of L.Y.X.'s conflict-of-interest statement is available at: <https://www.leonxiao.com/about/conflict-of-interest>. C.D. was previously employed with research funding from the AFSG. As to Z.D. and A.C., the University of Gibraltar received funding from the Gibraltar Gambling Care Foundation, an independent, not-for-profit charity, and donations from gambling operators through the LCCP RET process supervised by the UK Gambling Commission. C.H., O.K., and D.K. declare no conflicts of interest.

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References

- [1] Video Games Europe, European Games Developer Federation. All about Video Games: European Key Facts 2023. <https://www.videogameseurope.eu/wp-content/uploads/2024/09/Video-Games-Europe-2023-Key-Facts-Report-FINAL.pdf>; 2024.
- [2] Kowert R, Domahidi E, Quandt T. The relationship between online video game involvement and gaming-related friendships among emotionally sensitive individuals. *Cyberpsychol Behav Soc Netw* 2014;17(7):447–53. <https://doi.org/10.1089/cyber.2013.0656>.
- [3] Pallavicini F, Pepe A, Mantovani F. Commercial off-the-shelf video games for reducing stress and anxiety: systematic review. *JMIR Mental Health* 2021;8(8): e28150. <https://doi.org/10.2196/28150>.
- [4] Blumberg FC, Deater-Deckard K, Calvert SL, Flynn RM, Green CS, Arnold D, et al. Digital games as a context for children's cognitive development: research recommendations and policy considerations. *Soc Policy Rep* 2019;32(1):1–33. <https://doi.org/10.1002/sop2.3>.
- [5] Adams BLM, Stavropoulos V, Burleigh TL, Liew LWL, Beard CL, Griffiths MD. Internet gaming disorder behaviors in emergent adulthood: a pilot study examining the interplay between anxiety and family cohesion. *Int J Ment Heal Addict* 2019;17(4):828–44. <https://doi.org/10.1007/s11469-018-9873-0>.
- [6] Gisbert-Pérez J, Longobardi C, Martí-Vilar M, Mastrokoukou S, Badenes-Ribera L. Prevalence of internet gaming disorder in young adults: a systematic review and meta-analysis. *Addict Behav* 2026;174:108576. <https://doi.org/10.1016/j.addbeh.2025.108576>.
- [7] Markey PM, Ferguson CJ. Teaching us to fear: the violent video game moral panic and the politics of game research. *Am J Play* 2017;10(1):99–115.
- [8] Weaver JB, Mays D, Sargent Weaver S, Kannenberg W, Hopkins GL, Eroglu D, et al. Health-risk correlates of video-game playing among adults. *Int J Prev Med* 2009;37(4):299–305. <https://doi.org/10.1016/j.amepre.2009.06.014>.
- [9] Prescott AT, Sargent JD, Hull JG. Metaanalysis of the relationship between violent video game play and physical aggression over time. *Proc Natl Acad Sci* 2018;115(40):9882–8. <https://doi.org/10.1073/pnas.1611617114>.
- [10] Johannes N, Vuorre M, Magnusson K, Przybylski AK. Time spent playing two online shooters has no measurable effect on aggressive affect. *Collabra Psychol* 2022;8(1):34606. <https://doi.org/10.1525/collabra.34606>.
- [11] Przybylski AK, Weinstein N. Violent video game engagement is not associated with adolescents' aggressive behaviour: evidence from a registered report. *R Soc Open Sci* 2019;6:171474. <https://doi.org/10.1098/rsos.171474>.
- [12] Shao R, Wang Y. The relation of violent video games to adolescent aggression: an examination of moderated mediation effect. *Front Psychol* 2019;10. <https://doi.org/10.3389/fpsyg.2019.00384>.
- [13] Chabbouh A, Hallit S, Farah N, Youssef C, Hankache A, Fekih-Romdhane F, et al. Examining correlates of aggression and mediating effect of psychological distress between exposure to media violence and aggression in Lebanese adults. *BMC Psychol* 2023;11:191. <https://doi.org/10.1186/s40359-023-01232-0>.
- [14] Dogruel L, Joeckel S. Video game rating systems in the US and Europe: comparing their outcomes. *Int Commun Gaz* 2013;75(7):672–92. <https://doi.org/10.1177/1748048513482539>.
- [15] Ballou N, Sewall CJR, Ratcliffe J, Zendle D, Tokarchuk L, Deterding S. Registered report evidence suggests no relationship between objectively tracked video game playtime and well-being over 3 months. *Technol Mind Behav* 2024;5(1: spring 2024). <https://doi.org/10.1037/tmb0000124>.
- [16] Katz D, Horváth Z, Pontes HM, Koncz P, Demetrovics Z, Király O. How much gaming is too much? An analysis based on psychological distress. *J Behav Addict* 2024;13(3):716–28. <https://doi.org/10.1556/2006.2024.00036>.
- [17] Király O, Tóth D, Urbán R, Demetrovics Z, Maraz A. Intense video gaming is not essentially problematic. *Psychol Addict Behav* 2017;31(7):807–17. <https://doi.org/10.1037/adb0000316>.
- [18] Vuorre M, Johannes N, Magnusson K, Przybylski AK. Time spent playing video games is unlikely to impact well-being. *R Soc Open Sci* 2022;9(7):220411. <https://doi.org/10.1098/rsos.220411>.
- [19] Petrovskaya E, Zendle D. The relationship between psycho-environmental characteristics and wellbeing in non-spending players of certain mobile games. *R Soc Open Sci* 2023;10(1):221129. <https://doi.org/10.1098/rsos.221129>.
- [20] Aarseth E, Bean AM, Boonen H, Colder Carras M, Coulson M, Das D, et al. Scholars' open debate paper on the World Health Organization ICD-11 gaming disorder proposal. *J Behav Addict* 2016;6(3):267–70. <https://doi.org/10.1556/2006.5.2016.088>.
- [21] Király O, Demetrovics Z. Inclusion of gaming disorder in ICD has more advantages than disadvantages. *J Behav Addict* 2017;6(3):280–4. <https://doi.org/10.1556/2006.6.2017.046>.
- [22] Király O, Koncz P, Griffiths MD, Demetrovics Z. Gaming disorder: a summary of its characteristics and aetiology. *Compr Psychiatry* 2023;122:152376. <https://doi.org/10.1016/j.comppsych.2023.152376>.
- [23] Luo T, Wei D, Guo J, Hu M, Chao X, Sun Y, et al. Diagnostic contribution of the DSM-5 criteria for internet gaming disorder. *Front Psychol* 2022;12. <https://doi.org/10.3389/fpsyg.2021.777397>.
- [24] Király O, Griffiths MD, King DL, Lee H-K, Lee S-Y, Bányai F, et al. Policy responses to problematic video game use: a systematic review of current measures and future possibilities. *J Behav Addict* 2017;7(3):503–17. <https://doi.org/10.1556/2006.6.2017.050>.
- [25] Kati A, Elina K, Janne P, Juho H, Jani K. Free-to-play games: professionals' perspectives. In: DiGRA Nordic 2014: proceedings of the 2014 international DiGRA Nordic conference; 2014. <https://dl.digra.org/index.php/dl/article/view/702>.
- [26] Zende D, Cairns P. Video game loot boxes are linked to problem gambling: results of a large-scale survey. *PLoS One* 2018;13(11):e0206767. <https://doi.org/10.1371/journal.pone.0206767>.
- [27] Woods O. The economy of time, the rationalisation of resources: discipline, desire and deferred value in the playing of Gacha games. *Games Cult* 2022;17(7–8): 1075–92. <https://doi.org/10.1177/15554120221077728>.
- [28] Xiao LY. Breaking ban: Belgium's ineffective gambling law regulation of video game loot boxes. *Collabra Psychol* 2023;9(1):57641. <https://doi.org/10.1525/collabra.57641>.
- [29] Xiao LY, Henderson LL, Yang Y, Newall PWS. Gaming the system: suboptimal compliance with loot box probability disclosure regulations in China. *Behav Public Policy* 2024;8(3):590–616. <https://doi.org/10.1017/bpp.2021.23>.
- [30] Saltman E, Karhili NE. Level up: Policies, practices, and positive interventions to counter terrorism and violent extremism in gaming spaces. In: *Gaming and extremism*. Routledge; 2024. <https://doi.org/10.4324/9781003388371-10>.
- [31] Faraz A, Mounsef J, Raza A, Willis S. Child safety and protection in the online gaming ecosystem. *IEEE Access* 2022;10:115895–913. <https://doi.org/10.1109/ACCESS.2022.3218415>.
- [32] Chen Y, Chen PS, Hwang J, Korba L, Song R, Yee G. An analysis of online gaming crime characteristics. *Internet Res* 2005;15(3):246–61. <https://doi.org/10.1108/10662240510602672>.
- [33] Xiao LY, Demetrovics Z, Deery C, Heath C, Király O, King D, et al. Global review of assessments of online gambling policies affecting youths: bans, legalisation, advertising restrictions, and 'responsible gambling'. *Curr Addict Rep* 2026. <https://doi.org/10.1007/s40429-026-00748-w>.
- [34] Karhulahti V-M, Auranen T. Systematic error in gaming disorder measures. *Br J Psychiatry* 2025. <https://doi.org/10.31219/osf.io/h735n>.
- [35] Henning V, Reichelt J, Mendeley—a last.fm for research?. In: 2008 IEEE fourth international conference on eScience; 2008. p. 327–8. <https://doi.org/10.1109/eScience.2008.128>.
- [36] Ouzzani M, Hammady H, Fedorowicz Z, Elmagarmid A. Rayyan—a web and mobile app for systematic reviews. *Syst Rev* 2016;5(1):210. <https://doi.org/10.1186/s13643-016-0384-4>.
- [37] Webber N. The Britishness of 'British video games'. *Int J Cult Policy* 2020;26(2): 135–49. <https://doi.org/10.1080/10286632.2018.1448804>.
- [38] Lee YH. Making videogame history: videogame preservation and copyright law. *Interact Entertain Law Rev* 2018;1(2):103–8. <https://doi.org/10.4337/ielr.2018.02.03>.
- [39] Vvedenskaya A. Common features of video games and social networks: importance for international taxation. *Interact Entertain Law Rev* 2020;3(2): 105–20. <https://doi.org/10.4337/ielr.2020.02.03>.
- [40] Baeck J, Claeys I. Restitution of money spent on loot boxes in video games? *Comp Law Secur Rev* 2021;41:105566. <https://doi.org/10.1016/j.clsr.2021.105566>.
- [41] Hilgert F. Withdrawal right waivers for in-game currency under EU law. 2019. <https://doi.org/10.4337/ielr.2019.02.04>.
- [42] BeVier LR. Controlling communications that teach or demonstrate violence: "the movie made them do it". *J Law Med Ethics* 2004;32(1):47–55. <https://doi.org/10.1111/j.1748-720X.2004.tb00448.x>.
- [43] O'Sullivan J. Gambling disorder, financial loss and suicide—a journey to the 'outer reaches' of the common law. *Curr Leg Probl* 2023;76(1):173–200. <https://doi.org/10.1093/clp/cuad006>.
- [44] Berber LK, Atabay A. Privacy screening of online game platforms: a case study of "Gamecel". *Ann Fac Droit Istanbul* 2020;69:69.
- [45] Sas M, Denoo M, Mühlberg JT. Informing children about privacy: a review and assessment of age-appropriate information designs in kids-oriented F2P video games. *Proc. ACM Hum.-Comput. Interact.* 2023;7(CHI PLAY):390. 425–390:463, <https://doi.org/10.1145/3611036>.
- [46] Friehs MA, Klarkowski M, Frommel J, Phillips C, Mandryk RL. Fighting fair: community perspectives on the fairness of performance enhancement in esports. *Front Sports Active Liv* 2024;6. <https://doi.org/10.3389/fspor.2024.1330755>.
- [47] Hylland OM, Heian MT, Kleppe B, Stavrum H. Digital cultural policy in Norway: Old tools and new tasks. In: *Digital transformation and cultural policies in Europe*. Routledge; 2023.

- [48] Derrington S, Star S, Kelly SJ. The case for uniform loot box regulation: A new classification typology and reform agenda. *J Gambl Issues* 2021;46. <https://doi.org/10.4309/jgi.2021.46.15>. Article 0.
- [49] Zentile D, Flick C, Gordon-Petrovskaya E, Ballou N, Xiao LY, Drachen A. No evidence that Chinese playtime mandates reduced heavy gaming in one segment of the video games industry. *Nat Hum Behav* 2023;7:1753–66. <https://doi.org/10.1038/s41562-023-01669-8>.
- [50] Yang Q, Wang H, Wu H, Li W, Zhang Y, Yao Y, et al. Effect of online game policy on smartphone game play time, addiction, and emotion in rural adolescents of China. *BMC Psychiatry* 2023;23(1):814. <https://doi.org/10.1186/s12888-023-05325-3>.
- [51] Zhou X, Liao M, Gorowska M, Chen X, Li Y. Compliance and alternative behaviors of heavy gamers in adolescents to Chinese online gaming restriction policy. *J Behav Addict* 2024;13(2):687–92. <https://doi.org/10.1556/2006.2024.00021>.
- [52] Xiao LY. Reserve your judgment on “draconian” Chinese video gaming restrictions on children. *J Behav Addict* 2022;11(2):249–55. <https://doi.org/10.1556/2006.2022.00022>.
- [53] Sato Y, Brückner S, Michael Splichal J, Waragai I, Kurabayashi S. Cross-regional analysis of RRM design and implementation in mobile games by developers in China, the EU, Japan, and the USA. *Entertain Comp* 2024;48:100606. <https://doi.org/10.1016/j.entcom.2023.100606>.
- [54] Xiao LY. Drafting video game loot box regulation for dummies: a Chinese lesson. *Inform Commun Technol Law* 2022;31(3):343–81. <https://doi.org/10.1080/13600834.2022.2088062>.
- [55] Choi J. Fair trade commission targets major gaming firms in loot box probe. *BusinessKorea*; 2025. <https://www.businesskorea.co.kr/news/articleView.html?idxno=240671>.
- [56] Wen J, Zhang Z, Tran TM, Mu L, Rahman T, Jin H. Folk models of loot boxes in video games. *Proc ACM Hum-Comput Interact* 2024;8(CHI PLAY):307. 1–307:23. <https://doi.org/10.1145/3677072>.
- [57] Xiao LY, Fraser TC, Newall PWS. Opening Pandora's loot box: weak links between gambling and loot box expenditure in China, and player opinions on probability disclosures and pity-timers. *J Gambl Stud* 2023;39(2):645–68. <https://doi.org/10.1007/s10899-022-10148-0>.
- [58] Choi J, Cho H, Lee S, Kim J, Park E-C. Effect of the online game shutdown policy on internet use, internet addiction, and sleeping hours in Korean adolescents. *J Adolesc Health* 2018;62(5):548–55. <https://doi.org/10.1016/j.jadohealth.2017.11.291>.
- [59] Jo W, Sunder S, Choi J, Trivedi M. Protecting consumers from themselves: assessing consequences of usage restriction Laws on online game usage and spending. *Mark Sci* 2020;39(1):117–33. <https://doi.org/10.1287/mksc.2019.1174>.
- [60] Lee C, Kim H, Hong A. Ex-post evaluation of illegalizing juvenile online game after midnight: a case of shutdown policy in South Korea. *Telematics Inform* 2017;34(8):1597–606. <https://doi.org/10.1016/j.tele.2017.07.006>.
- [61] Phan QA. Challenges and opportunities for the online gaming industry in Vietnam: a qualitative study on the thoughts of involved parties. *Creat Ind J* 2019;12(3):248–71. <https://doi.org/10.1080/17510694.2019.1610933>.
- [62] Phan QA. Media governance: managing online games seen from the perspective of the state in Vietnam. *Heliyon* 2021;7(1):e06045. <https://doi.org/10.1016/j.heliyon.2021.e06045>.
- [63] Xiao LY. Illegal loot box advertising on social media? An empirical study using the Meta and TikTok ad transparency repositories. *Comput Law Secur Rev* 2025;56:106069. <https://doi.org/10.1016/j.clsr.2024.106069>.
- [64] Garrett E, Drummond A, Lowe-Calverley E, Sauer JD. Current loot box warnings are ineffective for informing consumers. *Comput Hum Behav* 2023;139:107534. <https://doi.org/10.1016/j.chb.2022.107534>.
- [65] Xiao LY, Henderson LL, Newall P. What are the odds? Lower compliance with Western loot box probability disclosure industry self-regulation than Chinese legal regulation. *PLoS One* 2023;18(9):e0286681. <https://doi.org/10.1371/journal.pone.0286681>.
- [66] Denoo M, Dupont B, Grosemans E, Zaman B, De Cock R. Counterplay: circumventing the Belgian ban on loot boxes by adolescents. In: *Proceedings of the ACM on human-computer interaction*, 7(CHI PLAY); 2023. <https://doi.org/10.1145/3611024>. 378:104–378:130.
- [67] Jöckel S, Blake C, Schlütz D. Influence of age-rating label salience on perception and evaluation of media. *J Media Psychol* 2013;25(2):83–94. <https://doi.org/10.1027/1864-1105/a000086>.
- [68] USK (Unterhaltungssoftware Selbstkontrolle). “EA Sports FC 24”, “eFootball 2024” und Co. – So wirkt sich die aktuelle Spruchpraxis auf Sportspiele aus [“EA Sports FC 24”, “eFootball 2024” und Co. – This is how the current ruling practice affects sports games]. *Unterhaltungssoftware Selbstkontrolle*. <https://usk.de/ea-sports-fc-24-efootball-2024-und-co-so-wirkt-sich-die-aktuelle-spruchpraxis-auf-sportspiele-aus/>; 2023.
- [69] Handsley E, Warburton W. Material likely to harm or disturb them’: testing the alignment between film and game classification decisions and psychological research evidence. *Psychiatry Psychol Law* 2022;29(1):68–92. <https://doi.org/10.1080/13218719.2021.1904466>.
- [70] Australian Classification Board. What are the ratings?. In: *Australian classification*; 2019. <https://www.classification.gov.au/classification-ratings/what-are-ratings>.
- [71] Azam KE. “That’s PEGI, the American system!”: perceptions of video game age ratings among families in Norway. *Media Cult Soc* 2023. <https://doi.org/10.1177/01634437231155340>. 01634437231155340.
- [72] Xiao LY. Beneath the label: unsatisfactory compliance with ESRB, PEGI, and IARC industry self-regulation requiring loot box presence warning labels by video game companies. *R Soc Open Sci* 2023;10(3):230270. <https://doi.org/10.1098/rsos.230270>.
- [73] Pan European Game Information (PEGI). PEGI changes rating advice for Roblox. PEGI Official Website, <https://pegi.info/news/pegi-changes-rating-advice-roblox>; 2022.
- [74] Threadgall R, Horsman G. An examination of gaming platform policies for law enforcement support. *Digit Investig* 2019;31:200887. <https://doi.org/10.1016/j.fsi.2019.200887>.
- [75] Rial-Boubeta A, Theotonio Á, Paz AN, Braña-Tobío T, Varela-Mallou J. Relationship between the consumption of PEGI18 video games with explicit violence, bullying, and cyberbullying. *Psychol Soc Educ* 2024;16(1):1. <https://doi.org/10.21071/pse.v16i1.16718>.
- [76] Carter M, ZhangShao T, Hardwick T, Eglington B, Xiao LY. Investigating mobile games’ compliance with Australia’s 2024 mandatory minimum age classifications scheme for gambling-like mechanics (SSRN Scholarly Paper No. 5543999) *Soc Sci Res Netw* 2025. <https://doi.org/10.2139/ssrn.5543999>.
- [77] Xiao LY. Is loot box presence in video games being correctly and consistently labelled? Comparing all age rating decisions made by the German USK, the American ESRB, and the European PEGI in 2023. In: *Proceedings of 2024 IEEE gaming, Entertainment, and media conference (GEM)*. 2024 IEEE gaming, entertainment, and media conference (GEM); 2024, April 25. <https://doi.org/10.1109/GEM61861.2024.10585443>.
- [78] de Kervenael R, Palmer M, Hallsworth A. From the outside in: consumer anti-choice and policy implications in the mobile gaming market. *Telecommun Policy* 2013;37(6):439–49. <https://doi.org/10.1016/j.telpol.2012.06.008>.
- [79] Sax M, Ausloos J. Getting under your skin(s): a legal-ethical exploration of Fortnite’s transformation into a content delivery platform and its manipulative potential*. *Interact Entertain Law Rev* 2021;4(1):3–26. <https://doi.org/10.4337/ielr.2021.0001>.
- [80] Autoriteit Consument & Markt [Authority for Consumers & Markets] (The Netherlands). ACM imposes fine on Epic for unfair commercial practices aimed at children in Fortnite game [News], <https://www.acm.nl/en/publications/acm-imposes-fine-epic-unfair-commercial-practices-aimed-children-fortnite-game>; 2024.
- [81] Autoriteit Consument & Markt [Authority for Consumers & Markets] (The Netherlands). Decision of the Netherlands Authority for Consumers and Markets regarding the imposition of fines and a binding instruction on Epic Games International S.a.r.l. Due to violations of the Dutch Unfair Commercial Practices Act ACM/22/179622. https://www.acm.nl/system/files/documents/sanctiebesluit-fortnite_en.pdf; 2023.
- [82] Autoriteit Consument & Markt [Authority for Consumers & Markets] (The Netherlands). Epic fined for unfair commercial practices aimed at children in Fortnite game [Decisions], <https://www.acm.nl/en/publications/epic-fined-unfair-commercial-practices-aimed-children-fortnite-game>; 2024.
- [83] Autoriteit Consument & Markt [Authority for Consumers & Markets] (The Netherlands). Epic’s objection against fines and binding instruction in connection with Fortnite declared unfounded [Decisions], <https://www.acm.nl/en/publications/epics-objection-against-fines-and-binding-instruction-connection-fortnite-declared-unfounded>; 2025.
- [84] Walsh DA, Gentile DA. A validity test of movie, television, and video-game ratings. *Pediatrics* 2001;107(6):1302–8. <https://doi.org/10.1542/peds.107.6.1302>.
- [85] Entertainment Software Rating Board (ESRB). Ratings Guide. ESRB Official Website; 2024. <https://www.esrb.org/ratings-guide/>.
- [86] Kutner LA, Olson CK, Warner DE, Hertzog SM. Parents’ and sons’ perspectives on video game play: a qualitative study. *J Adolesc Res* 2008;23(1):76–96. <https://doi.org/10.1177/0743558407310721>.
- [87] Miller MK. Exploring the relationship between video game ratings implementation and changes in game content as represented by game magazines. *Policy Polit* 2010;38(4):705–35. <https://doi.org/10.1111/j.1747-1346.2010.00255.x>.
- [88] Gray GC, Nikolakakos T. The self-regulation of virtual reality: issues of voluntary compliance and enforcement in the video game industry. *Can J Law Soc* 2007;22(1):93–108. <https://doi.org/10.1017/S0829320100009133>.
- [89] Pan European Game Information (PEGI). What do the labels mean? [PEGI Official Website], <https://pegi.info/what-do-the-labels-mean>; 2024.
- [90] Laczniak RN, Carlson L, Walker D, Brocato ED. Parental restrictive mediation and children’s violent video game play: the effectiveness of the Entertainment Software Rating Board (ESRB) rating system. *J Public Policy Mark* 2017;36(1):70–8. <https://doi.org/10.1509/jppm.15.071>.
- [91] Walker D, Brocato ED, Carlson L, Laczniak RN. Parents’ and children’s violent game play: role of co-playing. *J Consum Mark* 2018;35(6):623–32 (world). <https://doi.org/10.1108/JCM-10-2017-2397>.
- [92] Grace TD, Larson I, Salen K. Policies of misconduct: a content analysis of codes of conduct for online multiplayer games. *Proc ACM Hum* 2022;6(CHI PLAY). <https://doi.org/10.1145/3549513>. 250:1–250:23.
- [93] Ruberg B. “Obscene, pornographic, or otherwise objectionable”: biased definitions of sexual content in video game live streaming. *New Media Soc* 2021;23(6):1681–99. <https://doi.org/10.1177/1461444820920759>.
- [94] MacInnes I. Property rights, legal issues, and business models in virtual world communities. *Electron Commer Res* 2006;6(1):39–56. <https://doi.org/10.1007/s10660-006-5987-8>.
- [95] Whitson J, French M. Productive play: the shift from responsible consumption to responsible production. *J Consum Cult* 2021;21(1):14–33. <https://doi.org/10.1177/1469540521993922>.

- [96] Xiao LY, Henderson LL. Illegal video game loot boxes with transferable content on steam: a longitudinal study on their presence and non-compliance with and non-enforcement of gambling law. *Int Gambl Stud* 2024;24(3):498–524. <https://doi.org/10.1080/14459795.2024.2390827>.
- [97] Zhang J. Skin gambling in mainland China: survival of online gambling companies. *Cogent Soc Sci* 2023;9(2):2265209. <https://doi.org/10.1080/23311886.2023.2265209>.
- [98] Drummond A, Sauer JD, Hall LC, Zendle D, Loudon MR. Why loot boxes could be regulated as gambling. *Nat Hum Behav* 2020;4:986–8. <https://doi.org/10.1038/s41562-020-0900-3>.
- [99] UK Gambling Commission. Virtual currencies, eSports and social gaming—position paper. <https://web.archive.org/web/20210111075348/http://www.gamblingcommission.gov.uk/PDF/Virtual-currencies-eSports-and-social-casino-gaming.pdf>; 2017.
- [100] Autoriteit Consument & Markt [Authority for Consumers & Markets] (The Netherlands). Leidraad bescherming online consument [Guidelines on the protection of the online consumer] (updated 15 March 2023). <https://web.archive.org/web/20230708170835/https://www.acm.nl/nl/publicaties/voorlichting-aan-bedrijven/acm-leidraad/leidraad-bescherming-online-consument>; 2023.
- [101] Committee of Advertising Practice, Broadcast Committee of Advertising Practice. Guidance on advertising in-game purchases. <https://www.asa.org.uk/resource/guidance-on-advertising-in-game-purchases.html>; 2021.
- [102] Consumer Protection Cooperation Network, European Commission. Key principles on in-game virtual currencies. https://commission.europa.eu/document/t/8af13e88-6540-436c-b137-9853e7fe866a_en; 2025.
- [103] Department for Culture, Media & Sport (UK). Video games research framework. GOV.UK, <https://www.gov.uk/government/publications/video-games-research-framework/video-games-research-framework>; 2023.
- [104] Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol* 2005;8(1):19–32. <https://doi.org/10.1080/1364557032000119616>.
- [105] Shamseer L, Moher D, Clarke M, Ghersi D, Liberati A, Petticrew M, et al. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. *BMJ* 2015;349:g7647. <https://doi.org/10.1136/bmj.g7647>.
- [106] Bank D. Problematic monetization in mobile games in the context of the human right to economic self-determination. *Comput Hum Behav* 2023;149:107958. <https://doi.org/10.1016/j.chb.2023.107958>.
- [107] Xiao LY. Lex loot boxes: the regulation of gambling-like products in video games [PhD Thesis, IT University of Copenhagen]. 2024. <https://doi.org/10.31237/osf.io/af8ev>.
- [108] Ukhova D, Marionneau V, Nikkinen J, Wardle H. Public health approaches to gambling: a global review of legislative trends. *Lancet Public Health* 2024;9(1):e57–67. [https://doi.org/10.1016/S2468-2667\(23\)00221-9](https://doi.org/10.1016/S2468-2667(23)00221-9).