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Online Gaming and Gambling: Gaming and Simulated Gambling among Adolescents in Flanders

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The interdisciplinary GAM(E)(A)BLE research team of KU Leuven, UGent, and UCLL is studying the effects of the blurring lines between gaming and gambling in teenage lives in a broad consumer protection paradigm. New forms of easily accessible and popular online games incorporate gambling-like elements such as slot machines and loot boxes showing features one can win based on a randomised reward system to proceed in the game. This emerging phenomenon raises the concern that minors are being progressively exposed to mechanisms that resemble or are structurally identical to monetary gambling (De Cock et al., 2018; Drummond & Sauer, 2018; Zendle et al., 2019). These so-called 'simulated gambling games' refer to "a digitally simulated interactive gambling activity that does not directly involve monetary gain but is otherwise structurally identical to the standard format of a gambling activity" (King et al., 2014, p. 305). Loot boxes and skin lotteries do function as 'gambling-like features' (Drummond & Sauer, 2019; Griffiths et al., 2013) that may induce people to play or 'hook' them to continue playing (Parke & Griffiths, 2006). The need for a more enhanced media literacy on these topics among children but equally so among parents, educators, and youth counsellors is becoming pressing.

As video gaming and gambling convergence is on the rise, researchers warn for gambling-like elements in and around video games that can serve as steppingstones towards monetary gambling. Following the Theory of Reasoned Action (Ajzen & Fishbein, 1980), these elements could incite a pathway to monetary gambling behaviour, via attitudes, towards gambling, perceived normative pressure to take part in gambling, and gambling intention. The introduction of new gambling-like elements and recent research have indicated a need to widen the scope of video gaming research, looking beyond loot boxes (Zendle, 2020). It is therefore pivotal to study the whole video gaming ecosystem, including gambling-like elements in video games, in video game genres, and on video game stream platforms. Recent evolutions force us to widen the scope of video gaming research and to study a broader video gaming ecosystem, in line with how media theorist Neil Postman understood media ecology (Media Ecology Association, s.d.). It addresses the ways in which media and communication affect human perception, understanding, feeling, and value. Ecology implies the study of environments, that is, their structure, content, and impact on the people acting and operating within these media environments. In a world of constant and fast cultural and social change, it is crucial to analyse the mechanisms of media as environments we live in. They offer us information about the world, define how we perceive and experience everyday life, provide us with knowledge about what is acceptable and what is

not. This becomes increasingly true for our online lives as well. It is therefore pivotal to study the broader video gaming ecosystem, including active (e.g., opening of loot boxes in games) and passive activities (e.g., watching gambling streams on external social media platforms, not directly related to the game world). Linked with Cultivation Theory (Gerbner, 1998) and the Theory of Reasoned Action (Ajzen & Fishbein, 1980), conscious and unconscious received media messages interact with what we consider as acceptable or not, what is allowed, legal, ethically right or not in games for minors versus adults and what can be promoted in a young age group. In our research set-up, we therefore included exposure to gambling-like elements in games, attitude to monetary gambling, perceived normative pressure, intention to gambling later in life, and actual monetary gambling behaviour. In the result section of this book chapter, we will only focus on the most recent completed and available survey data of the Gam(e)(a)ble research consortium: winter 2022–spring 2023 data. A total of 1,872 secondary school pupils took part in the study.

1. Game habits and game changers: monetisation models

Video gaming is very popular among youngsters as well as among young adults and adults in Flanders. According to the Digimeter (IMEC Digimeter, 2022), a survey questioning 2,309 Flemings older than 18 about their media consumption habits and use of media devices, 33% of the adults play video games on a monthly basis by using a smartphone, 20% by using a computer, 16% play video games on a tablet, and active gaming by game consoles is done by 15% of the adult sample. Especially the youngest group of adults (18- to 24-year-olds) watches gaming videos on social media platforms such as Twitch on a monthly basis (37%) and one out of five watches video game streamers (IMEC Digimeter, 2022, p. 23–24). These streams follow gamers in action, filming on-screen progress in the game as well as online comments of viewers, player reactions and emotions alike by recording verbal and non-verbal expressions. These include enthusiastic responses on (paid and free) loot box openings and randomly obtained price rewards by spinning wheels etcetera.

When we zoom in on the media habits of children and teenagers in Flanders, gaming (70%) is the most popular media-related occupation, even more

popular than watching series, movies or videos (66%) or listening to music (61%) (Vanwynsberghe et al., 2022, research report Apestaartjaren). More than half of the children and teenagers most often play along with friends or acquaintances, with about a third of them playing video games in a solitary way. About one out of ten plays video games with strangers online. Researchers of MediaNest (2023) asked parents (mainly mothers filled out the questionnaire) in Flanders about the media consumption of their children (0- to 18-year-olds). In their study, watching television (78%) and online videos (76%) was more popular among youngsters, while listening to music and gaming were equally loved (53%). Gaming was mostly popular among 9- to 12-year-olds among whom the popularity of this media activity increased to 76%. Social media use was reported by 27% of the sample, this can be explained by the wide age range of the sample, including children that are far younger than the requested age restrictions of most social media channels. Interestingly, 10% of the parents in this study report that their child spends money online on virtual items or coins in games (MediaNest, 2023, p. 33). Parents are not well aware of streaming and game streaming platforms such as Twitch and Discord (only 6% and 1% respectively report the platforms in the Media-Nest 2023 study, pp. 47–48) whereas the Apestaartjaren figures reported by children themselves offer a different perspective on the popularity of video game watching and game streaming platforms. This points to a blind spot in the parental media guidance when it comes to video gaming and video game streaming. As far as gaming devices are concerned, parents of children who gamed on a weekly basis reported that gaming consoles (62%) are the most used device, followed by tablets (53%), smartphones (44%), and computers (33%) (MediaNest, 2023, p. 55).

This popularity of video gaming is a global phenomenon and has turned the video gaming industry into the largest entertainment industry worldwide, estimated to be worth 268.81 billion US dollars in 2025, of which more than 74 million will be earned by in-game purchases (Clement, 2023). These in-game purchases or so-called microtransactions have altered the dominant business model of the gaming industry and are becoming increasingly important to cope with rising game development costs. Relatedly, consumers' demands and their call for updates and challenging, exciting new elements in the gameplay are also growing. Video games are no longer sold as mere products on a unique acquisition moment, but they have become services (Bernevega & Gekker, 2021) that allow developers and publishers to generate revenue throughout a game's lifecycle. Bernevega and Gekker (2021, p. 47) describe the

contemporary video game as an "asset that continuously generates revenue for its owners". The combination of free-to-play access to the core game with game-as-a-service options has become the new business standard, turning microtransactions into a strong monetisation model. The objects of these microtransactions are items or adaptations of attributes or avatars one can buy for a small amount of money but very frequently. These adaptations can be useful in the game progress (e.g., generating more power) or they may involve something purely cosmetic (such as a different skin for your avatar or weapon) that may be much wanted by users for the sake of gaining prestige.

One of the most successful microtransactions in the game ecology are loot boxes. Spicer et al. (2022, p. 1001) describe loot boxes as "video game-related purchases with a chance-based outcome". Delfabbro and King point to the fact that loot boxes can also be earned in the game, next to being purchased, the so-called difference between free and paid-for loot boxes. The focus lies here on the randomness of the rewards that are inside the crates, containers or packages: "Such features allow people (and very often young people) to spend money on an event with an uncertain outcome and acquire something of value as a result" (Delfabbro & King, 2023, p. 493). The definition of loot boxes by Xiao et al. (2022, p. 163) explicitly refers to monetisation and gambling-likeness: "Loot boxes are gambling-like monetisation mechanics in video games that are purchased for opportunities to obtain randomised in-game rewards." This leads us to another used term within the converging world of video gaming and gambling: gambling-like elements, features or mechanics. In this chapter, we will not discuss all the different terms in use by researchers and experts studying gaming and gambling convergence (for an in-depth terminology mapping see the work of Dupont et al. (2022). Declerck and Feci (2022, pp. 7–8) state that "consideration (1), chance (2), and prize (3) are nowadays central to the debate of whether gambling(-like) elements in video games can be classified as (illegal) gambling." In their conceptualisation "gambling(-like) elements means the elements, features and practices in the video game environment which resemble or show similarities with real-life gambling activities or practices."

1.1 Ludoliteracy as reflection on media use

Loot boxes, and simulated gambling, thus mark a departure from traditional video gaming by introducing a challenging shift in system rules and player

expectations. As criteria for success or 'winning' in a video game may no longer be clear (e.g., when opening a loot box containing a random reward, which you may or may not have hoped for), players may be susceptible to malformed beliefs or biases when trying to make sense of unpredictable events (Macey & Hamari, 2020). As argued by Delfabbro and King (2023), an enhanced ludoliteracy, that focuses on improving awareness of risks, knowledge of hidden costs, and critical thinking, may help diminish their impact. In their work on the digital convergence of gaming and gambling, Delfabbro and King (2023, p. 499) plea for more 'consumer education', and extra attention for new developments within video gaming as especially young people are prone to the mingling of these previously separated activities. This is in line with the recommendation related to the importance of media literacy in the most recent report on media use among Flemish children and teenagers (Vanwynsberghe, 2022, p. 53). The report emphasises the need for increased attention at schools, so not only within family boundaries, to discuss digital literacy and to reflect on media use. In our Gam(e)(a)ble survey, we therefore included questions probing the attention to ludoliteracy (game literacy) at schools as an important element in a wider media literacy setting.

2. Policy responses in Belgium and Flanders

Of all gambling-like elements, loot boxes receive the most media and scholarly attention due to their high visibility in games and online videos with spectacular box openings and their huge popularity among gamers (Grosemans et al., 2024; Spicer et al., 2022). In response, policymakers have been reflecting on the possible negative results of the appearance of loot boxes and their random rewards in games intensely played by teenagers, as shown by a content analysis conducted by the Belgian Gaming Commission with the support of the Minister of Justice in Belgium (Belgian Gaming Commission, 2018). This report focused on *Overwatch*, *Star Wars Battlefront II*, *Fifa 18* and *Counter-Strike: Global Offensive*. Also, the UK House of Commons commissioned a report on 'immersive and addictive' technologies incorporated in video games (UK Parliamentary Commission House of Commons, 2019).

The investigation led Belgium to install restrictions on paid loot boxes in 2018, applicable for all its inhabitants, with the intention to protect minors and adults who "ought not to be confronted with games of chance when looking for fun in a game" (Geens, 2018). As explained in further detail in the work of Denoo et al. (2023), the restrictions on loot boxes were the first of their kind worldwide and stimulated international discussion, but they did so without obstructing the sale of loot boxes completely. The ingenuity of players stirred up the spreading of methods to circumvent these restrictions in Belgium and therefore breaking their effectiveness (Denoo et al., 2023). Nevertheless, the Belgian restrictions forced game publishers to remove paid-for loot boxes in video games offered to Belgian citizens and thus, theoretically speaking, offering "the highest degree of protection" a state can provide against the potential harm of loot boxes (Xiao et al., 2022, p. 11). In reality, though, "paid loot boxes remained widely available among the 100 highest-grossing iPhone games in Belgium" (Xiao, 2022, p. 2). As Denoo et al. (2023) indicate, Belgian players found a way round technical restrictions quite easily by using a Virtual Private Network (VPN) or operating through third-party websites to purchase virtual currencies, which are then used within the video game to obtain loot boxes. Youngsters who are less tech-savvy easily find access to online communities and content creators explaining these circumvention strategies in how-to videos. In a global game ecology in rapid flux, it is important to reflect on the limited possibilities of a single nation state to act against a potentially harmful game feature, especially when close enforceability is lacking.

As part of the Gam(e)(a)ble project studying the blurring lines between gaming and gambling among teenagers, our media and psychology research team has been reaching out to media literacy experts and educational specialists of Mediawijs and MediaNest in particular. During several stakeholder meetings throughout the project and in the set-up of smaller workshops focusing on separate deliverables such as the questionnaire development or the valorisation track, the input and reflection of the experts have been proven invaluable. For future dissemination of research results and the translation of findings to specific groups such as young teenagers or parents who are not so familiar with the gaming world, our collaboration with Mediawijs as the Flemish expertise centre for digital and media literacy and other project stakeholders will continue.

3. Research questions and methodology

3.1 Research questions

In this chapter, we want to inspect the prevalence of the elements that could be of influence on adolescents' monetary gambling behaviour. Therefore, numbers regarding video gaming, simulated gambling, and monetary gambling in Flemish adolescents will be provided. To investigate the role of said elements, we will also report correlations between the different items. Throughout this chapter, we will not only look at adolescents' monetary gambling behaviour as an outcome, but also investigate adolescents' monetary gambling attitude, perceived normative pressure, and intention. These concepts were derived from the Theory of Reasoned Action (Ajzen & Fishbein, 1980), which posits that attitude and norms predict intention, and intention, in turn, predicts behaviour. Since minors are not allowed to gamble yet, we included attitude, norms, and intention in our analyses. In the past, this approach has proven useful when researching monetary gambling behaviour (Dahl et al., 2018; Lee, 2013); however, research on adolescents and on simulated gambling is still missing. Lastly, we will sketch a profile of the Flemish adolescent simulated gambler. This latter part is needed, as Abarbanel and colleagues pose in their study on eSports bettors that "developing baseline profiles of those who participate in this emerging field are key to understanding if, and in what ways, participants differ from other cohorts" (Abarbanel et al., 2020, p. 2). Similar research on the profile of the simulated gambler is needed. Based on the literature review, the following research questions were posed:

- RQ1a: What is the prevalence of simulated gambling in Flemish teenagers?
- RQ1b: What is the prevalence of monetary gambling in Flemish teenagers?
- RQ2: What is the profile of the simulated gambling player (regarding socio-demographic profile, social support, and mental health situation)?
- RQ3: What is the correlation between simulated gambling behaviour and monetary gambling attitude, norms, intention, and behaviour?

- RQ4: What is the prevalence of the exposure to media literacy programmes at schools in Flanders, related to video games and monetary gambling (compared to advertising)?

3.2 Method and questionnaire

In order to provide an answer to these research questions, a large-scale survey was conducted among Flemish (Dutch-speaking part of Belgium) secondary school pupils (12- to 18-year-olds). Nine high schools across Flanders took part in the study. Respondents filled out an online Qualtrics survey, either during class hours or in their free time, between November 2022 and April 2023. The survey contained questions on video games, simulated gambling, and monetary gambling, next to sociodemographic, personality trait, and mental health items. More specifically, the following clusters of variables were assessed:

- Sociodemographic items
- Media literacy
- Video gaming:
  - Prevalence
  - Time spent playing video games
  - Video gaming habits: video gaming platforms and genres
- Social support variables and mental health
- Simulated gambling
- Monetary gambling

3.2.1 Sociodemographic items

Gender was measured by one item, allowing participants to identify themselves as ‘male’, ‘female’, or ‘other’. If needed, participants could leave the question blank. Age was an open question. Family income consisted of one question (“Which statement do you find most applicable to the income (money) of your family at home?”), to be answered on a scale of one to six (ranging from “It is very difficult for us to make ends meet at home” to “We get around very easily at home”). Lastly, family composition was computed using four different

answering options (“My parents are married and/or living together”, “My parents are divorced and/or separated”, “I have a single parent”, or “other”).

3.2.2 Media literacy

With this item, we assessed whether pupils had learned about video games, monetary gambling, and advertising in an educative way at school. Participants were asked to answer this question using ‘yes’ or ‘no’.

3.2.3 Video gaming

First, participants were asked to indicate whether or not they played video games and if so, how many hours they spent on video games per weekday and weekend day. Participants were asked to tick all gaming platforms they used. They could choose between PC, console, handheld, mobile, cloud gaming, and ‘other’. Next, they could tick all video gaming genres they played from time to time (choosing between 20 items).

3.2.4 Social support variables and mental health

Support from family and friends was measured by one item respectively, to be scored between one and five, with higher scores indicating higher support. Next, a sense of belonging to an online community and an online gaming community were assessed (ranging from one to ten). Depression was measured by the CES-D6 (Centre for Epidemiologic Studies Depression scale) (Radloff, 1977) (α = .86), and anxiety by the STAI-6 (Six-Item State Anxiety Scale) (Marteau & Bekker, 1992) (α = .74). Both scales consisted of six items and resulted in a total score between 0 and 18, with higher scores pointing towards higher feelings of depression or anxiety.

3.2.5 Simulated gambling

Respondents who played video games were asked to report their participation in seven different simulated gambling activities in the past twelve months, namely: opening free loot boxes, paying for loot boxes, selling items from loot boxes, buying items within social casino games, watching loot box openings (videos displaying people opening loot boxes in a video game, showing the contents of the boxes to viewers), watching gambling videos, and spinning prize wheels. Respondents were able to rank their participation in each activity on a scale of 1 (‘never’) to 7 (‘everyday’) (α = .80). Later, these scores were rescaled to ‘yes’ or ‘no’.

3.2.6 Monetary gambling

Respondents were asked to indicate their participation in a number of monetary gambling activities in the last twelve months (α = .95). We also looked at attitude, norms, intention, next to behaviour, following the Theory of Reasoned Action (TRA; Ajzen & Fishbein, 1980). This fits with our age group of interest since adolescents are not legally allowed to gamble. Attitude towards monetary gambling was measured using seven items, to be answered on a six-point Likert scale (e.g., "I think minors should be able to participate in monetary gambling activities" and "Monetary gambling is a good way to make money). The total scale resulted in a score between one and six, with higher scores indicating more positive attitudes towards monetary gambling (α = .81). Perceived norms regarding monetary gambling (or norms or normative pressure) were measured by five items, to be answered on a seven-point scale. This scale was used by Dahl et al. (2018). Example items included "Most people who are important to me gamble" and "Most of the people whose opinions I value would approve of me gambling in the next 2 weeks". The higher the score, the higher the degree of perceived normative pressure (α = .87). Lastly, intention was measured using one item, to be scored on a scale from 1 to 10. Higher scores indicated higher intention to take part in monetary gambling, once the legal gambling age is reached.

3.3 Ethical considerations

Parents and legal caretakers of the pupils were informed about our study via mail, prior to the start of the survey, and gave their passive consent for their child's participation. The young respondents themselves were asked to agree to an informed consent before they filled out the survey. This procedure received ethical approval (G-2021-3439-R2(AMD), date of approval: 25 October 2021) by the Social and Societal Ethics Committee at KU Leuven.

3.4 Data analysis

Analyses were conducted in SPSS. Data cleaning was performed by excluding respondents above the age of 18, by removing those who gave nonsense answers in open text boxes, and by means of an attention check. Only respondents who filled out a substantial number of questions were retained. Descriptive statistics for each variable and bivariate correlations between

the different variables were calculated (Pearson's r for normally distributed data, and Spearman's ρ for all other variables). Our final sample consisted of 1,872 respondents, all between the ages of 11 and 18 (mean age = 14.37 (SD = 1.71)). 45.1% identified themselves as male, while 53.5% identified as female (and 1.4% as 'other' or they left the question blank). 71.9% of the teenagers indicated that their parents were still together, while 21.6% of parents were separated. 3% of respondents lived in a single-parent family.

4. Research results: descriptive results on video gaming habits of Flemish teenagers

Video gaming is a very popular pastime among teenagers in Flanders, with 81.1% of the sample reporting that they played video games. Almost all boys play video games (94.2%), and around 7 in 10 girls (69.9%) report playing video games as well. On average, teenagers spend 2 hours and 12 minutes per day playing video games (almost 2 hours on weekdays, and more than 3 hours on weekend days). Boys spend, on average, significantly more time playing video games than girls. Table 1 displays the time spent playing video games.

	Total	Weekdays	Weekend days
All respondents	2.20	1.76	3.29
Boys	2.83	2.25	4.29
Girls	1.44	1.17	2.12

Table 1. Time spent playing video games, on average per day (in hours)

All gender differences were significant ($p < .001$). Total gaming time: $t(1467.995) = 11.504$; gaming time on weekdays: $t(1478.949) = 8.812$; gaming time on weekend days: $t(1409.356) = 13.680$

Video gamers prefer playing on mobile (smartphone or tablet), with 66% of them playing mobile games. Both PC games (44.8%) and console games

(46.5%) are popular as well. Around one in four (24.4%) video game players use handheld devices, such as a Nintendo Switch. Lastly, cloud gaming is growing in popularity, with 11.5% of gamers claiming to make use of a cloud gaming platform. Cloud gaming allows players to stream video games, instead of buying and installing a digital or physical copy. It is often included in game subscription services, where players pay for access to a library of video games (rather than paying for a single game). In terms of video game genres, battle royale games such as *Call of Duty* and *Fortnite* are the most popular (45.4% of video game players), followed by survival games (such as *Minecraft*; 42.9%) and racing games (such as *Mario Kart*, *Rocket League*, or *Need for Speed*; 40.0%).

4.1 RQ1a: What is the prevalence of simulated gambling in Flemish teenagers?

Respondents who played video games were asked to indicate their participation in seven different simulated gambling activities. No less than 68.2% of respondents had tried out at least one of the activities in the past 12 months. The most popular activity was spinning a prize wheel in a game, with over half of video game players (50.8%) having done so. This was followed by opening free loot boxes (done by 43.2% of video game players) and watching loot box openings (36.4%). One in five video game players (21.6%) had paid for a loot box, despite the supposed ban on paid-for loot boxes in Belgium (Declerck & Feci, 2022). Some players even tried to make money from loot boxes, by selling the items they received from the boxes (13.8%). Lastly, 9.4% of video game players had spent money on social casino games, while 20.6% had watched gambling videos. Our results show that, just like playing video games, interacting with simulated gambling elements is popular among teenagers. These elements can be found at different layers of the video gaming ecosystem: within video games (loot boxes or prize wheels), within video game genres (social casino games), and within video game streams (loot box openings and gambling videos).

4.2 RQ1b: What is the prevalence of monetary gambling in Flemish teenagers?

As a next step in the questionnaire, monetary gambling was assessed. Respondents were asked to indicate their participation in the last twelve months in a range of monetary gambling activities. It is noteworthy that more than half of the respondents (56.2%) had taken part in at least one activity in the past year, although most of them were younger than the legal gambling age in Belgium (18 years at the time of the study). Scratch cards (played by 34.0% of respondents), betting among friends or in a (sports) club (29.8%) and offline gambling games (21.4%) were the most mentioned.

On average, participants scored 2.05 on the gambling attitude scale (out of 1–6, SD = 0.85). Boys (M = 2.12, SD = 0.92) were significantly more positive than girls (M = 1.99, SD = 0.80) ($t(1599.966) = 3.166$, $p < .01$). Age was significantly positively correlated with attitude ($r = .15$, $p < .001$), indicating that attitude towards gambling becomes more positive with age.

Perceived normative pressure regarding monetary gambling was on average 1.36 (out of 1–7, SD = 0.77). Boys (M = 1.51, SD = 0.95) perceived significantly more normative pressure to participate in monetary gambling than girls did (M = 1.24, SD = 0.55; $t(1244.569) = 7.191$, $p < .001$). Age and normative pressure were significantly positively correlated ($\rho = .08$, $p < .001$), meaning that the older one gets, the more normative pressure one perceives.

The intention to participate in monetary gambling scored 2.13 on average (out of 0–10, SD = 2.45). Boys' intention (M = 2.60, SD = 2.75) was significantly higher than girls' intention (M = 1.76, SD = 2.09) ($t(1508.423) = 7.216$, $p < .001$). Age and intention had a small but positive, significant correlation ($r = .07$, $p < .01$), meaning that the older one gets, the higher one's intention to gamble.

4.3 RQ2: What is the profile of the simulated gambling player (regarding sociodemographic profile, social support, and mental health)?

As mentioned supra, 68.2% of the respondents reported having tried out at least one of the seven proposed simulated gambling activities. Most of these teenagers identified themselves as male (60.7%, with 37.5% identifying

themselves as female and 1.8% as 'other' or missing). The mean age of simulated gamblers was 14.39 years old (SD = 1.71). Approximately seven out of ten (68.9%) simulated gamblers were part of the general education system, 18.0% is enrolled in the technical education system, 11.5% in the vocational education system, and lastly, 1.1% in arts education. The odds of pupils from other education types, outside of general education, being simulated gamblers were 1.42 times higher, compared to the odds of general education pupils being simulated gamblers ($p < .01$, 95% BI = [1.112, 1.814]). More than half of the simulated gambling players (57.1%) were in the first three years of high school, although youngsters in the last four years of high school had a higher odds ratio to be a simulated gambler (OR = 1.50, $p < .001$, 95% BI = [1.201, 1.881]). 73.2% of the simulated gamblers reported that their parents were still together, while 21.7% reported that their parents were divorced or separated. 2.4% lived in a single-parent family. A vast majority of the simulated gambling players (89.4%) said that their family made ends meet easily, financially.

Compared to teenagers who had not participated in simulated gambling activities, teenagers who had participated in simulated gambling activities experienced significantly less anxiety. Feelings of depression were not significantly different between the two groups. Simulated gamblers felt much more connected to online gaming communities (for example: on Discord or Twitch) than non-simulated gamblers, but not significantly more connected to 'regular' online communities (for example: on Facebook or Instagram). There were also no significant differences in perceived support from family or friends. All these differences can be found in more detail in Table 2.

	Simulated gamblers	Non-simulated gamblers
Gender		
Male	60.7%	32.7%
Female	37.5%	66.3%
Other/missing	1.8%	1.0%
Mean age (SD)*	14.39 (1.71)	14.07 (1.73)
School level		
General education ('ASO')	68.9%	75.9%
Arts education ('KSO')	1.1%	1.0%
Technical education ('TSO')	18.0%	13.7%
Vocational education ('BSO')	11.5%	8.2%
Other	0.5%	1.2%
School year		
1st year	16.9%	25.8
2nd year	23.1%	22.5%
3rd year	17.0%	18.4%
4th year	13.9%	7.8%
5th year	21.4%	17.6%
6th year	6.7%	7.6%
7th year	1.0%	0.4%
Family composition		
My parents are together	73.2%	71.0%
My parents are separated	21.7%	21.3%
I have a single parent	2.4%	3.7%
Other	2.8%	4.1%
Family income		
We come by very hard at home	0.5%	0.4%
We come by hard at home	1.2%	1.4%
We come by rather hard at home	8.8%	6.5%
We come by rather easily at home	26.8%	22.3%
We come by easily at home	45.8%	49.7%
We come by very easily at home	16.8%	19.6%
Mental health (0–3)		
Anxiety (SD)*	1.05 (0.63)	1.13 (0.64)
Depression (SD)	0.69 (0.70)	0.67 (0.75)

	Simulated gamblers	Non-simulated gamblers
Support (1-5)		
Support from family (SD)	3.94 (1.16)	4.00 (1.17)
Support from friends (SD)	3.71 (1.03)	3.78 (1.14)
Online belongingness (0–10)		
Online communities (SD)	4.47 (2.87)	4.26 (3.19)
Online gaming communities (SD)*	4.15 (3.18)	2.82 (2.99)

Table 2. Differences between simulated gambling and non-simulated gamblers, regarding sociodemographic items, mental health, and personality traits
*Significant differences. Age: $t(1538) = -3.435$, $p < .001$; anxiety: $t(1538) = 2.369$, $p < .05$; belonging to an online gaming community: $t(1008.273) = -8.007$, $p < .001$

Teenagers who had taken part in simulated gambling activities in the past year spent significantly more time playing video games than teenagers who did not. In our sample, 64.7% of simulated gambling players had also participated in monetary gambling in the past twelve months, while only 42.3% of non-simulated gamblers had done so. Simulated gamblers had a significantly more positive attitude towards monetary gambling than non-simulated gamblers. Monetary gambling norms and intention were significantly higher for simulated gamblers than for non-simulated gamblers. These differences are detailed in Table 3.

	Simulated gamblers	Non-simulated gamblers
Video gaming		
Time spent playing video games (SD)	2.45 (2.61)	1.62 (2.06)
Time spent playing video games on weekdays (SD)	1.96 (2.59)	1.30 (2.16)
Time spent playing video games on weekend days (SD)	3.67 (3.43)	2.42 (2.76)
Monetary gambling		
Monetary gambling prevalence	64.7%	42.3%
Monetary gambling attitude (SD)	2.15 (0.86)	1.76 (0.79)
Perceived normative pressure regarding monetary gambling (SD)	1.50 (0.90)	1.17 (0.56)
Monetary gambling intention (SD)	2.59 (2.64)	1.56 (2.12)

Table 3. Differences between simulated gamblers and non-simulated gamblers, regarding video gaming and monetary gambling

All differences were significant ($p < .001$). Time spent playing video games: $t(1129.472) = -6.626$; video game time on weekdays: $t(1073.995) = -5.125$; video game time on weekend days: $t(1109.276) = -7.541$. Monetary gambling attitude: $t(1001.795) = -8.843$; perceived normative pressure: $t(1389.257) = -8.702$; monetary gambling intention: $t(1146.869) = -8.103$

4.4 RQ3: What is the correlation between simulated gambling behaviour and monetary gambling attitude, norms, intention, and behaviour?

As a next step, the correlation between simulated gambling and monetary gambling was assessed. Average frequency scores were used for simulated gambling behaviour and monetary gambling behaviour (ranging from 1 to 7, with higher scores indicating more frequent participation). All items were significantly positively correlated. This indicates that the more frequently pupils participated in simulated gambling activities in the past twelve months, the more positive their attitude towards monetary gambling was, the more normative pressure towards monetary gambling they perceived, the higher their intention to take part in monetary gambling was, and the more often they

participated in monetary gambling activities in the past twelve months. Table 4 shows the precise correlation scores.

	Monetary gambling attitude	Perceived normative pressure	Monetary gambling intention	Monetary gambling behaviour
Simulated gambling behaviour	.328*** (r)	.366*** (ϱ)	.290*** (r)	.337*** (ϱ)
Monetary gambling attitude	-	.417*** (ϱ)	.394*** (r)	.305*** (ϱ)
Perceived normative pressure	-	-	.376*** (ϱ)	.324*** (ϱ)
Monetary gambling intention	-	-	-	.375*** (ϱ)

Table 4. Bivariate correlations between simulated gambling and monetary gambling
***p < .001

4.5 RQ4: What is the prevalence of exposure to media literacy programmes at schools in Flanders, related to video games and monetary gambling (compared to advertising)?

We asked our respondents whether they received explanations at school about video gaming and about monetary gambling as media literacy topics. The results indicate that video gaming and monetary gambling are less popular topics to be discussed during classes at school compared to advertising. Less than half of our respondents had learned about video games (45.8%) in class and only one in four had discussed monetary gambling (25.2%) in an educational and preventive context at school. Advertising, on the other hand, was discussed at school according to 66.3% of our respondents.

5. Discussion and conclusion

As video gaming and gambling convergence is on the rise, experts warn that gambling-like elements in video games or so-called simulated gambling features, as for instance loot boxes offering random rewards and prize wheels, may serve as steppingstones towards monetary gambling. Quantitative research is needed to determine the prevalence of said gambling-like elements (Zaman et al., 2020) and their relationship with monetary gambling attitude, norms, intention, and actual gambling behaviour among adolescents (Lawn et al., 2020). Our study surveyed 1872 secondary school pupils (11- to 18-year-olds, mean age = 14.13) throughout Flanders about media literacy, video gaming, simulated gambling, and monetary gambling.

As expected, video gaming is very common among adolescents in Flanders as four out of five adolescents in our study reported playing video games, and it is more popular among boys than among girls. On average, teenagers spend two hours on video gaming during weekdays, and more than three hours during weekend days. Our findings show that less than half of the sample secondary school pupils had ever received educational reflection on video gaming at school and only one out of four had discussed monetary gambling in a preventive context whereas two thirds had obtained information on advertising literacy. This points to a ludoliteracy gap and the need for educational material customised for minors focusing on the use of gambling-like features and its related risks in video games.

When we zoom in on the prevalence of simulated gambling in Flemish adolescents, respondents who played video games were asked to indicate their participation in seven different simulated gambling activities. Seven out of ten had tried out at least one of the activities in the past twelve months. The most mentioned activity was spinning a prize wheel in a game, followed by opening free loot boxes, watching loot box openings, and buying paid-for-loot boxes, despite their supposed ban in Belgium. As one out of five adolescents reported paying for loot boxes, it is clear that the Belgian policy initiative is not resulting in an effective way to prevent young consumers from interacting with these paid-for loot boxes, as was the intention of the restrictions. Our results are in line with recent research (see Denoo et al., 2023; Xiao, 2023). One out of seven even tried to make money from loot boxes, by selling the items they received from the crates or packs, one out of ten had spent money on social casino games, and one in five of the adolescents had watched

gambling videos. These results indicate that interacting with simulated gambling elements has become quite common among teenagers in all different layers of the video gaming ecosystem: internally as mechanics within games (loot boxes or prize wheels), as fully fledged video game genre (social casino games), and externally through video game streams on platforms (loot box openings and gambling videos). As exposure to gambling-like elements in the video gaming world itself and beyond (video content produced by game and gambling streamers) has become so common among adolescents, the potential normalisation of gambling, gambling attitudes and beliefs becomes apparent, in line with the tradition of the cultivation theory of George Gerbner (1998). Especially youngsters who are not only more exposed to gambling and gambling-like elements online but who are also confronted with real-life contact with scratch cards, sports betting opportunities etc. (the so-called 'double dose') are extra vulnerable.

Looking at the profile of the simulated gambler, more boys than girls are involved in simulated gambling and the mean age of a simulated gambler in the sample was 14.39 years. Compared to non-simulated gambling players, players reported significantly less anxiety, although the difference was rather small. Since previous research on, for example, problematic video gaming (González-Bueso et al., 2018), often found positive correlations between anxiety and problematic behaviour, more research is needed to explain these found differences. Simulated gambling players also felt more connected to online gaming communities such as Discord and Twitch. This extends the results of previous research, which stated that belonging to an online community was associated with problem gambling (Savolainen et al., 2020). On top of that, a systematic review has pointed out that gaming communities often incite players to perform certain in-game behaviours or to purchase items within video games (Sirola et al., 2021). In the case of simulated gambling, it could be that tips and tricks on gambling-like elements are exchanged in these communities, increasing the feeling of belonging. It also points to the possible role of peers in influencing adolescents' gambling behaviour, as was the case in previous research (Botella-Guijarro et al., 2020). Future (qualitative) research could further investigate the role of gaming communities in adolescents' gambling behaviour.

When the prevalence of monetary gambling among Flemish adolescents comes to the fore, more than half of these mostly minor teenagers had taken part in at least one gambling activity in the past year. Scratch cards (one out

of three), betting among friends or in a (sports)club (one out of three) and offline gambling games (one out of five) were the most popular.

Finally, our results show that simulated gambling behaviour is correlated with monetary gambling attitude, norms, intention, and behaviour among Flemish adolescents. The more teenagers participated in simulated gambling activities in the past year, the more positive their attitude towards monetary gambling, the more normative pressure to take part in monetary gambling they perceived, the higher their intention to take part in monetary gambling, and the more often they actually participated in monetary gambling activities themselves in the past twelve months. This points to the applicability of the Theory of Reasoned Action (Ajzen & Fishbein, 1980; Dahl et al., 2018; Lee, 2013) when researching simulated gambling and monetary gambling in teenagers. It also asks for a careful approach when it comes to the inclusion of gambling-like features in video games and their use by minors. In the next steps of the Gam(e)(a)ble project, a longitudinal analysis can shed more light on the precise connections between simulated gambling features in and around video games and real gambling attitude, norms, intention, and behaviour among Flemish teenagers.

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