Evaluation of the gambling habits of Spanish adolescents and young adults post-COVID-19 and implementation of a digital escape room intervention for preventing gambling: study protocol of a cluster-randomized controlled trial (GAMBL-OUT project)

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Abstract

Background Gambling behaviors among adolescents and young adults have been experiencing an upward trend in the last years, possibly because of new habits developed during the COVID-19 lockdown restrictions. Different preventive strategies have been proposed: universal classroom-based interventions have shown promising evidence as preventive tools, but challenges exist in engaging the target audience effectively. Serious games, i.e., those designed with the specific intent to educate, broaden knowledge, and change behaviors, have been tested with positive outcomes. Digital escape rooms constitute a modality of serious game that has shown potential for a variety of educational purposes, but their efficacy for preventing addictive behaviors, as well as their long-term impact, has not been widely studied.

Methods The present protocol includes two studies: Study 1 aims to examine changes in gambling habits among a large sample ($N=420$) of adolescents and young adults (aged 16–25) in Aragon, Spain, comparing pre-COVID-19 data to current trends. It will assess various gambling types, including online betting, and estimate the prevalence of problem gambling. Study 2 will be a cluster-randomized controlled trial focused on testing the effectiveness of the GAMBL-OUT digital escape-room in preventing gambling among a sample of 240 youngsters. It will evaluate knowledge, intentions, and attitudes pre- and post-intervention, as well as in a 3-month follow-up assessment. Implementation outcomes will also be assessed using qualitative methods, considering acceptability, adoption, appropriateness, feasibility, fidelity, penetration, and sustainability.

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Discussion The present project aims at assessing the gambling habits of a sample of 16–25-year-olds in the region of Aragon, Spain, that could be compared to the data gathered before the pandemic started, so not only the prevalence rates can be updated but also potential differences in habits (e.g., preferred gambling alternatives) can be detected. This will undoubtedly help the design of effective preventive measures, such as the GAMBL-OUT digital escape room, a serious game to be implemented in high schools with the aim of increasing knowledge, reducing intentions to gamble, and changing attitudes towards gambling.

Trial registration This study was registered in ClinicalTrials.gov on 25/03/2025; registration number: NCT06904794.

Keywords Gambling, Mental health, Adolescents, Young adults, Serious games, Digital escape room, Prevention

Background

Adolescents and young adults constitute a population at high risk for developing addictive disorders such as problem gambling [1]. In the last years, a clear upward trend in gambling frequency and the prevalence of addictive behaviors can be observed, suggesting an increased normalization of such behaviors among adolescents and young adults. Systematic reviews suggest that a great proportion of adolescents (up to 57.5%) present some degree of problematic gambling [2, 3]. In Spain, studies conducted in 2022 observed that more than 20% of adolescents (14–19 years old) had gambled money in the previous year [4], and the prevalence of problem gambling was established at 4.7% [5], while in the year 2019, only 2.4% of university students screened positively for problem gambling in the Spanish region of Aragon [6]. These statistics underscore the critical importance of addressing addictive behaviors among teenagers and young adults as a primary focus for public health organizations and educational institutions [7].

This increased frequency of gambling in recent years could be explained at least in part due to new habits developed as a consequence of the COVID-19 pandemic restrictions: the closure of schools and universities implied that many adolescents and young adults spent most time at home with very limited social interactions, which constitutes a risk factor for developing addictive behaviors [8–11]. Despite the restrictions were temporary and the pandemic was declared officially over in May 2023, the habits formed during different stages of COVID-19 lockdown may persist in the long term [12]. Some previous studies compared gambling behaviors pre- vs. during-pandemic, with heterogeneous and limited evidence [13–16], possibly because longer time frames are needed to assess the real impact of the COVID-19 pandemic on people's habits. It is, therefore, truly relevant to assess the current use of the different gambling options that are available among adolescents and young adults, so effective measures can be taken to address this problem.

In response to the heightened risk of problematic gambling behaviors among adolescents and young adults, various preventive strategies have been implemented. When addressing mental health concerns such as this, implementing universal preventive strategies that cater to all adolescents irrespective of their risk or symptom levels offers several advantages: such approaches can effectively reach a broader spectrum of adolescents, potentially reducing barriers associated with seeking professional help and minimizing stigma surrounding mental health treatment [17]. In a recent systematic review, Monreal-Bartolomé et al. [1] found that universal preventive interventions delivered in the classroom achieved good results in terms of reducing the frequency and severity of gambling, and also producing significant changes in misconceptions, fallacies, knowledge, and attitudes towards gambling. These interventions typically involved educational programs designed to increase awareness about the risks associated with gambling and develop skills to resist peer pressure and impulsive behaviors. Nonetheless, the effectiveness of classroom-delivered interventions is not without limitations: one of the primary challenges of this approach lies in its ability to engage and resonate with the target audience, since adolescents and young adults may perceive traditional educational methods as mundane or disconnected from their lived experiences, reducing the efficacy of these interventions [1, 18].

Taking in consideration the need for more engaging and interactive approaches to address the prevention of mental health-related conditions such as problem gambling, the inclusion of games as part of the learning experience has resulted a valuable alternative. Previous studies have observed that different types of classroom-delivered interventions that included games could foster aspects such as knowledge and modify attitudes towards addictions (alcoholism, tobacco, and other substances) [7, 19–24], as well as reducing stigma [25]. The type of games included in these interventions was very heterogeneous: some of them consisted of quizzes and competitive dynamics to obtain prizes, while others could be considered "serious games", i.e., games designed with the specific intent to educate players, enhance their skills, broaden their knowledge, and change behaviors [26, 27].

Among the different types of serious games that have been developed and tested, the utilization of digital escape rooms has recently garnered attention as

promising avenues for collaborative and enjoyable learning experiences [28]. Educational escape rooms provide participants with a captivating and enjoyable learning setting, fostering collaboration, nurturing soft skills, and promoting intellectual development [7, 29]. Unlike traditional classroom-based interventions, escape rooms offer a dynamic environment where participants can actively engage with content and collaborate with peers to solve challenges. By incorporating storytelling elements and gamified mechanics, these interventions appeal to the intrinsic motivations of adolescents and young adults. The digital nature of these interventions implies that participants must use some type of technology (e.g., tablet, computer, smartphone) to engage with the experience, at least partially. The effects of digital escape rooms have been mostly tested in samples of university students or elementary school children, generally with the aim of learning about a topic related to their training, with promising outcomes [28, 30]. It is likely that this form of intervention could be used for other populations, such as adolescents, and with other aims, such as mental health promotion.

To our knowledge, only one study has reported the effectiveness of an intervention delivered in the classroom in the form of a digital escape room for preventing addictive behaviors in adolescents: Bezençon et al. [7] designed the *Escape Addict* program, a 90-minute experience in which students, working together in small groups of 4–6 pupils, used a tablet to visualize the contents of the program and advance through a series of challenges, all of them related to the story of a teenager grappling with issues related to addictive behaviors. As groups progressed through investigations, they gathered pieces of a physical puzzle that the entire class assembled at the game's conclusion to unlock the room. The effects of *Escape Addict* on knowledge about addictions and risky behaviors were significant, while risk perception and behaviors (e.g., changing privacy settings on social networks) were not modified [7].

Interestingly, Bezençon et al. [7] observed that teenagers with higher educational attainment experienced a greater benefit after the intervention, which lead the authors to highlight the need of exploring alternatives that are engaging and effective across all educational backgrounds or potentially more impactful for teenagers with lower educational achievement, who may initially possess a lesser knowledge base. The authors also underscore the importance of delving into optimal techniques for embedding preventive messages within digital escape rooms to maximize their impact. Another relevant aspect that needs further research is the long-term impact of digital escape rooms, so their efficacy in promoting lasting behavior change and preventing harm can be assessed.

Methods
Study aims
The aim of Study 1 is to describe the gambling habits of adolescents and young adults in the Autonomous Community of Aragon (Spain) comparing them to the pre-COVID-19 pandemic data that were gathered in a previous work [6]. These habits include frequency of diverse types of gambling alternatives to observe if some typologies have become more popular after the pandemic (e.g., online betting). Also, the prevalence of problem gambling in our sample will be estimated, with the expectation of observing an increase compared to pre-pandemic evidence, as previous studies have suggested.

Study 2 will focus on testing the effects of an online program to prevent gambling among students in high schools and vocational centers: the GAMBL-OUT escape-room. Knowledge about gambling, intentions to gamble, and attitudes towards gambling will be assessed both before and after the intervention. The frequency of usage of different gambling alternatives will be assessed at baseline and in the 3-month follow-up assessment. In addition, the implementation of the GAMBL-OUT program in the educational centers will be explored (i.e., acceptability, appropriateness, adoption, feasibility, and fidelity).

Study design
Study 1 presents a cross-sectional design, while Study 2 will be a multicenter, parallel, cluster-randomized controlled trial in which educational center's homerooms will be clusters, with an equal cluster allocation rate between groups (i.e., GAMBL-OUT escape room vs. wait-list control group) as well as equal cluster size. The study participants will be assessed at baseline, post-intervention, and three months after baseline. For ethical reasons, those participants allocated in the control group will be offered the intervention after finishing the follow-up assessment.

Participants
For Study 1, a sample of adolescents and young adults (i.e., between 16 and 25 years of age) residents in the Autonomous Community of Aragon (Spain) will be included. Participants may be students in secondary school, vocational training centers or universities, without considering any inclusion criteria other than having signed the informed consent.

For Study 2, on the other hand, only adolescents aged between 16 and 18 will be considered for two compelling reasons: firstly, it is anticipated that the impact of a preventive program will be more pronounced in adolescents who are close to the legal age for gambling (i.e., 18 years old). Existing reviews suggest that commencing preventive interventions at an early age is beneficial

Barceló-Soler *et al. BMC Psychology* (2025) 13:690

Page 4 of 11

in preventing the development of misconceptions [31]. Moreover, some reviews even suggest that initiating universal prevention measures during university stages might be too late [32]. Secondly, including a mix of high school/vocational center students and university students would result in an overly heterogeneous sample, potentially limiting the external validity of our findings. At least five educational centers that can provide 2 homerooms of around 24 students (see Sample size section) will take part in the study. Apart from this criterion, the signed informed consent provided by the student and, if needed, their legal guardian will be required to participate in Study 2.

Sample size

For the descriptive epidemiological study (Study 1), a sample size of 420 participants will be needed. This will allow us to detect a prevalence of pathological gambling in the target population of 2.4% [6], assuming a precision of 1.5%. Thus, we will obtain confidence interval limits using the exact binomial method at 95%, ranging from 1.15 to 4.35% (prevalence ± precision).

Following the recommendation of Cohen [33], the sample size calculation of Study 2 is based on the assumption of a moderate effect size ($d = 0.50$) of the intervention, since there is no clear evidence about the expected effect of an online program such as the GAMBL-OUT escape room when compared to an inactive group [34]. Assuming a common standard deviation, an alpha of 0.05, an intra-cluster correlation coefficient of 0.03 [35], and a statistical power of 80%, with a 1:1 allocation rate, the sample size resulted in 5 clusters of 20 individuals each in each study arm. Finally, considering that the participants of this study will be high school students who will complete the three assessments within the same academic year, the expected attrition rate at 3-months follow-up was established at 20%, resulting in a total sample of around 240 students (i.e., 120 per study arm, 24 per cluster) as presented in Fig. 1.

Procedure

The project will be promoted in the media so that educational institutions in Aragon interested in participating can learn about it and know how to get in touch with the research team, who will also actively reach out to different centers. All interested centers will receive an informational session about the two studies involved in the GAMBL-OUT project, and they may choose to participate in one or, in case of high schools and vocational training centers, both. These sessions will present the aims of the project, the procedures, and will pay special attention to addressing the aspect of data confidentiality (for details see below the Ethics section).

Those educational centers interested in participating in Study 1 will schedule a meeting with a member of the research team. In universities, we will disseminate information of the project (posters and diptychs with a QR link to the online survey, allocated in Survey Monkey) in different parts of the center so that students can find it. In secondary schools, teachers responsible for homerooms will be asked to dedicate part of a session to present the objective of the GAMBL-OUT project and complete the online survey (via computer or smartphone). In universities and vocational training centers, the same strategy will be conducted, although students are expected to complete the online survey in their free time and not in class. The survey will be open from November 2023 to March 2024. Before accessing it, participants will need to read the project information and sign electronically the informed consent to participate.

Study 2 will take place during 2024-25 and 2025-26 academic years. A meeting with a member of the research team will be scheduled to present this study, regardless of if they had already participated in Study 1 or not. In this meeting, the protocol of the GAMBL-OUT escape-room program will be presented. Two homerooms of around 24 students each will be required so that the educational center can participate. Once at least five centers agree to participate, an external researcher, not related to this study, will conduct the randomization process to one of the two possible sequences using EPIDAT 4.2 (see Fig. 1).

For those centers interested in taking part in Study 2, a timeline will then be agreed with the research team: first, the students will be presented with the information about the study and the informed consent, and those interested in participating will complete the baseline evaluation using their computer or smartphone in the classroom. Then, the intervention will be implemented in two consecutive weeks: the first week, the GAMBL-OUT escape-room program will be held in the classroom, and in the second, a group activity inspired by "The Alphabet Game" will be used to review, discuss, and reflect on the main contents covered in the escape-room experience. Each session will last 60 min and will be conducted by a member of the research team, in the presence of the homeroom teacher. The second session will end with the post-intervention assessment, and 3 months later, a follow-up assessment will be conducted. The research team will be in direct contact with these teachers to remind them about baseline and follow-up evaluations with sufficient anticipation. Informed consent from each student and, if required, their legal guardians will be required to participate in the program.

Once the follow-up assessment is conducted, three focus groups will be held to qualitatively assess the acceptance and suitability of the intervention, and interviews will be conducted with students, teachers
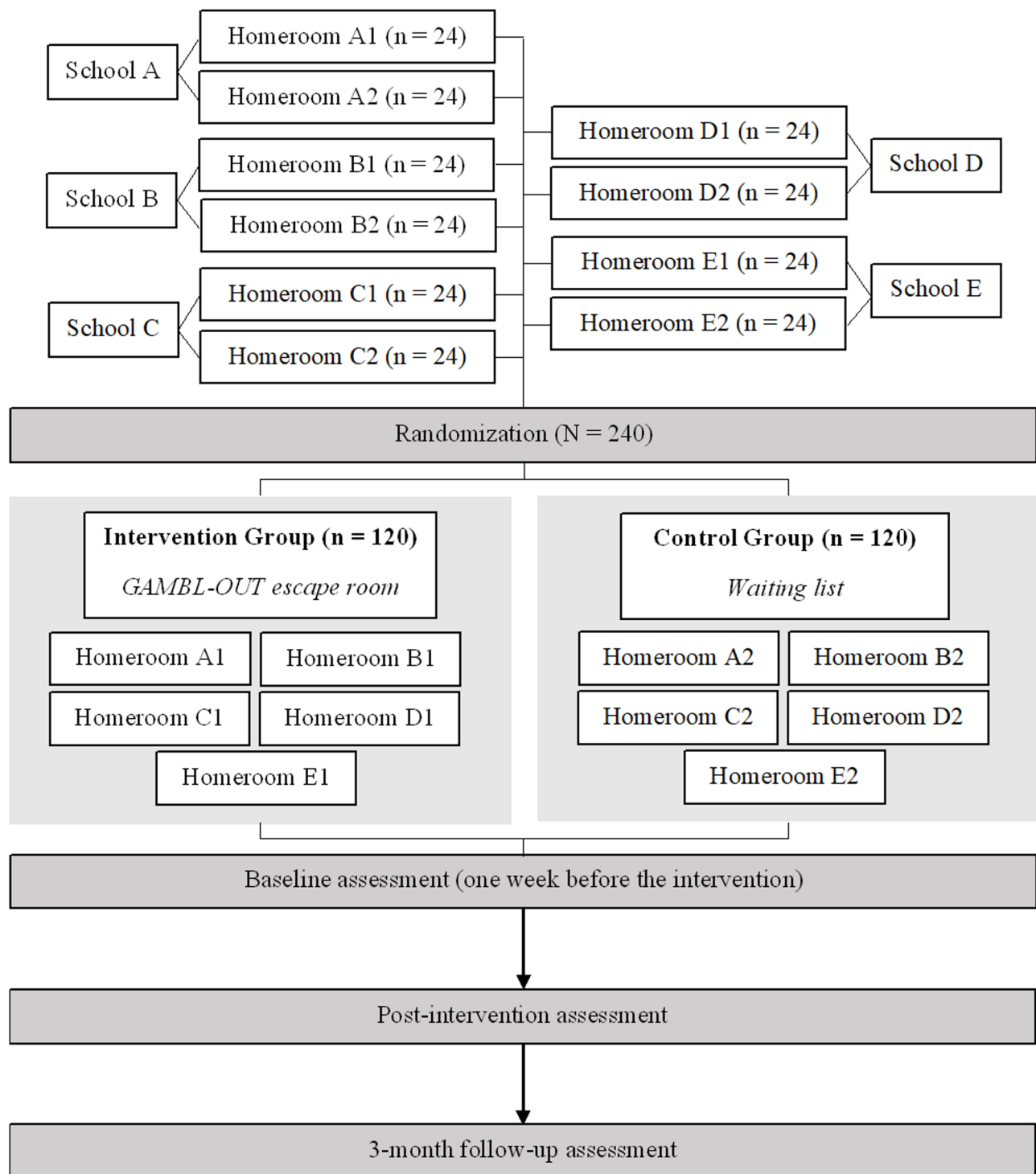
Fig. 1 Study 2 flowchart diagram

and headmasters to evaluate different aspects regarding implementation of the program. When the project is completed (i.e., after the follow-up assessment), the GAMBL-OUT escape-room program will be made available for every participant of Study 1 who did not participate in Study 2 and for those who were allocated in the control group.

Intervention

The GAMBL-OUT program consists of two sessions: the first one involves a digital escape room to be delivered

in the classroom. In small groups (4–5 students), participants need to work together to solve different puzzles and riddles, all of them related to the story of a young adult (Lucas) who is dealing with problem gambling. Each group will solve a demo room to ensure that participants understand the mechanics before the escape room and timer begin. The scenario opens with the main character describing how easy it is to earn money and how successful he has become through gambling. However, after placing a bet, he loses and ignores a call from a friend to whom he owes money. This moment reveals the darker side of gambling; through a sequence of flashbacks across different rooms, the narrative explores how the main character became trapped in gambling behavior. The groups are expected to complete all the rooms, assisting Lucas in seeking help and overcoming his gambling problem. The second session will start from here: exploring the protagonist's experience with gambling through an activity inspired by "The Alphabet Game". This structured group exercise is designed to consolidate and expand participants' understanding of the content addressed in the escape room, while fostering critical reflection and discussion on the key concepts covered. The facilitator will make sure that every group engages successfully in the process, helping those which present more difficulties. The last minutes of the second session will include the post-intervention assessment (15 min).

Assessment plan

Study 1 will replicate the measures that were included in the study conducted pre-COVID-19 [6] so a clear comparison among all the variables can be established: sociodemographic profile (age, gender, nationality, city, studies, employment situation and amount of money available for leisure per month) and a series of ad hoc questions asking interest in sports and frequency of physical activity, social support, exposure to different gambling options (e.g., betting shops in the area, gambling websites), frequency of exposure to gambling advertising, frequency of exposure to prevention messages, knowledge about gambling (e.g., "Studies show that gambling begins at an early age"), attitudes towards gambling (e.g., "I think it should be more regulated"), presence of gambling problems among relatives and friends, intention to gamble in the future (a 5-point Likert scale as in a previous study) [36], and engagement with gambling activities (in the last 12 months and also during life). For those who have gambled in the last 12 months, a pathological gambling screening will be conducted, along with questionnaires asking about motivations to gamble, and specific ad hoc questions (e.g., frequency, money spent) regarding different types of gambling (i.e., betting shops, websites, digital actives such as cryptocurrency, microtransactions in games, and sports betting). Finally,

validated questionnaires measuring different cognitions related to gambling, the impact of gambling advertising, and impulsivity will also be included.

Study 2 will focus on measures that can be impacted through the GAMBL-OUT escape room: knowledge, intentions, and attitudes will be assessed in each assessment point (baseline, post-intervention, and follow-up). For what concerns to the implementation of the program, it will be assessed using some questionnaires and focus groups on which teachers and students will participate. In Table 1, a summary of the variables assessed in each study is presented.

Pathological gambling screening

For evaluating the prevalence of pathological gambling in our sample, the Problem Gambling Severity Index (PGSI) will be used. This 9-item scale, which is a shortened version of the Canadian Problem Gambling Index [37], assesses problematic gambling behaviors in the last 12 months and harmful consequences related to gambling. Items are rated on a 4-point scale (0 = never, 3 = almost always). The final score ranges from 0 to 27 and can be interpreted as follows: 0 = non-problem gamblers, 1–2 = low-risk gamblers, 3–7 = moderate-risk gamblers, and 8 and above = problem gamblers). The Spanish adaptation has presented sound psychometric properties, including high internal consistency ($\alpha = 0.97$) [38].

Gambling-related cognitions

The Gambling Related Cognitions Scale (GRCS) [39] will be used to evaluate the study participants' perceived inability to stop gambling (5 items), interpretative bias (4 items), illusion of control (4 items), gambling-related expectancies (4 items) and predictive control (6 items). Each item is scored on a 7-point Likert scale (7 = "strongly agree", 1 = "strongly disagree"), with higher scores reflecting higher numbers of gambling-related cognitions displayed. The Spanish adaptation of the GRCS has shown good psychometric properties [40].

Gambling motivations

The Gambling Motives Questionnaire (GMQ) [41] presents with 15 items divided in three factors related to different reasons for gambling: to increase positive emotions, to reduce or avoid negative emotions, and to enhance social affiliation. Good internal consistency coefficients for the 3 subscales and excellent test-retest reliability were obtained in the Spanish adaption of the GMQ [42].

Impacts of gambling advertising

The Impacts of Gambling Advertising Scale for adolescents (IGAS) [43] will be used for exploring three domains: (a) attitudes, interests and behavior related to

Table 1 Assessment plan

	Study 1	Study 2		
		Baseline	*Post-intervention*	*3-month follow-up*
Sociodemographic profile	X	X		
Ad hoc questions:				
- Interest in sports	X			
- Social support	X			
- Exposure to different gambling options	X			
- Exposure to gambling advertising	X			
- Exposure to prevention messages	X			
- Knowledge about gambling	X	X	X	X
- Attitudes towards gambling	X	X	X	X
- Presence of gambling problems among relatives and friends	X			
- Intentions to gamble	X	X	X	X
- Engagement with gambling (last 12 months / life)	X			
- Gambling habits (e.g., frequency, money spent)	X	X		X
Problem gambling screening (PGSI)	X			
Gambling-related cognitions (GRCS)	X			
Gambling motivations (GMQ)	X			
Impact of gambling advertising (IGAS)	X			
UPPS Impulsive Behavior Scale	X			
Implementation outcomes			X	

gambling ("Participation"), (b) knowledge about gambling options and providers ("Knowledge"), and (c) the degree to which people are aware of gambling advertising ("Awareness"). The IGAS presents 9 items which are answered on a 4-point Likert scale. The Spanish adaptation has shown good psychometric properties [44].

Impulsivity
Impulsivity will be measured using the 20-item version of the UPPS-P Impulsive Behavior Scale [45], which evaluates five distinct facets: sensation seeking, lack of premeditation, lack of perseverance, negative urgency, and positive urgency. The Spanish adaptation has presented good psychometric properties [46].

Implementation outcomes
Focus groups will be held with the key players involved in the study in each center (students and teachers) once the intervention is complete to qualitatively evaluate different domains related to the implementation. Following the Consolidated Framework for Implementation Research (CFIR) model and incorporating the guidance provided by Proctor et al. [47] and the recommendations outlined for implementation studies of online interventions by Hermes et al. [48], this study will evaluate various outcomes related to the implementation process: acceptability, adoption, appropriateness, feasibility, fidelity, penetration, and sustainability.

Data analysis
Quantitative analysis
In both Study 1 and Study 2, the variables will be described by using descriptive statistics: means and standard deviations in the case of quantitative variables with normal distribution, medians and interquartile range in the case of quantitative variables with non-normal distribution, and frequencies and percentages for categorical variables. The data obtained in Study 1 will be compared to a previous database (developed in 2019, pre-COVID-19) by conducting Student's t test and Chi squared tests. In Study 2, our primary analysis will employ intention-to-treat analysis at the individual level, utilizing linear regression to compare the outcomes between the intervention and control groups. The primary outcomes will be measured both in absolute scores and as a percentage of the total possible score. Adjusted standard errors will be utilized to account for clustering at the classroom level, which serves as our unit of randomization.

Qualitative analysis
The assessment of implementation outcomes will occur following focus group sessions conducted with both students and teachers. Once all data have been gathered, interviews will be translated, transcribed, and managed using NVivo (version pro 12) [49]. A reflexive thematic analysis approach will be adopted, following the recursive six stages of analysis outlined by Braun and Clarke [50]. Data analysts will independently engage in repeated readings of transcripts to familiarize themselves with the

data. Transcripts will then undergo inductive analysis in batches of five, with codes examined to identify patterns of similarity or divergence in ideas. This iterative process will continue until coding is comprehensive. The primary codes will be presented to the study team for consideration in constructing core themes based on recurring codes. Following the refinement of the codebook, a thematic scheme will be developed and presented to the study team for further refinement, naming, and finalization, facilitating interpretation and subsequent writing.

Ethics and dissemination

All procedures conducted within this study will adhere to the principles outlined in the 1964 Declaration of Helsinki and its subsequent amendments (7th revision, adopted by the 64th World Medical Association General Assembly, Fortaleza, Brazil). Prior to participation, all individuals will provide signed informed consent, with legal guardians providing consent if necessary, after being fully informed about the study procedures, potential risks, and their right to withdraw at any point. The Research Ethics Committee of the Autonomous Community of Aragon (CEICA) has granted approval for these studies (PI22/406 and PI24/364), and any significant protocol modifications will require approval from the ethics committee.

To ensure confidentiality, all collected data will comply with the provisions of the Spanish Data Protection and Digital Rights Act 3/2018 (LOPD), aligning with the European Union's General Data Protection Regulation (GRDP). A detailed plan will be implemented to maximize the security of all data collected, with an assessment conducted to identify and mitigate potential risks and impacts on information flow. The technology platforms will be segregated into two entirely independent systems, each accessing independent databases, ensuring complete disaggregation of patient data and doubling the security measures protecting end users.

Upon completion of the study, results will be disseminated through publication in international peer-reviewed biomedical journals and presentations at national and international conferences. The implementation study will be conducted and reported in accordance with the Standards for Reporting Implementation Studies (StaRI) Statement, designed for reporting implementation studies focused on enhancing the adoption and sustainability of interventions [51]. A comprehensive report will also be submitted to the Spanish Ministry of Health, the primary funding body. Furthermore, the lead researcher will organize an end-of-study knowledge translation seminar with the main objective of sharing the study findings with stakeholders. This seminar will facilitate discussions on maximizing uptake of the findings and determining future research directions.

Discussion

The GAMBL-OUT project represents a significant endeavor aimed at comprehensively understanding the gambling behaviors among a specific demographic segment—16 to 25-year-olds—in the Autonomous Community of Aragon, Spain. By comparing current data with information collected before the onset of the pandemic [6], the study seeks not only to update prevalence rates but also to identify potential shifts or alterations in gambling habits, including changes in preferred gambling alternatives (e.g., online betting, sports bets). This nuanced examination is vital for different reasons: firstly, it provides insights into how societal and environmental factors, such as the COVID-19 pandemic, may have influenced gambling behaviors among adolescents and young adults, as suggested in previous studies [52]; secondly, by pinpointing any emerging trends or variations, policymakers and public health authorities can tailor interventions more effectively to address evolving needs and challenges.

Adolescents and young adults often view conventional educational approaches as dull or unrelated to their everyday lives, diminishing the impact of these interventions [1, 18]. A significant challenge lies in the capacity of such interventions to capture and maintain the attention of the intended audience, and serious games constitute a promising alternative. While there exist a wide variety of gamified interventions [26], not many have been used for teaching about mental health-related issues such as problem gambling in samples of adolescents. Those which have explored this aspect have used different approaches, including a digital escape room (*Escape Addict*) that resulted effective for increasing knowledge about addictive behaviors [7], although with some limitations.

Following this line of research, the present study will test the effectiveness of the GAMBL-OUT digital escape room—a serious game designed to educate and engage youngsters in discussions surrounding gambling. The gamified nature of the escape room, coupled with its educational content, offers a unique opportunity to not only increase knowledge about gambling but also to instigate meaningful shifts in attitudes and intentions related to gambling behavior. By immersing participants in a captivating narrative and presenting them with various challenges and puzzles related to problem gambling, the escape room fosters active learning and critical thinking [28, 30]. Participants are encouraged to collaborate, think critically, and apply problem-solving skills to navigate through the game, all while gaining valuable insights into the risks and consequences associated with gambling.

The implementation of the GAMBL-OUT digital escape room in educational centers represents a proactive approach to prevention, capitalizing on the formative years of adolescents and young adults to impart essential

knowledge and skills. By targeting this demographic, which is particularly vulnerable to developing addictive behaviors [1], the intervention aims to intervene early, equipping young people with the tools and awareness needed to make informed decisions about gambling. Moreover, by embedding preventive measures within an engaging and interactive format, the escape room has the potential to overcome the abovementioned common barriers associated with traditional educational approaches, such as disengagement or apathy.

However, the success of such interventions hinges not only on their design and content but also on their effective implementation within educational settings. As such, the present study will also explore various implementation outcomes, including acceptability, adoption, appropriateness, feasibility, fidelity, penetration, and sustainability [47, 48]. By gathering insights from key stakeholders, such as students and teachers, the study aims to identify facilitators and barriers to implementation, as well as areas for improvement or refinement. This iterative approach to intervention development and implementation ensures that interventions like the GAMBL-OUT escape room are not only evidence-based but also contextually relevant and responsive to the needs of the target population.

In conclusion, the present study represents a multifaceted effort to address the complex issue of gambling among adolescents and young adults. By combining rigorous epidemiological research with innovative prevention strategies, such as the GAMBL-OUT digital escape room, the study seeks to advance our understanding of gambling behaviors while simultaneously empowering young people to make healthier choices. Through collaborative partnerships with educational institutions and ongoing engagement with stakeholders, the study aims to translate research findings into actionable insights and tangible interventions that have the potential to positively impact the lives of young adults and communities at large.

Abbreviations
CEICA   Research ethics committee of the autonomous community of aragon
CFIR   Consolidated framework for implementation research
IGAS   Impacts of gambling advertising scale
GMQ   Gambling motives questionnaire
GRCS   Gambling related cognitions scale
GRDP   European union's general data protection regulation
LOPD   Spanish data protection and digital rights act 3/2018
PGSI   Problem gambling severity index
StaRI   Standards for reporting implementation studies

Supplementary Information
The online version contains supplementary material available at https://doi.org/10.1186/s40359-025-03035-x.

Supplementary Material 1

Data availability
No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate
The Research Ethics Committee of the Autonomous Community of Aragon (CEICA) evaluated and approved the study protocols (PI22/406 and PI24/364). All study participants will sign an informed consent prior to randomization.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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Barceló-Soler *et al. BMC Psychology*   (2025) 13:690

Page 10 of 11

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