ORIGINAL RESEARCH

Evaluation of Effectiveness of the Unplugged Program on Gambling Behaviours among Adolescents: Study Protocol of the Experimental Controlled Study "GAPUnplugged"

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Abstract

Gambling risk behaviour is an emerging problem among adolescents. "Unplugged" is an effective Social Influence curriculum for preventing substance use among students. This study aims to develop and test a new component focused on gambling added to the Unplugged program. Schools of Piedmont region and Rome city were invited to participate in the study. A self-completed anonymous questionnaire including questions on socio-demographic characteristics, addictive behaviours, beliefs, attitudes and risk perceptions about gambling, normative perceptions, parental practices, school climate, refusal skills, impulsiveness, self-esteem, antisocial behaviours and sensation seeking was prepared for baseline and follow-up surveys. The protocol of the study was submitted and approved by the Novara Ethical Committee and registered in ClinicalTrials.gov (NCT05630157, Protocol ID: 080.742, 11/17/2022). Twenty-nine schools accepted to participate in the study. Sixty-three classes (1325 students) satisfied the eligibility criteria for intervention and were allocated to the intervention arm, and the other 61 (1269 students) were allocated to the control arm. Because of drop-out, absentees, refusals, and invalid questionnaires, data on 1874 students (998 in the intervention and 876 in the control arm), were available for the analysis at baseline. Data management of follow-up questionnaires is in progress. Results of the present study will be useful to clarify the effectiveness of prevention interventions in reducing gambling behaviours among adolescents. Moreover, this will be the first experience of evaluating a new component focused on a different risk behaviour, added to a curriculum previously shown as effective on other risk behaviours.

Introduction

Gambling risk behaviour is an emerging problem among adolescents. According to the ESPAD 2019 survey, in Europe the prevalence of 16-year-old students who gambled for money in the last year was 22% (29% of boys and 15% of girls). Among these, 5% (6.3% of boys; 2.4% of girls) had a problem gambling behaviour, corresponding to 1.4% of the overall sample (ESPAD Group, 2020).

In Italy, the prevalence of last year gambling was 32% (41% of boys and 22% of girls), and among these, 3.9% (5% of boys; 1.6% of girls) had problem gambling (ESPAD Group, 2020). However, among 15-year-olds students participating in the HBSC 2018 survey the prevalence of risk/problem gambling was higher, around 7% (14% of boys; 3% of girls) (HBSC Italia, 2020). No data are available as regards the prevalence of gambling behaviours among early adolescents (11–14 years old).

According to literature, the frequency of problem gambling is 2–4 times higher among adolescents than among adults (Delfabbro et al., 2005; Huang & Boyer, 2007; Purdie et al., 2011; Shaffer & Hall, 2001; Splevins et al., 2010). Moreover, the engagement in gambling appears to be precocious, between 11 and 12 years of age (Gupta & Derevensky, 1998; Westphal et al., 2000; Derevensky et al., 2019; Commission Gambling, 2023) and early initiation is a risk factor for development of problematic gambling and is associated with substance use behaviours among adolescents (Andrie et al., 2019; Burge et al., 2006; Delfabbro et al., 2005; Dowling et al., 2017; Shaffer & Korn, 2002; Westphal et al., 2000) and with psychiatric disorders and substance use disorders in adulthood (Burge et al., 2006; Lynch et al., 2004; Rahman et al., 2012). Independently from the frequency of the behaviour, there is a continuum of risk progression, and negative consequences can occur at any stage of the behaviour (Canale et al., 2016a; Derevensky & Gilbeau, 2015; Langham et al., 2016; Raisamo et al., 2015; Shaffer & Korn, 2002).

It is longly recognized that school-based prevention programs implemented in early adolescence are the most convenient and appropriate strategy to tackle risk behaviours among youth (UNICRI, 2003). A large number of pupils can indeed be reached, and teachers can work on risk behaviours before stabilization.

Previous studies evaluating gambling prevention interventions among adolescents showed effect in improving knowledge, attitudes and beliefs, correcting misconceptions, and reducing gambling behaviours (Calado et al., 2020; Canale et al., 2016b; Donati et al., 2014, 2022; Ferland et al., 2002; Ladouceur et al., 2004; Lavoie & Ladouceur, 2004; Lupu & Lupu, 2013; Ren et al., 2019; Tani et al., 2021; Todirita & Lupu, 2013; Walther et al., 2013; Williams et al., 2010). However, only a paucity of studies were conducted on early adolescents (Ferland et al., 2002; Ladouceur et al., 2004; Lavoie & Ladouceur, 2004; Lupu & Lupu, 2013; Todirita & Lupu, 2013; Walther et al., 2013). Interventions included information on risks of gambling, with particular attention to unfair nature of gambling and probability of win, strategies to correct erroneous beliefs on gambling and rituals, information on symptoms of problematic and pathological gambling, and on health services to contact for help. Among these components, the most

promising ones were those focusing on correcting misconceptions about the fairness of gambling and the probability of winning, addressing cognitive distortions associated with gambling behaviour, and fostering a more realistic understanding of the risks involved (Keen et al., 2017, 2019). Moreover, studies highlighted that youth tend to respond better to programs that are interactive and engaging. For example, computer simulation exercises used to explore the concepts of chance and causality help students to understand that strategies, tricks, or various rituals do not influence the outcomes of gambling (Donati et al., 2014; Keen et al., 2017, 2019; Ladouceur et al., 2004; Lupu & Lupu, 2013; Todirita & Lupu, 2013).

"Unplugged" is a Social Influence universal school curriculum developed and tested in the multicentric European project "EU-Dap" (European Drug Addiction Prevention, www.eudap.eu). It includes 12 interactive lessons, applied by trained teachers following standardized education material (van der Kreeft et al., 2009). According to results of the original first European trial, and of replication trials conducted around the world, the program was effective in reducing tobacco, cannabis, drunkenness episodes and alcohol-related problems among students who participated in the experimental curriculum compared with usual curricula (Caria et al., 2011; Faggiano et al., 2008, 2010; Gabrhelik et al., 2012; Sanchez et al., 2021; Vigna-Taglianti et al., 2021). The program is listed as effective program in systematic reviews (Catalano et al., 2012; Faggiano et al., 2014; Foxcroft & Tsertsvadze, 2011; Tremblay et al., 2020) and in the best practice portal of EMCDDA (https://www.emcdda.europa.eu/best-practice/xchange/unplugged_en).

This study was designed to assess the effectiveness of the "Unplugged" prevention curriculum integrated with a new component focused on gambling in preventing gambling behaviours and in improving knowledge, attitudes, risk perceptions, beliefs, refusal skills, and normative perceptions on gambling among Italian secondary school students.

Methods

The protocol of the study was submitted and approved by the Novara Ethical Committee (Protocol 943/CE; study code CE228/2022; approval obtained on 11/18/2022) and registered in ClinicalTrials.gov database (NCT05630157; Protocol ID: 080.742; registered on 11/17/2022).

Study Design and Population Recruiment

The study was designed as non-randomized cluster controlled experimental trial with two study arms:

– experimental: Unplugged program + gambling component,
– control: usual curriculum (no specific intervention).

The unit of allocation was the class.

The study originated from a collaboration between the Addiction Unit of ASL Roma1 and the University of Eastern Piedmont. The network of Unplugged trainers within the local health units of Piedmont region and city of Rome was engaged to invite secondary schools to participate in the study.

Second and third grade classes of 1st cycle secondary schools (median age of pupils 11–12 years) and first grade classes of 2nd cycle secondary schools (median age of pupils 13–14 years) were eligible for the study. Classes available to be part of the experimental arm should have at least one class teacher already trained for the implementation of the Unplugged program, either in the past or in the weeks before the beginning of the study, available to participate in a 2-h training session focused on the new contents on gambling, and to implement the new component on gambling in class.

Classes accepting to participate in the study and satisfying the above-mentioned inclusion criteria for intervention arm were allocated to intervention arm; the other eligible classes were allocated to control group.

Two documents were prepared and sent to parents for collecting informed consent before the start of the study: a document including information on the study, and a document including information on data collection. Only students whose parents or caregivers gave consent to participate were involved in the study. Before the administration of questionnaires, information was provided also to the pupils in order for them to express their consent to participate. Both pupils whose parents or caregivers expressed refusal to participate and pupils who themselves expressed refusal to participate did not participate in the study; they left the classroom during the questionnaire administration.

The Unplugged Curriculum and the New Component on Gambling

Unplugged is a combined Social Competence and Social Influence universal school curriculum, consisting of 12 standardized units, one-hour each, delivered by class teachers to adolescents 12–14 years old. The program aims to prevent tobacco, alcohol and drugs use among adolescents, trying also to prevent the transition from experimental to regular use, to support the cessation among those already using regularly or at risk, enhancing the skills necessary to deal with everyday life, and to resist to peer pressure and social influences.

Details on the contents and the theoretical model of the program are published elsewhere (Vadrucci et al., 2016; van der Kreeft et al., 2009). The curriculum is entirely taught using interactive techniques and addresses personal and social skills (critical and creative thinking, relationship skills, assertiveness, refusal skills, verbal and non-verbal communication, the ability to manage emotions and coping skills, empathy, problem solving and decision-making skills), normative education (e.g. the correction of normative beliefs about substances and of the incorrect perception of prevalence of use among peers) and provides science-based information on consequences of substance use.

In the present study, a new component focused on gambling was developed and integrated into the curriculum. This consisted in a specific unit called "Unit X:

Unattainable ratings", located between unit 11 and unit 12, and in new contents on gambling added all along the program, especially in units 3–4–5–7–9. A description of these contents is provided in Table 1.

The new specific unit followed the same structure of the other units, so including: (1) a few words about the lesson; (2) objectives; (3) what you need; (4) tips to help with the lesson; (5) opening (with an activating energizer); (6) main activity (described below); (7) closure (with an energizer); (8) "in a nutshell" section. The teacher first promotes the sharing and comparison of data, preconceptions, and experiences on gambling, dividing the students in small groups. Brainstorming is used to identify the meaning of event probability concepts (following a subjectivist approach) and gambling iniquity. Using students' words and thoughts, a shared definition of sports betting is obtained, and this is compared with the scientifical definition, described in the teacher's handbook. Then students are asked about their knowledge on bets, specifically the sport bets.

The sports betting simulator is then presented and experimented. This is an application downloadable both on smartphones and classroom's pc, allowing the player, after choosing the amount of money, to place a bet on the results of 10 football matches (1×2 bet type), showed on the screen, with minimum two results. In case the player guesses all the results, the simulator displays the money earned, whilst in case of loss the simulator declares the loss. After the first betting round, the player may opt to continue gambling, or stop playing. At the end of each turn the simulator shows the final budget. Despite the simulator is based on virtual money, the loss has an emotional impact on the students. Indeed, experiencing the simulator, students notice they are systematically losing, and curiosity arises on understanding what kind of mechanism regulates the bets. After the simulation, the teacher starts a debate phase, focused on the improbability of winning's and on the actual risk to lose in the long run, even when winning sometimes.

The lesson ends with the explanation on the way the bookmaker calculates the odds, showing through mathematical calculations the probability of winning and the intrinsic iniquity. It is reiterated that the bookmaker has always a profit margin due to the percentage of mark-up (also known as vig or board) applied on the odds. The bookmakers tend to lower the exact odds, to make a small profit through the vig. This makes the odds of winning unfair as well as the relation between players and bookmakers. This information aims to promote the growth of negative attitudes against gambling among students.

The newly developed activities aim to correct normative beliefs, experience directly iniquity of betting, increase students' critical thinking, reducing positive attitudes and fostering negative attitudes related to gambling behaviours, by applying social-emotional learning approach (Goleman, 1995; Salovey & Mayer, 1990). Normative beliefs based on incorrect or imprecise information can lead to inappropriate and at-risk behaviour: the wrong belief becomes the norm and, as a result, the risk behaviour is acted (Perkins and Berkowitz, 1986). By comparing estimates and real data, normative education activities within the Unplugged program foster the transition from favourable to unfavourable attitudes toward tobacco, alcohol and drug use risk behaviours. Normative beliefs and attitudes were indeed mediators of Unplugged effectiveness (Giannotta et al., 2014).

Table 1 The 12 *Unplugged* units, goals and new content on gambling

Unit	Title	Goals	New content on gambling	Goals
1	Opening Unplugged	Introduction to the programme, setting of the objectives and rules for the lessons, reflecting on knowledge on drugs	Gambling was added to the list of risk behaviours discussed	
2	To be or not to be in a group	Clarification of group influences, dynamics, and expectations	Gambling was added to the list of risk behaviours discussed	
3	Choices-alcohol, risk and protection	Information on different factors influencing drug use	References to gambling as risk behaviour are inserted along the activities. Discussion on risk and protective factors on a par with alcohol consumption. Personal and social factors are examined	Making students reflect on gambling as behaviour that can evolve to problematic or clearly pathological behaviour. Make them understand how complex the phenomenon is
4	Your beliefs, norms and information: do they reflect reality?	Fostering critical evaluation of information, reflection on differences between own opinion and actual data, correction of norms, achieving realistic estimation of peer drug use	Data on gambling prevalence are provided; an additional column is inserted in the exercise charts	Stimulating students to think about the perception of the spread of gambling. Reducing positive attitudes toward gambling
5	Smoking the cigarette drug—inform yourself	Information on effects of smoking, differentiation of expected vs. real effects and short-term vs. long-term effects, discussion on why people smoke even though they know damaging effects	A new question on the association between smoke and gambling is proposed in the opening questionnaire of the student's workbook. References to gambling are included in the main activities and discussed in The Court Game	Assessing knowledge on gambling effects stimulating the comparison with tobacco. Making students discussing pro and contra arguments
6	Express yourself	Adequate communication of emotions, distinguishing between verbal and nonverbal communication		

Table 1 (continued)

Unit	Title	Goals	New content on gambling	Goals
7	Get up, stand up	Fostering assertiveness, respect for others, stand up for rights	A situational example focused on gambling theme is added to the 5 situations already proposed	Training students' assertiveness during specific situation related to gambling. Increasing refusal skills and skills to resist the peer's social pressure in relation with gambling behaviour
8	Party tiger	Recognition and appreciation of others' positive qualities, acceptance of positive feedback, practising and reflection on getting into contact with others	Gambling was added to the list of risk behaviours discussed	
9	Drugs—get informed	Information on effects and risks of drug use, and on sources of accessible information on drugs	References to gambling are inserted in the information on effects and risks. The knowledge quiz is enlarged introducing three new cards including gambling questions, accompanied by ideas and stimuli to encourage discussion, similarly to the other cards used for the quiz	Increasing the correct knowledge on the subject and reviewing beliefs, debunking misconceptions. Reducing positive attitudes and increasing negative attitudes toward gambling
10	Coping competences	Identification of healthy coping strategies, reflection on personal attributes, negative feelings, coping with weaknesses		
11	Problem solving and decision making	Structured problem solving, fostering creative thinking and self-control, distinguishing long and short term positive and negative consequences of actions		

Table 1 (continued)

Unit	Title	Goals	New content on gambling	Goals
X	Unit X: Unattainable ratings		Small groups work on data, preconceptions, and experiences on gambling. Brainstorming on definition of sports betting. An online sport betting simulator is then presented and experimented. The lesson ends with presentation and discussion of mechanisms of bookmaker odds calculations and the intrinsic iniquity	Training students on mathematical basis to calculate the odds of winning. Making students reasoning on inequity in sports betting. Reducing students' positive attitudes and increasing negative attitudes toward gambling
12	Goal setting	Splitting long term goals in short term objectives, reflecting on application of program contents, evaluating strengths and weakness of the program, closing the programme		

Through information analysis tasks students achieve expertise in objective evaluation of everyday life's experiences, considering advantages and disadvantages, distinguishing reality from preconceptions, and so developing critical thinking. Brainstorming and discussions, together with confrontation among peers applied all along the program, stimulate critical thinking, and help the students to generate alternative solutions and independent choices. All these activities, together with role plays, refer to Social Learning theory (Bandura, 1977). The introduction of a simulator in the new "Unit X" follows the same reasoning: interactive approach, experimentation, peer confrontation, and experiential learning (Kolb, 1984). The simulator allows the students to experience gambling in a safe and risk-free context, getting passionate, having fun, and finally ending up with losses and defeating, that makes them reason on the low probability of victory and the iniquities inherent in gambling system integrating mathematical skills and logical reasoning.

The Training

In order to ensure the standardisation of the application of the program, teachers of the intervention classes were invited to participate in a 2-h training course held online. Three training sessions were organized and held on 15th December 2022, 10th January 2023 and 24th January 2023. The training was reserved to teachers participating in the GAP Unplugged trial with intervention classes. According to inclusion criteria, teachers needed to have been previously trained on the traditional Unplugged program and they should have implemented the Unplugged curriculum in the past. The training session was entirely interactive and followed the Unplugged methodology: teachers were requested to directly experience GAP integrations for units 3, 4, 5, 7 e 9, and unit X through the sports betting simulator. This approach follows the Kolb's experiential learning, defined as "the process in which educators purposefully engage with students in direct experience and focused reflection in order to increase knowledge, develop skills, and clarify values" (Kolb, 1984). According to this approach, knowledge results from the combination of grasping and transforming experience; teachers experience first-hand the innovations brought by the research group and they receive tools and instructions to apply the program in the classroom. Additionally, teachers received updated information on gambling phenomenon, prevalence, and legislation. Finally, process monitoring forms collecting data on implementation and satisfaction with the program were presented together with the online mask to fill. Training and subsequent help desk is supposed to motivate teachers to apply the curriculum according to indications.

The training was held by a multidisciplinary group, composed of psychologists, researchers, and mathematicians, the same who designed the gambling contents and the simulator.

Booklets describing the new contents on gambling to be followed during the implementation of Unplugged were prepared and distributed to the teachers, together with an integration of the student workbook.

Sample Size Calculation

According to the mean reduction of risk behaviours obtained for substance use outcomes in previous experimental evaluations of Unplugged (Faggiano et al., 2008; Vigna-Taglianti et al., 2021), and in a similar trial assessing the effectiveness of a gambling prevention program conducted in Germany (Walther et al., 2013), we expect a reduction of 30% of gambling behaviour in the intervention vs the control arm.

The STATA command "clsampsi" was used to calculate the number of clusters for specified cluster size and power, by using the Satterthwaite approximate *F* test for clustering (Batistatou et al., 2014). Taking in consideration the lowest level of clustering (class), and assuming alpha 0.05 (two-sided), power 0.80, prevalence of gambling behaviour in the control arm 13.3%, 20 pupils per class and ICC 0.025, the estimated number of clusters (classes) needed is 74 per group. This corresponds to 1480 pupils in the intervention and 1480 pupils in the control arm, 2960 overall.

Data Collection and Data Management

Data collection was foreseen before and after the intervention through a standardized questionnaire developed ad hoc and containing previously validated questions.

The first questionnaire was administered between the end of November 2022 and the end of January 2023 both in the control and the intervention group. Afterwards, the intervention group received the 13 units of the Unplugged program with the gambling component, for about 3 months. Finally, after 4 to 8 weeks from the completion of the program, the same evaluation questionnaire was administered both in the control and in the intervention classes (May–June 2023).

The questionnaire was anonymous. A pseudoanonymization code was filled by the students and will be used for linkage of baseline and follow-up data. Automatic procedures and manual matching will be applied. At the end of the survey, data will be analyzed in aggregated and anonymized form.

In order to ensure the standardization of the questionnaire administration, a document describing procedures was prepared and distributed to all researchers involved. A process monitoring form to be filled at the end of the administration session was also prepared and data were registered.

To monitor the curriculum implementation and the satisfaction of pupils and teachers with the program, a set of monitoring and program satisfaction forms were provided to the teachers. The satisfaction questionnaires were filled at the end of the program by teachers and pupils using an online mask.

The Questionnaire and Measures

A self-completed anonymous questionnaire was created ad hoc for the surveys using as base the Unplugged evaluation questionnaire (available at www.eudap.eu). To preserve confidentiality, the questionnaires were labeled with a 9-digit individual

code self-generated by the student. The questionnaires were filled out by students in the classroom during the school time using an online application. In cases of lack of computers or problems of connection, the researchers administered the paper version of the questionnaire.

The questionnaire included 36 questions (described below) derived from the EDDRA data bank of EMCDDA (http://eddra.emcdda.eu.org) and other international sources and projects (ESPAD, HBSC, Project ALERT, RATING Swedish cohort).

Questions on attitudes and beliefs toward gambling, refusal skills, impulsiveness, self-esteem, sensation seeking, parental practices, relation with mathematics and class climate allowed response alternatives on a 4-point Likert scale (strongly agree/agree/disagree/strongly disagree and very likely/likely/unlikely/very unlikely).

Socio-Demographic Characteristics

Individual socio-demographic information included gender, age (based on birth date), family composition (living with "both parents", "one parent", and "other relatives"), languages spoken in family, father and mother occupation. The socio-economic status was measured by the Family Affluence Scale (FAS-III), a scale measuring family economic wellness through 4 items about family car possession, child having their own bedroom, family holidays and family computers (Hartley et al., 2016). This scale was validated in the HBSC study on samples of pupils aged 11–15 years.

Substance Use and Gambling Behaviours

Cigarette smoking, alcohol drinking, drunkenness episodes, marijuana and other drug use were investigated by asking students if they used any particular substance lifetime and during the last 30 days, with "yes" or "no" as possible answers. Gambling behaviour was investigated by asking students if they gambled (scratchcards, lottery, bingo, slot machines, sport betting, event betting, poker, cards) during the last 12 months and during the last 30 days, with response categories ranging on a scale from 0 to 13 times or more. The Italian version of South Oaks Gambling Screen—Revised for Adolescents (SOGS-RA), a 12-item scale with "true" or "false" as possible answers, was used to assess the problem gambling behaviour i.e. lying about gambling, having discussions or arguments with family and friends due to gambling, gambling more than intended, being criticized, feeling bad about amount bet, wishing to stop, hiding the gambling receipts, borrowing money without returning it, dropping school classes for gambling, and robbing to obtain money for gambling. The scale was validated in the Italian context on 15–19 years-old adolescents obtaining acceptable internal consistency, $\alpha = 0.78$ (Colasante et al., 2014).

Attitudes, Risk Perceptions, Beliefs, and Refusal Skills towards Gambling

Attitudes toward gambling were assessed asking "what do you think about gambling?" with possible answers "I find it funny", "I find it risky", "I find it

enthusiastic", "I think it could become a habit", "I could lose the money" and "I will become rich". For each item, the pupils had to declare their grade of agreement. Risk perceptions were measured using the question "How much do you think people risk harming themselves if they gamble" with possible answers "No risk", "Slight risk", "Great risk" and "Don't know" for each specific game. A 7-item question investigated beliefs toward gambling, e.g. predicting gambling results, becoming rich, winning if gambling often, the role of chance.

Refusal skills were assessed by presenting three scenarios related to different situations in which a friend offers to play games of chance; the pupil has to declare how likely is he/she to accept the proposal, using a response scale from 1 = very likely to 4 = very unlikely, with higher scores indicating greater ability to cope with the offer and apply refusal skills.

Impulsivity, Self-Esteem, Violent Behaviour, and Sensation Seeking

Impulsivity was assessed with a 5-item scale asking opinion to the statements: "I often say or do things without thinking", "I often get in troubles because I do things without thinking it through", "I am impulsive person", "I weight up all the choices before I decide on something", "I often say something off the top of my head". This scale was validated on 13–14 years-old pupils obtaining acceptable internal consistency, $\alpha = 0.69$ for 13 years old pupils, and $\alpha = 0.71$ for 14-year-old pupils (Vitaro et al., 1999). Self-esteem was measured with the Italian version of the Rosenberg Self-Esteem Scale, a 10-item scale including 5 positive statements (e.g. "On the whole, I am satisfied with myself") and 5 negative statements (e.g. "At times I think I am no good at all") (Prezza et al., 1997). A 7-item question assessed episodes of violent and antisocial behaviour, e.g. violence toward the teachers, fights, threats with weapons, stealing episodes, and others. Sensation seeking was evaluated with the Italian version of Brief Sensation Seeking Scale (BSSS), including questions on experience seeking (e.g. "I would like to explore strange places"), boredom susceptibility (e.g. "I get restless when I spend too much time at home"), thrill and adventure seeking (e.g. "I like to do frightening things"), disinhibition (e.g. "I like wild parties"). This scale was validated in the Italian context on 14–20 year-old adolescents showing acceptable internal consistency, $\alpha = 0.73$ (Primi et al., 2011).

Perception of Friends and Peers' Behaviours

Questions on the perceived number of friends and people of the same age smoking cigarettes, drinking alcohol, getting drunk, using marijuana or other drugs, and gambling in presence and online allowed the answers: "None", "Less than half of them", "About half of them", "More than half of them" and "All of them". The question of friend's approval of gambling allowed the answers "Would approve", "Would disapprove but still be my friends", "Would disapprove and stop being my friends" and "They would not care".

Parental Gambling, Monitoring and Permissiveness

Exposure to friends and parental gambling was measured by asking "Have you ever gambled together with father, mother, siblings, other relatives, friends?" with possible answers "often", "sometimes", "never", "I have never gambled"; and "Does any of your parents gamble?". Parental rules and practices were investigated by asking students questions about parental monitoring, parental disappointment and parental support. Perceived parental permissiveness was assessed by asking students if their parents would allow them smoking cigarettes and drinking alcohol (separate questions), with possible responses "Would allow", "Would allow at home", "Would not allow at all". Perceived parental permissiveness toward gambling allowed responses "Would allow" and "Would not allow".

School Climate, General and Maths Scores and Attitudes

Class climate, school performance and pupil's respect for teachers were assessed by a question allowing the following answers "The students in my class enjoy being together", "Most of the students in my class are kind and helpful", "Other students accept me as I am", "How I do in school matters a lot to me" and "I have great respect for what my teachers tell me". The information on mathematics grades was investigated by a specific question allowing the answers "High", "Medium" and "Low". A 10-item question assessed the relation of the student with mathematics through positive (e.g. "I am able to perform requested calculations", "I understand the formulas", "Math is useful outside the school", "I am having fun doing math", "It fascinates me", "It is my favourite subject") and negative items (e.g. "I don't like it", "I don't understand it", "I make mistakes doing calculations", "I don't understand the formulas I have to apply").

Outcomes

All outcomes were measured at baseline and at follow-up, 4–8 weeks after completion of the intervention.

Primary Outcomes

- Prevalence of gambling behaviours in the past 30 days.

Secondary Outcomes

- Prevalence of at-risk gambling behaviour measured through the past 30 days frequency of at-risk indicator according to the definition of SOGS-RA (Wiebe et al., 2000),

- beliefs about gambling: score of 7-item scale assessing false beliefs concerning gambling,
- attitudes towards gambling: score of 6-item scale assessing attitudes about gambling by asking "What do you think about gambling",
- refusal skills for gambling: proportion of pupils answering they will refuse vs accept the proposal of gambling from a friend (three scenarios),
- normative perceptions on gambling: proportion of pupils scoring as > 50% the proportion of friends or people of their age who gamble,
- risk perceptions on gambling: proportion of pupils with high vs low risk perceptions towards gambling as measured by a question asking "How much do you think people arm themselves by gambling to."

Statistical Analysis

Descriptive statistical analyses will be performed to examine baseline characteristics of the study sample. Differences at baseline in variables of interest between intervention and control pupils will be tested through chi-square tests and p-values in order to evaluate interchangeability of groups.

Due to non-randomized study design, several approaches will be applied to provide unbiased estimation of the program effects. The analyses will be firstly conducted according to Intention to Treat approach, i.e. students will be kept in the intervention (and control) arm as assigned at baseline independently from the real participation and the level of implementation of the program. Secondarily, the analyses will be performed allocating classes not implementing the program to the control arm. Finally, difference-by-difference approach will be applied comparing the difference between the pre-post difference in outcomes of the treatment group and the pre-post difference of the control group, allowing the adjustment for confounding factors.

Primary outcome variables will be analysed as dichotomous (yes/no). Crude and Adjusted Odds Ratios and their corresponding 95% Confidence Intervals will be calculated as measures of association between experimental condition and primary and secondary outcomes.

Multilevel mixed-effect modelling will be used to control for the hierarchical nature of the data and the cluster effect, testing health authority and class as levels. Baseline level of the outcomes, age, socio-economic status and gender will be assessed as potential confounders and moderators. In case of significant differences in prevalence of behaviours among health authorities, indicators of last month prevalence at local level will be derived from the baseline overall database and included in the models.

Transition among stages of gambling behaviours will be analysed comparing pupil's stage of the behaviour in the last 30 days at baseline with stage of the behaviour at follow-up. For this purpose, mutually exclusive variables will be used: no behaviour (no gambling in the last 30 days), sporadic behaviour (one to two times), and frequent behaviour (three or more times).

Finally, in order to understand the mechanisms of effect of the intervention, mediation analysis will be performed testing the mediating role of beliefs, attitudes, risk perceptions, refusal skills, perceptions of peers' and friends' gambling, class climate as measured at follow-up on Unplugged effect on last 30 days gambling behaviour. The PROCESS macro for SPSS will be used (Hayes, 2018). The following effects will be estimated: intervention effect of each mediator (path a); effect of each mediator on gambling (path b); total, indirect and direct effects of the intervention program on the outcome. The indirect effect will be obtained by applying the technique of bootstrapping.

Statistical analyses will be carried out at the central level, in University of Eastern Piedmont, Italy, using STATA software release 18.0 and SPSS software release 28.0 (Stata Corporation, 2023; IBM Corporation, 2021).

Results

Enrolled Schools and Classes

Schools and classes accepting to participate in the study are presented in Fig. 1 and Table 2. In Table 2, numbers refer to the students declared by the teachers as part of the classes, at allocation, independently from the actual participation.

Twenty-nine schools accepted to participate in the study: 6 in the city of Rome, 5 in local health authority of AL, 1 in local health authority of Torino city, 4 in local health authority of CN1, 1 in local health authority of CN2, 6 in local health authority of TO3, 1 in local health authority of TO5, 1 in local health authority of NO and 4 in local health authority of VC. The large majority of schools were 1st cycle secondary schools whilst 6 (20.1%) were of 2nd cycle.

Sixty-three classes satisfied the eligibility criteria for intervention and were allocated to the intervention arm, and the other 61 to the control arm, for a total of 124 classes accepting to participate in the study. According to the number of students declared by the teachers as part of the classes, the sample should have accounted for 1325 students in the intervention arm and 1269 students in the control arm.

Participating Schools and Classes

The flow of school, classes and students' participating in the study is presented in Fig. 1.

One school accepting to participate in the study with both intervention and control classes declined to be part of the intervention before the baseline survey (3 classes); however, it maintained the participation with the control classes. Other 3 classes (1 intervention, 2 control) of two schools dropped before the baseline survey.

Because of drop-out, absentees and refusals, the real participants at baseline were lower than expected. Moreover, some questionnaires were invalid. Valid baseline questionnaires were available for the analysis for a total of 1874 students, 998 in the intervention and 876 in the control arm. Consequently, the
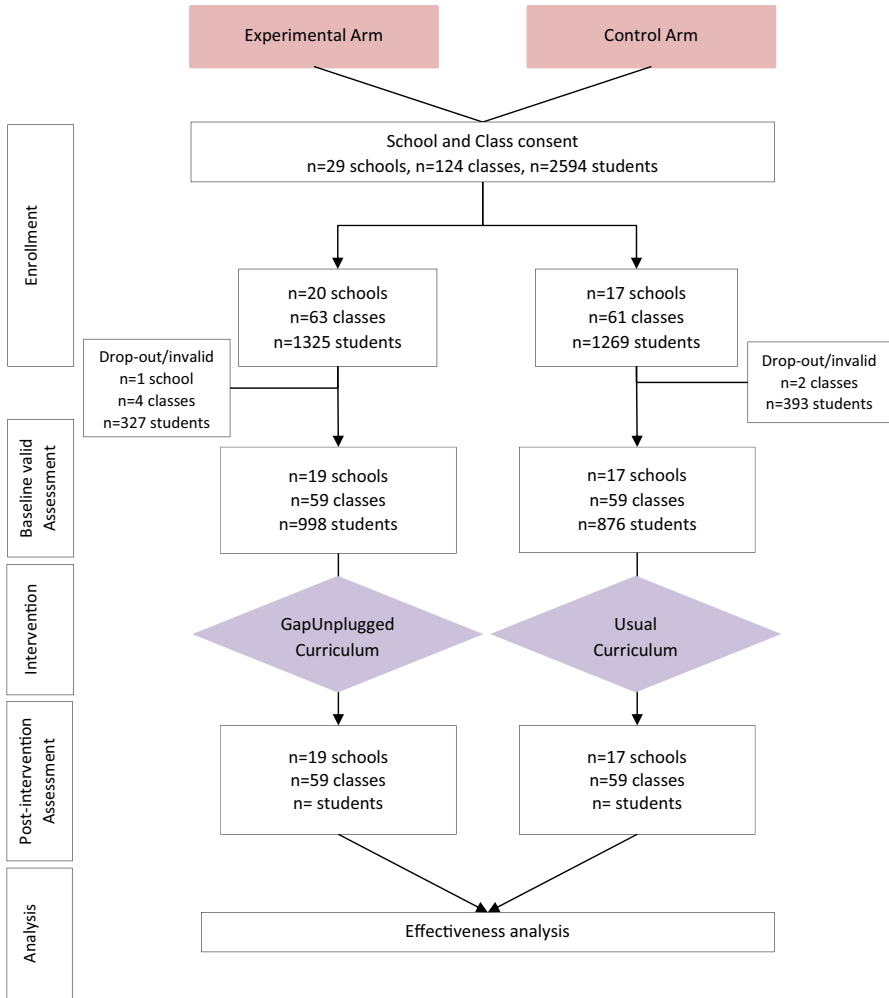
Fig. 1 Flowchart of the "GAPUnplugged" study

overall number of valid questionnaires at baseline was 37% lower than the necessary sample size estimated through sample size calculations, 33% lower in the intervention and 41% lower in the control group. Considering numbers of students declared by the teachers as part of the classes at allocation, drop-out rate at baseline was 25% in the intervention arm and 31% in the control arm.

All the schools and classes participated in the post-intervention survey. Data management of follow-up questionnaires is in progress.

Table 2 Schools, classes and students allocated to intervention and control arm by region and local health autority

Region and local health autority	Municipality	Schools	Grade	Intervention arm		Control arm	
				Classes	Students	Classes	Students
Lazio region							
ASL Roma 1	Roma	6	I	21	449	21	412
Piedmont region							
ASL AL	Spinetta Marengo	1	I	5	102		
	Novi Ligure	1	I	6	129		
	Stazzano	1	I	1	21		
	Alessandria	2	I			15	340
ASL Torino city	Torino	1	I	3	60	2	43
ASL CN1	Robilante	1	I	1	21		
	Savigliano	1	II	2	51		
	Racconigi	2	II			3	53
ASL CN2	Pocapaglia	1	I	2	29		
ASL TO3	Pinerolo	1	I	2	46	2	45
	Rivoli	2	I			7	144
	Bruino	1	I	4	80	4	78
	Piossasco	1	I	3	66		
	S. Antonino Susa	1	I	4	69		
ASL TO5	Andezeno	1	I	2	43	1	20
ASL NO	Oleggio	1	I	3	73	3	72
ASL VC	Vercelli	4	I, II	4	86	3	62
Overall		29	I-II	63	1325	61	1269

Discussion

This is the first study evaluating the effectiveness of the "Unplugged" prevention curriculum integrated with a new component focused on gambling in preventing gambling behaviours among students. Secondary schools of the territories of Piedmont region and city of Rome in Italy were invited to participate in the study, and 124 classes of 29 schools accepted to participate. Baseline valid questionnaires were available for 1874 students of 118 classes and 29 schools.

Within the study, a new component focused on gambling was developed and integrated into the Unplugged curriculum. This consisted in new contents on gambling added all along the program, and in a specific unit called "Unit X". The newly developed activities aim to rectify misconceptions and false beliefs about gambling, experience directly iniquity of betting, increase students' critical thinking, and correct normative beliefs, reducing positive attitudes and fostering negative attitudes related to gambling behaviours. Normative beliefs and attitudes were previously shown to be mediators of Unplugged effectiveness (Giannotta et al., 2014). Normative beliefs are important contents in prevention science: personal opinions may indeed become

behavioural benchmarks. When personal opinions are based on incorrect or imprecise information, this can result in inappropriate and at-risk behaviour. Perkins and Berkowitz (1986) stated that risk behaviour is particularly affected by this bias: the wrong belief becomes the norm and, as a result, the risk behaviour is acted. By comparing estimates and real data, the unit on normative beliefs within the Unplugged program applies normative education and fosters the transition from favourable to unfavourable attitudes toward tobacco, alcohol and drug use risk behaviours. Moreover, through information analysis tasks students achieve expertise in objective evaluation of everyday life's experiences, considering advantages and disadvantages, distinguishing reality from preconceptions, and so developing critical thinking. Also brainstorming, discussions, and confrontation among peers applied all along the program, stimulate critical thinking, and help the students to generate alternative solutions and independent choices. This kind of activities, together with role plays, refer to Social Learning theory (Bandura, 1977). The introduction of a simulator in the new "Unit X" follows the same reasoning: interactive approach, experimentation, peer confrontation, and experiential learning (Kolb, 1984). The simulator allows the students to experience gambling in a safe and risk-free context, getting passionate, having fun, but finally ending up with losses and defeating. This helps the pupils to reason on the low probability of victory and the iniquities inherent in gambling system using logical reasoning and mathematical skills, finally demotivating them to continue gambling.

Results of the present study will be useful to clarify the effectiveness of this kind of prevention interventions in reducing adolescent gambling behaviour, still scarcely addressed by prevention programs. Moreover, this appears to be the first experience of evaluating a new component focused on a different risk behaviour, added to a curriculum previously shown as effective on other risk behaviours. As regards this point, the hypothesis at the base of the study is that Social Influence curricula could be effective in reducing risk behaviours in general, and not only those formally addressed by the program. This could be true especially for behaviours very prevalent in the country where the experiment is conducted. For example, in the EU-Dap trial, and in subsequent replication trials, significant prevention effects were observed on the most prevalent and socially influenced risk behaviours, such as tobacco smoking (Faggiano et al., 2008; Gabrhelik et al., 2012), excessive alcohol use (Faggiano et al., 2008, 2010), alcohol use (Vigna-Taglianti et al., 2021), and marijuana use (Faggiano et al., 2008; Gabrhelik et al., 2012). Since gambling is very prevalent among Italian adolescents (ESPAD Group, 2020; HBSC Italia, 2020), and it is socially influenced, we expect Unplugged will have a similar effect on gambling than on other highly prevalent risk behaviours. Furthermore, we expect positive effects of Unplugged on this behaviour similarly to what achieved on the other risk behaviours concerning "licit" substances, alcohol and cigarettes, that share many characteristics with gambling. One possible mechanism of effect is the reduction of positive beliefs and positive attitudes, fostering the process of denormalization of risk behaviours. In case of cigarette smoking and alcohol drinking, the program acted in a context of concomitant efforts undertaken by the society, the health care and the health promotion services which over time allowed these risk behaviours to be less and less normalized and culturally accepted. We expect the same effect on

gambling behaviour that is undergoing the same process. A second possible mechanism is the correction of misperceptions through critical thinking, and the consequent increase of refusal skills and abilities to cope with peer pressure. Finally, Unplugged previously obtained the best results in terms of efficacy on males (Vigna-Taglianti et al., 2009), that are the subgroup at higher risk of gambling behaviour in adolescence (Griffiths, 2000). It is possible that again, this subgroup will positively react to the program as already observed in the original EU-Dap trial.

In case the effect of the program will be detected, potential mediators will be investigated through mediation models. It will be interesting to see if the mechanism of effect on gambling will replicate the direction of the mediation effects found for substance use behaviours, i.e. if the program will act decreasing positive attitudes toward drugs, increasing refusal skills, and correcting norms about peers, similar to what happened in the EU-Dap trial (Giannotta et al., 2014), and already shown in other studies on similar interventions (Komro et al., 2001; Liu et al., 2009; Orlando et al., 2005).

Not last, the role of fidelity of implementation will be assessed. It is acknowledged indeed that participants' outcomes are more likely to be achieved when interventions are replicated as closely as possible to their original protocols (Durlak & DuPre, 2008; Elliott & Mihalic, 2004), and the standardized high quality of the training is one of the keys factors of the effectiveness of the Unplugged program. Moreover, in a replication trial evaluating the effectiveness of Unplugged, higher effects of the program were shown when restricting the analysis sample to classes with high fidelity of implementation (Vigna-Taglianti et al., 2023).

Results of the study will need to be interpreted considering the study limitations. First, the study was designed as non-randomized experimental controlled study. Appropriate statistical analyses techniques will be applied to limit the intrinsic biases due to this kind of study design, but residual confounding due to non-interchangeability of groups will be possible. Second, the intervention was allocated by class (and not by school) and a contamination of effect among intervention and control classes within the same school will be possible; if occurring, this will lead to an underestimation of the intervention effects. Furthermore, a drop-out of participants higher than expected was observed at baseline. This was mainly due to refusals or missing signment of informed consent from parents; the direction of the consequent bias is difficult to anticipate, but it will be needed to take it into account both in the statistical analysis and in the interpretation of results.

In conclusion, based on the results of the trial, and taking into account the study limitations, if shown to be effective the Unplugged program could be disseminated as program for the prevention of tobacco, alcohol, substance use and gambling behaviours among adolescents. It will be in this case one of the few school-based prevention programs addressing multiple risk factors including gambling behaviour.

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Data Availability Statement Data will be provided under request. Federica D. Vigna-Taglianti is responsible for the data.

Declarations

Conflict of Interest The authors declare they have no competing interests. Fabrizio Faggiano is an Associated Editor of the Journal of Prevention.

Ethical Approval The study is being conducted following the principles of the Declaration of Helsinki. The protocol of the study including details on the study design, materials, intervention, instruments, and procedures for enrolment was submitted to the Novara Ethical Committee, and approval was obtained on 18/11/2022 (prot. 943/CE; study code CE228/2022). Small amendments to the procedures were requested and applied. Informed letters were sent to parents and written informed consent for the participation of the children in the study was asked and obtained before the baseline survey. Students were informed about the objectives of the study and provided consent to participate before filling the baseline questionnaire. Questionnaires are anonymous. Linkage between baseline and follow-up questionnaires will be performed through an anonymous code self-generated by the student.

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