The impact of COVID-19 pandemic on gambling: A systematic review

Alberto Catalano [a,b,*], Lorenzo Milani [a], Matteo Franco [a], Federica Buscema [a],
Ilenia Giommarini [a], Barbara Sodano [a,c], Winston Gilcrease [a], Luisa Mondo [d], Michele Marra [d],
Chiara Di Girolamo [a], Antonella Bena [d], Fulvio Ricceri [a]

[a] Centre for Biostatistics, Epidemiology, and Public Health, Department of Clinical and Biological Sciences, University of Turin, Orbassano, Turin, Italy
[b] Department of Translational Medicine, University of Piemonte Orientale, Novara, Italy
[c] Department of Statistics, Computer Science, Applications, University of Florence, Florence, Italy
[d] Unit of Epidemiology, Regional Health Service ASL TO3, Grugliasco, (TO), Italy

ABSTRACT

Background and Aims: Since the COVID-19 outbreak, people's habits changed radically. In fact, to limit the spread of SARS-CoV-2, governments implemented restrictive measures that influenced the lives of individuals. The aim of this systematic review is to analyze the impact of COVID-19 on gambling by examining three different outcomes: frequency, expenditure, and transition among possible types of gambling.
Methods: All studies assessing the impact of restrictive measures implemented to limit the spread of SARS-CoV-2 on gambling were included. For the search, two different databases were used: Pubmed and CINAHL.
Moreover, two different populations were analyzed: the general population, and subjects who used to gamble before SARS-CoV-2 pandemic. All qualitative studies, reports not based on peer-review, and papers in which the statistical unit was not the subject but the gambling or wagering operators were excluded.
Results: From the search, 408 reports were identified. Of these, 28 were included in the systematic review. From the studies, a strong reduction in the frequency and expenditure of land-based gambling emerged, while the results about online gambling were different among the studies. However, a reduction was observed assessing sports betting, and an increase emerged considering online casino and skill games. Finally, a significant migration from land-based gambling to online platforms was identified. The main reasons for these findings were the physical closures of land-based gambling venues and the more time spent at home, the suspension or cancelation of sporting events on which subjects used to bet, and more mental health issues during this challenging period.
Conclusions: The COVID-19 pandemic greatly affected subjects' habits, including gambling, by reducing land-based gambling and sports betting, and increasing gambling on online platforms. This shift poses significant challenges, requiring a comprehensive approach to monitor and mitigate the negative consequences of this increase in online gambling caused by the pandemic.

1. Introduction

On March 11, 2020, the World Health Organization (WHO) declared Coronavirus Disease (COVID-19) a global pandemic. The first cases of COVID-19 were detected in Wuhan, China, in December 2019, and subsequently in the rest of the world between January and February 2020 (World Health Organization, 2020.). Since the first case occurred, the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) has significantly altered the global landscape, with a huge number of

deaths and an even higher number of hospitalizations or intensive care unit (ICU) admissions, leading even the most advanced national health care systems to collapse (Caramello et al., 2022). For this reason, in almost all countries, local governments implemented several policies to counteract the spread of COVID-19 and reduce its effects. Generally, such measures imposed a strict lockdown involving isolation, social and physical distancing, and taking preventive measures such as wearing mask and hand washing. Moreover, the restrictions imposed the closure of all non-essential activities, allowing only essential stores or services

(e.g., food stores, supermarkets, pharmacies, hospitals, etc.) to remain open, and movement restrictions, including the prohibition of leaving the house without a necessary reason. In some countries such as Italy, which was the first country to face the emergency in Europe (Alessi et al., 2022; Saglietto et al., 2020), New Zealand (Rodda et al., 2022), Australia (Black et al., 2022), Denmark (Håkansson, 2021), Germany (Smith et al., 2023), Israel (Bonny-Noach & Gold, 2021), and the United Kingdom (Emond et al., 2022) these restrictions were strictly implemented through the se-called lockdown. In other countries, instead, the measures implemented were less restrictive. For example, in Sweden, the government only recommended limiting social contacts and maintaining physical distancing, prohibiting public gatherings of more than 500 people, and subsequently more than 50 people (Håkansson, 2020a; Månsson et al., 2021). In addition, the local authorities encouraged to work from home, without imposing it (Månsson et al., 2021).

The restrictions implemented during the COVID-19 pandemic had a great impact on several aspects, including gambling (Quinn et al., 2022) and other addictions such as problematic internet use and problematic social media (Gjoneska et al., 2022; Casale et al., 2023).

The word gambling concerns all types of games that involve wagering money on the outcome of a future event for which the outcome cannot be certain, with the primary intent of winning additional money or material goods. Common forms of gambling include casino games (such as slot machines, poker, blackjack, and roulette), sports betting, lottery games, scratch cards, and online gambling platforms. While some people engage in gambling for entertainment, others may develop problematic gambling behavior, leading to negative consequences such as financial losses, relationship issues, and psychological distress (Buchanan et al., 2020; Mathews & Volberg, 2013).

For these reasons and others related to religion and culture, some local governments chose to regulate gambling. The extent of regulation varies significantly among countries. In some nations, such as Saudi Arabia (Alshammari & Goto, 2022), North Korea, and Qatar (Mattar, 2020), gambling is strictly prohibited. In others, such as the United Kingdom (Atherton & Beynon, 2019; Thomas et al., 2023), Australia, Denmark, Sweden (Binde, 2013), and Italy (Bastiani et al., 2013), gambling is regulated under several legislation and regulations, to ensure transparency, consumer protection, and responsible gaming practices. Finally, there are some countries where gambling regulations are relatively lenient or non-existent, allowing for a more permissive or open approach. The most important examples of such countries include Singapore (Winslow et al., 2015) and the state of Nevada in the United States, particularly in the renowned gambling destination of Las Vegas (Tucker et al., 2021). The diffusion of gambling varies significantly across countries in terms of size, prevalence, and type of gambling. These differences depend in part on the presence or absence of public health interventions aimed at preventing and combating abuse, as well as treating pathological dependence, although their effectiveness differs from intervention to intervention (Velasco et al., 2021).

In addition to these factors, the complexity of restrictions due to the COVID-19 pandemic outbreak complicated the situation, because the differences among countries' restrictions above discussed may have had different impacts on gambling consumption patterns.

In general, the national lockdowns implemented in many countries not only imposed the physical closure of certain business activities such as land-based casinos and betting stores, allowing only the purchase of lottery tickets or scratch cards at essential stores (Fluharty et al., 2022), but they also led to the cancellation or suspension of most sporting events worldwide (Cataldo et al., 2022). Specifically, on March 9, 2020, Italian male soccer leagues were canceled, on 12 March United States Major League Baseball was suspended, on March 13 Premier League was halted, on March 15 there was the decision to suspend ice hockey season in Sweden, and on March 24 the 2020 Summer Olympics scheduled in Tokyo were postponed (Håkansson, 2020b). In addition, major tennis and the Six Nations rugby tournaments, volleyball championships, and basketball leagues were suspended or postponed due to the COVID-19 pandemic.

Therefore, it is possible that the imposed closures of many gambling venues, the cancellation of major sporting events many subjects traditionally bet on, the increased time spent at home, and the higher level of anxiety and depression experienced by gamblers, especially during a period in which anxiety and depression levels increased (Brodeur et al., 2021; Kessler et al., 2008; Rajkumar, 2020; Zhu et al., 2023), may have had a very strong impact on gambling habits.

Several studies have investigated the impact of the COVID-19 pandemic on gambling. However, to date, no systematic work has specifically examined and summarized this effect. Therefore, this systematic review aims to summarize the results of the studies present in the literature that assessed the effect of the restrictive measures implemented due to the COVID-19 pandemic on gambling, both land-based and online. The focus of this systematic review is on the gambling frequency, gambling expenditure, and transitions among different types of gambling.

2. Methods

2.1. Design and registration

The current systematic review was conducted using the updated Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021). The PRISMA 2020 Checklist is shown in Supplementary Table 1. The protocol of this study was registered within the International Prospective Register of Systematic Reviews PROSPERO (registration number: CRD42023484007). In this systematic review, there is no deviation from the registered protocol.

2.2. Search strategy and eligibility criteria

For the purpose of this systematic review, all studies assessing the impact that restrictive measures implemented to limit the spread of SARS-CoV-2 had on gambling were included, both considering land-based and online gambling. Specifically, the types of gambling considered included betting (on sports, racing, and eSports), casinos, card games (Poker, Blackjack, baccarat, etc.), lottery, bingo, Keno, slot machines or Electronic Gambling Machines (EGMs), and scratch cards.

Two different academic databases were used to search: PubMed and CINAHL. The search strings used in these databases are shown in Table 1. Only papers published 1 January 2020 and 9 October 2023 were checked.

Qualitative studies (including commentaries, editorials, text mining or sentiment analyses, protocols, and different types of reviews), and reports not based on peer review were excluded. In addition, all papers in which the statistical unit was not the subject but the gambling or wagering operators were not included in this systematic review. No restrictions on geographical area and on the type of quantitative study were considered.

2.3. Outcomes

In this systematic review, three different outcomes were assessed. The change in (1) frequency and (2) expenditure in gambling between before and after the outbreak of the COVID-19 pandemic was analyzed. The third outcome concerned the change in the type of gambling used by the subjects due to the restrictive measures implemented to limit the spread of COVID-19. This outcome was investigated only considering gamblers or bettors.

Moreover, this review focused separately on two different populations:

1) the general population, which included both people who used to gamble before the pandemic and people who had never gambled;

Table 1
Search strategy implemented on PUBMED and CINAHL to conduct the systematic review.

N° Step	Search strategy
PUBMED	
S1	"COVID-19″[Mesh] OR COVID-19*[Title/Abstract] OR 2019-nCoV[Title/Abstract] OR COV-19*[Title/Abstract] OR "SARS-CoV-2″[Mesh] OR SARS-CoV-2*[Title/Abstract]
S2	"Pandemics"[Mesh] OR pandemic*[Title/Abstract]
S3	S1 OR S2
S4	"Gambling"[Mesh] OR gambl*[Title/Abstract] OR betting[Title/Abstract] OR "slot machine*"[Title/Abstract] OR slots[Title/Abstract] OR lotter*[Title/Abstract] OR roulette*[Title/Abstract] OR blackjack[Title/Abstract] OR baccarat[Title/Abstract] OR bingo[Title/Abstract] OR poker[Title/Abstract] OR casino*[Title/Abstract] OR "gaming machine*"[Title/Abstract] OR craps[Title/Abstract] OR lotto[Title/Abstract]
S5	S3 AND S4
S6	Limits to 2020–2023 and English language
CINAHL	
S1	MH "COVID-19+" OR TI "COVID-19*" OR AB "COVID-19*" OR TI "2019-nCoV" OR AB "2019-nCoV" OR TI "COV-19*" OR AB "COV-19*" OR MH "SARS-CoV-2″ OR TI "SARS-CoV-2*" OR AB "SARS-CoV-2*"
S2	MH "COVID-19 Pandemic" OR TI pandemic* OR AB pandemic*
S3	S1 OR S2
S4	MH "Gambling" OR TI gambl* OR AB gambl* OR TI betting OR AB betting OR TI "slot machine*" OR AB "slot machine*" OR TI slots OR AB slots OR TI lotter* OR AB lotter* OR TI roulette* OR AB roulette* OR TI blackjack OR AB blackjack OR TI baccarat OR AB baccarat OR TI bingo OR AB bingo OR TI poker OR AB poker OR TI casino* OR AB casino* OR TI "gaming machine*" OR AB "gaming machine*" OR TI craps OR AB craps OR TI lotto OR AB lotto
S5	S3 AND S4
S6	Limits to 2020–2023 and English language

2) the population composed of gamblers or bettors who had gambled at least once before the COVID-19 pandemic.

2.4. Study selection and data extraction

Study selection was performed in two different stages. First, after removal of duplicate records, a selection by titles and abstracts of all studies derived from the search string according to the eligibility criteria was performed. Second, the full texts of the studies selected in the first stage were reviewed for final eligibility. In both stages, two reviewers operated independently. Moreover, in instances where the two reviewers did not agree, a third reviewer was involved. Reference management, duplicate elimination and item selection was conducted through Zotero software (V. 6.0.30).

Data were extracted by both reviewers. The information retrieved from each study, reported in Table 2, include: the first author, year of publication, country, type of population, sample size, study design, types of gambling analyzed, outcomes assessed, and different possible predictors of changing gambling habits analyzed in the studies.

2.5. Risk of bias

To assess the risk of bias of the selected studies, the Newcastle Ottawa Scale (NOS) was used (Wells et al., 2000). This scale is generally used for observational studies. There are three different versions for the assessment of observational studies: a version for cross-sectional studies (7 items), one for case-control studies (8 items), and one for prospective cohorts (8 items). In all three versions, the highest attainable score is 9,

and a score below 5 corresponds to a high risk of bias (Luchini et al., 2017). In this systematic review, studies with a high risk of bias were excluded.

The risk of bias was assessed by two different co-authors, and in case of disagreement, the opinion of a third author was taken into consideration.

3. Results

3.1. Selection process

The above-mentioned search strategy identified a total of 408 reports: 293 were found in PubMed, and 115 in CINAHL. After excluding duplicate records (n = 77), in the first screening phase (for title and abstract), a total of 235 papers were excluded. Subsequently, out of the remaining 96 reports, 67 were removed after full texts' assessment. The primary reasons for exclusion were (1) assessing an outcome different from the one under investigation (n = 34) and (2) being qualitative studies or editorials (n = 26) (Supplementary Table 2). Of the final 29 studies, only a paper had a Newcastle-Ottawa Scale score below 5 and was therefore excluded from the systematic review. Therefore, overall, 28 different papers were included in this systematic review. The PRISMA Flow Chart (Page et al., 2021) representing the entire selection process is summarized in Fig. 1.

3.2. Characteristics of included studies

Of the 28 studies included in this systematic review, six analyzed only the general population, 14 focused attention on gamblers or bettors before the COVID-19 pandemic, and eight studied both populations. In addition, eighteen were cross-sectional studies and ten were longitudinal studies. The sample size ranged from a minimum of 70 to a maximum of 616,245 subjects.

From a geographic point of view, most studies were conducted in Sweden (n = 7), the United Kingdom (n = 4), and Italy (n = 4). The other countries involved were Australia (n = 2), Canada (n = 2), Czech Republic, Denmark, Germany, Greece, Israel, New Zealand, Spain, and Switzerland. Only one paper involved subjects from multiple countries (Germany, Finland, Norway, and Sweden). Regarding the outcomes, the impact of the COVID-19 pandemic on gambling frequency was assessed by 26 studies, the effects on gambling expenditure were investigated by 7 reports, and the influence on the changes in gambling types was analyzed in 6 papers. The characteristics of each study are summarized in Table 2.

3.3. Risk of bias assessment

The results related to the risk of bias assessment are shown in Fig. 2 and Fig. 3 (McGuinness & Higgins, 2021). Item-specific ratings for each study are shown in Supplementary Table 3 and Supplementary Table 4.

Of the 29 included studies, only one cross-sectional study was found to have a NOS score of less than 5, and therefore was excluded from the systematic review.

3.4. General population

3.4.1. Frequency

Fourteen different studies assessed the impact of COVID-19 on gambling frequency.

Regarding overall gambling, studies showed mixed effects on gambling habits. Authors reported a decrease in overall gambling frequency (Amerio et al., 2022 (cross-sectional); Emond et al., 2022 (longitudinal); Håkansson, 2020a, 2021 (cross-sectional); Håkansson et al., 2020 (cross-sectional); Pérez-Albéniz et al., 2022 (cross-sectional); Sharman et al., 2022 (cross-sectional); Shaw et al., 2022 (longitudinal)), and indicated that a subset of individuals started (Amerio et al., 2022

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Table 2

Main information about the studies included in the systematic review.

First author and year of publication	Country	Population	Sample size	Study design	Outcomes assessed in the study	Type of gambling	Variables assessed in the study	Type of analysis conducted
MC. Alessi, 2022 (Alessi et al., 2022)	Italy	Gamblers before the pandemic period	153 gamblers	Cross-sectional	Frequency	Land-based Gambling Online gambling	None	Frequency Percentage
A. Amerio, 2022 (Amerio et al., 2022)	Italy	General population	6,003 subjects	Cross-sectional	Frequency	Overall gambling	None	Regression
M. Auer, 2022 (Auer & Griffiths, 2022)	Sweden	Gamblers before the pandemic period	133,286 gamblers	Longitudinal	Expenditure	Online gambling	Intensity of gambling	Percentage
M. Auer, 2023 (Auer et al., 2023)	Germany, Sweden, Finland, Norway	Gamblers before the pandemic period	5,396 gamblers	Longitudinal	Expenditure	Online gambling	None	Percentage
M. Balem, 2023 (Balem et al., 2023)	Sweden	Gamblers before the pandemic period	616,245 gamblers	Longitudinal	Frequency Expenditure	Online gambling	Gender	Regression
ME. Bellringer, 2021 (Bellringer & Garrett, 2021)	New Zealand	Gamblers before the pandemic period	301 gamblers	Longitudinal	Frequency	Online gambling	Gender Age Ethnicity Occupational status Education level Alcohol consumption Level of problematic gambling	Regression
N. Black, 2022 (Black et al., 2022)	Australia	Gamblers before the pandemic period	462 gamblers	Longitudinal	Frequency	Overall gambling	Level of problematic gambling	Regression
H. Bonny-Noach, 2021 (Bonny-Noach & Gold, 2021)	Isreal	General population	113 subjects	Cross-sectional	Frequency	Online gambling	Cannabis use Drugs use	Regression
E. Claesdotter-Knutsson, 2021 (Claesdotter-Knutsson & Håkansson, 2021)	Sweden	Gamblers before the pandemic period	1,064 gamblers	Cross-sectional	Frequency	Online gambling	Gender Age Occupational status Education level Income Time at home Alcohol consumption Level of problematic gambling Distress level	Regression
A. Emond, 2022 (Emond et al., 2022)	United Kingdom	General population / Gamblers before the pandemic period	2,160 subjects / 1,255 gamblers	Longitudinal	Frequency	Overall gambling Land-based gambling Online gambling	Intensity of gambling	Regression
M. Fluharty, 2022 (Fluharty et al., 2022)	United Kingdom	Gamblers before the pandemic period	7,026 gamblers	Longitudinal	Frequency	Overall gambling	Gender Age Ethnicity Education level Income Living with someone Alcohol consumption Smoking status Anxiety level Depression level	Regression

(continued on next page)

Table 2 (*continued*)

First author and year of publication	Country	Population	Sample size	Study design	Outcomes assessed in the study	Type of gambling	Variables assessed in the study	Type of analysis conducted
							Distress level	
SM. Gainsbury, 2021 (Gainsbury et al., 2021)	Australia	Gamblers before the pandemic period	769 gamblers	Cross-sectional	Frequency	Overall gambling Land-based gambling Online gambling	Age Level of problematic gambling	Regression
A. Håkansson, 2020 (Håkansson, 2020a)	Sweden	General population Gamblers before the pandemic period	2,016 subjects 1,246 gamblers	Cross-sectional	Frequency Changes in type of gambling	Overall gambling Land-based gambling Online gambling	Age Gender Occupational status Living with children Time at home Alcohol consumption Level of problematic gambling Distress level	Regression
A. Håkansson 2021 (Håkansson, 2021)	Denmark	General population Gamblers before the pandemic period	1,971 subjects 1,098 gamblers	Cross-sectional	Frequency	Overall gambling Land-based gambling Online gambling	Age Gender Occupational status Living with children Income Time at home Alcohol consumption Level of problematic gambling Distress level	Regression
A. Håkansson 2020 (Håkansson et al., 2020)	Sweden	General population Gamblers before the pandemic period	327 subjects 277 gamblers	Cross-sectional	Frequency Changes in type of gambling	Overall gambling Land-based gambling Online gambling	Age Gender Alcohol consumption Gambling intensity Depression level Anxiety level	Frequency Percentage
A. Håkansson 2021 (Håkansson & Widinghoff, 2021)	Sweden	General population Gamblers before the pandemic period	2,029 subjects 1,281 gamblers	Cross-sectional	Frequency	Land-based gambling Online gambling	Age Occupational status Income Time at home Alcohol consumption Level of problematic gambling Distress level	Regression
J. Kalke, 2022 (Kalke et al., 2022)	Germany	Gamblers before the pandemic period	612 gamblers	Cross-sectional	Frequency Changes in type of gambling	Land-based gambling Online gambling	Age Gender Migration background Gambling intensity Level of problematic gambling	Regression
S. Lischer, 2021 (Lischer et al., 2021)	Switzerland	Gamblers before the pandemic period	110 gamblers	Longitudinal	Frequency	Overall gambling Land-based gambling Online	None	Frequency Percentage

Table 2 (*continued*)

First author and year of publication	Country	Population	Sample size	Study design	Outcomes assessed in the study	Type of gambling	Variables assessed in the study	Type of analysis conducted
						gambling		
A. Lugo, 2021 (Lugo et al., 2021)	Italy	General population Gamblers before the pandemic period	6,003 subjects 980 gamblers	Cross-sectional	Frequency	Land-based gambling Online gambling	Age Gender Educational level Alcohol consumption Smoking status Cannabis use Anxiety level Depression level Quality of life Sleep quality Sleep quantity	Regression
V. Månsson, 2021 (Månsson et al., 2021)	Sweden	General population	325 subjects	Longitudinal	Frequency Expenditure	Overall gambling Land-based gambling Online gambling	Age Gender Level of problematic gambling Mental health issues	Regression
V. Mravčík, 2021 (Mravčík & Chomynová, 2021)	Czech Republic	General population	3,000 subjects	Cross-sectional	Frequency	Online gambling	None	Frequency
E. Otis, 2022 (Otis et al., 2022)	Canada	Gamblers before the pandemic period	100 subjects	Cross-sectional	Frequency Expenditure	Overall gambling Land-based gambling	None	Regression
A. Pérez-Albéniz, 2022 (Pérez-Albéniz et al., 2022)	Spain	General population	540 subjects	Cross-sectional	Frequency	Overall gambling	None	Frequency Percentage
K. Rantis, 2022 (Rantis et al., 2022)	Greece	Gamblers before the pandemic period	70 gamblers	Cross-sectional	Frequency Changes in type of gambling	Overall gambling Land-based gambling	None	Frequency Percentage
L. Salerno, 2021 (Salerno & Pallanti, 2021)	Italy	General population	254 subjects	Cross-sectional	Frequency	Overall gambling	Gender Occupational status	Frequency Percentage
S. Sharman, 2022 (Sharman et al., 2022)	United Kingdom	General population Gamblers before the pandemic period	1,028 subjects 505 gamblers	Cross-sectional	Frequency Expenditure	Overall gambling	Changes in employment status	Frequency Percentage
CA. Shaw, 2022 (Shaw et al., 2022)	Canada	General population Gamblers before the pandemic period	3,449 subjects 2,394 gamblers	Longitudinal	Frequency Expenditure Changes in type of gambling	Overall gambling Online gambling Land-based gambling	Level of problematic gambling Number of types of gambling played	Regression
H. Wardle, 2021 (Wardle et al., 2021)	United Kingdom	Gamblers before the pandemic period	3,866 gamblers	Cross-sectional	Frequency Changes in type of gambling	Land-based gambling Online gambling	Gender	Regression

(cross-sectional); Håkansson & Widinghoff, 2021 (cross-sectional); Salerno & Pallanti, 2021 (cross-sectional); Shaw et al., 2022 (longitudinal)) or increased their gambling habits (Amerio et al., 2022 (cross-sectional); Håkansson, 2020a, 2021 (cross-sectional); Håkansson et al., 2020 (cross-sectional); Håkansson & Widinghoff, 2021 (cross-sectional); Shaw et al., 2022 (longitudinal)). The percentage of those reporting more gambling varied across studies, ranging from about 4 to 16 %.

However, it emerges that most people did not change their gambling habits during the period when the restrictive measures aimed at counteracting the COVID-19 pandemic were implemented, keeping their gambling frequency unchanged or never gambling either before or after the pandemic (Amerio et al., 2022 (cross-sectional); Håkansson, 2020a, 2021 (cross-sectional); Håkansson et al., 2020 (cross-sectional); Håkansson & Widinghoff, 2021 (cross-sectional); Salerno & Pallanti, 2021 (cross-sectional); Sharman et al., 2022 (cross-sectional); Shaw et al., 2022 (longitudinal)). Predictors of having increased overall gambling frequency identified by the authors were younger age (Håkansson, 2020a, 2021 (cross-sectional); Håkansson & Widinghoff,
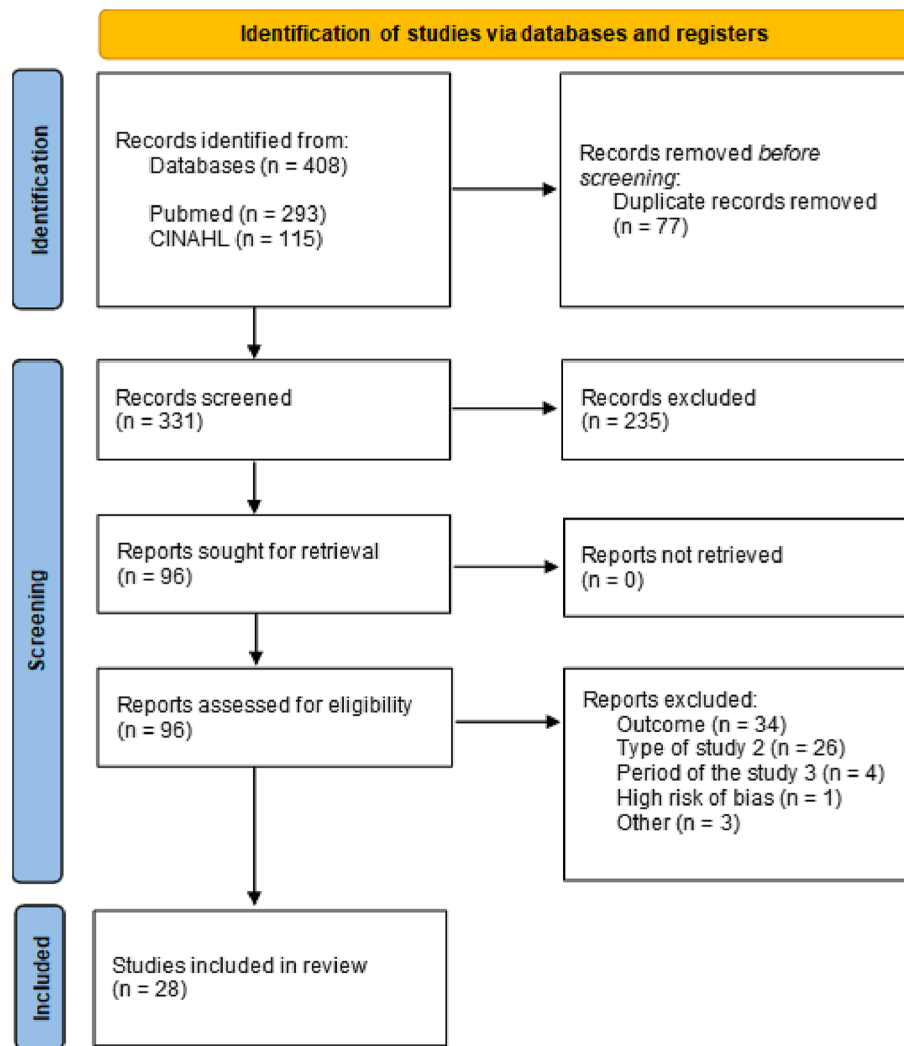
Fig. 1. PRISMA flow diagram representing the entire selection process.

2021 (cross-sectional)), higher gambling problem severity level (Håkansson, 2020a, 2021 (cross-sectional); Håkansson et al., 2020 (cross-sectional); Shaw et al., 2022 (longitudinal)), spending more time at home (Håkansson, 2020a, 2021 (cross-sectional); Håkansson & Widinghoff, 2021 (cross-sectional)), higher alcohol consumption (Håkansson, 2020a, 2021 (cross-sectional); Håkansson & Widinghoff, 2021 (cross-sectional)), psychological distress (Håkansson, 2020a, 2021 (cross-sectional); Håkansson & Widinghoff, 2021 (cross-sectional)), worry about mental health (Månsson et al., 2021 (longitudinal)), irregular occupation (Håkansson, 2021 (cross-sectional); Håkansson & Widinghoff, 2021 (cross-sectional)), job loss or reduced working hours (Sharman et al., 2022 (cross-sectional)), and playing in more types of gambling (Shaw et al., 2022 (longitudinal)). Starting gambling, instead, resulted positively and significantly associated with younger age and use of cannabis (Lugo et al., 2021 (cross-sectional)).

Focusing on land-based gambling, a strong decrease during the COVID-19 pandemic emerged, even considering different types (land-based casinos, poker, lotteries, EMGs, etc.) (Månsson et al., 2021 (longitudinal)). However, one study reported a very low percentage of subjects who increased their land-based gambling habits, although the decreases were larger (Håkansson, 2021 (cross-sectional)). Another study by the same author conducted in Sweden (where restrictive measures due to COVID-19 pandemic were more lenient) showed that a small percentage of people who started land-based gambling during the pandemic (1 to 3 % considering different types of land-based gambling)

(Håkansson & Widinghoff, 2021 (cross-sectional)).

Concerning the frequency of online gambling, again studies show different directions. A study shows a strong reduction in online gambling frequency (Mravčík & Chomynová, 2021 (cross-sectional)), although less strong than land-based gambling. Others, however, show a significant increase (Bonny-Noach & Gold, 2021 (cross-sectional)). In addition, a study (Månsson et al., 2021 (longitudinal)) observed a reduction in specific types of online gambling (online casino (table games), online sports betting, land-based horse betting, land-based bingo, online bingo, land-based scratch cards, and land-based number games), and an increase in other types (Online casino (slots), online horses betting, online scratch cards, and online number games). Finally, some studies reported also that a small minority of subjects started online gambling during COVID-19 pandemic (Håkansson, 2021 (cross-sectional); Håkansson & Widinghoff, 2021 (cross-sectional)).

3.4.2. Expenditure

Three studies investigated the impact of the COVID-19 pandemic on gambling expenditure in the general population. The majority of people reported either no changes or a reduction in the amount of money spent on gambling, while the percentage of those reporting an increase in gambling expenditure ranged between 16 % and 32 % (Månsson et al., 2021 (longitudinal); Shaw et al., 2022 (longitudinal)). Regarding different amounts of money gambled, subjects had a lower probability of weekly gambling in the range of 1-50£, while there were not significant

Risk of bias

Study	D1	D2	D3	D4	D5	D6	D7	D8	Overall
M. Auer 2022	+	+	+	+	+	+	+	+	+
M. Auer 2023	+	+	+	+	+	+	+	+	+
M. Balem 2023	+	+	+	+	+	+	+	+	+
ME. Bellringer 2021	+	+	+	+	+	X	+	+	+
N. Black 2022	+	+	+	+	+	X	+	+	+
A. Emond 2022	+	+	+	+	+	X	+	X	+
M. Fluharty 2022	+	+	+	+	+	X	+	+	+
S. Lischer 2021	+	+	+	+	+	X	+	+	+
V. Månsson 2021	+	+	+	+	+	X	+	+	+
CA. Shaw 2022	+	+	+	+	+	X	+	+	+

D1: Representativeness of the exposed cohort
D2: Selection of the non exposed cohort
D3: Ascertainment of exposure
D4: Demonstration that outcome of interest was not present at start of study
D5: Comparability of cohorts on the basis of the design or analysi
D6: Assessment of outcome
D7: Was follow-up long enough for outcomes to occur
D8: Adequacy of follow up of cohorts

Judgement
X High
+ Low

Fig. 2. Risk of Bias for each longitudinal study which met inclusion and exclusion criteria, evaluated through Newcastle-Ottawa Scale. *D1: High = 1, Low = 0; D2: High = 1, Low = 0; D3: High = 1, Low = 0; D4: High = 1, Low = 0; D5: High = 2, Unclear = 1, Low = 0; D6: High = 1, Low = 0; D7: High = 1, Low = 0; D8: High = 1, Low = 0; Overall: High = 6–9, Unclear = 5, Low = 0–4. ** "Unclear" not present as there is no case among the assessed studies.

differences when assessing larger amounts (51-200£) (Sharman et al., 2022 (cross-sectional)).

Concerning different types of gambling, higher expenditures were observed for online casino games (slots and table games), electronic gambling machines, online bingo, and land-based scratch cards. Conversely, lower or no changes in the amount of money spent were reported for online poker, land-based gambling, online horse betting, online scratch cards, land-based number games, and sports betting (Månsson et al., 2021 (longitudinal)). Predictors significantly associated with increasing gambling expenditures were greater frequency of overall gambling, online gambling, and lower Problem Gambling Severity Index scores (Shaw et al., 2022 (longitudinal)).

3.5. Gamblers

3.5.1. Frequency

Eighteen different studies assessed the impact of COVID-19 on gambling or identified the main predictors of increasing/decreasing gambling habits among those who gambled at least once before the COVID-19 pandemic.

Regarding overall gambling, the studies indicate that most subjects either maintained their gambling habits or decreased them, while only a minority of gamblers increased their frequency during the SARS-CoV-2 pandemic (Black et al., 2022 (longitudinal); Fluharty et al., 2022 (longitudinal); Gainsbury et al., 2021 (cross-sectional); Lischer et al., 2021 (longitudinal); Otis et al., 2022 (cross-sectional); Rantis et al., 2022 (cross-sectional); Sharman et al., 2022 (cross-sectional)). The

percentage of subjects reporting an increase ranged from 7 to 13.6 %.

The main predictors of increasing gambling habits identified by the authors were: younger age (Håkansson, 2020a, 2021 (cross-sectional); Lugo et al., 2021 (cross-sectional)), female gender (Håkansson, 2021 (cross-sectional)), high alcohol consumption (Fluharty et al., 2022 (longitudinal); Håkansson, 2020a, 2021 (cross-sectional); Håkansson & Widinghoff, 2021 (cross-sectional); Lugo et al., 2021 (cross-sectional)), cannabis use (Lugo et al., 2021 (cross-sectional)), higher gambling problem severity (Gainsbury et al., 2021 (cross-sectional); Håkansson, 2020a, 2021 (cross-sectional); Håkansson & Widinghoff, 2021 (cross-sectional)), psychological distress (Fluharty et al., 2022 (longitudinal); Håkansson, 2020a, 2021 (cross-sectional); Håkansson & Widinghoff, 2021 (cross-sectional)), anxiety and depression symptoms (Fluharty et al., 2022 (longitudinal); Lugo et al., 2021 (cross-sectional)), and more time spent at home (Håkansson, 2020a, 2021 (cross-sectional)). No clear relationship emerged, however, when considering smoking habit and occupation. Moreover, older age and being an EGM player were identified as predictors of stopping or decreasing gambling (Gainsbury et al., 2021 (cross-sectional); Lugo et al., 2021 (cross-sectional)).

Also focusing on land-based gambling, it was found that the majority of subjects either decreased their frequency or maintained the same pre-pandemic habits. Only a very small percentage of subjects increased the frequency of land-based gambling; nevertheless, these increases ranged from 1 % to 6 %, which is far below those identified by assessing overall gambling (Alessi et al., 2022 (cross-sectional); Gainsbury et al., 2021 (cross-sectional); Håkansson, 2020a (cross-sectional); Kalke et al., 2022 (cross-sectional); Lischer et al., 2021 (longitudinal); Otis et al., 2022

Risk of bias

Study	D1	D2	D3	D4	D5	D6	D7	Overall
MC. Alessi 2022	+	X	X	+	+	-	+	+
A. Amerio 2022	+	+	X	+	+	-	+	+
H. Bonny-Noach 2021	+	X	X	+	+	-	+	+
I. Cataldo 2022	X	X	X	+	+	-	X	X
E. Claesdotter-Knutsson 2021	+	+	X	+	+	-	+	+
SM. Gainsbury 2021	+	+	X	+	+	-	+	+
A. Håkansson (Changes in gambling) 2020	+	+	X	+	+	-	+	+
A. Håkansson (Gambling and self-) 2021	+	+	X	+	+	-	+	+
A. Håkansson (Psychological distress) 2020	X	X	X	+	+	-	+	-
A. Håkansson (Changes of gambling) 2021	+	+	X	+	+	-	+	+
J. Kalke 2022	+	+	X	+	+	-	+	+
A. Lugo 2021	+	+	X	+	+	-	+	+
V. Mravčík 2021	+	+	X	+	X	-	X	-
E. Otis 2022	+	X	X	+	+	-	+	+
A. Pérez-Albéniz 2022	X	+	X	+	X	-	+	-
K. Rantis 2022	+	+	X	+	X	-	+	+
L. Salerno 2021	+	X	X	+	X	-	+	-
S. Sharman 2022	+	+	X	+	+	-	+	+
H. Wardle 2021	+	+	X	+	+	-	+	+

D1: Representativeness of the cases
D2: Sample size
D3: Non response-rate
D4: Ascertainment of the screening/surveillance tool
D5: The potential confounders were investigated by subgroup analysis or multivariable analysis
D6: Assessment of the outcome
D7: Statistical test

Judgement: X High, - Unclear, + Low

Fig. 3. Risk of Bias for each cross-sectional study which met inclusion and exclusion criteria, evaluated through Newcastle-Ottawa Scale. *D1: High = 1, Low = 0; D2: High = 1, Low = 0; D3: High = 1, Low = 0; D4: High = 2, Unclear = 1; Low = 0; D5: High = 1, Low = 0; D6: High = 2, Unclear = 1, Low = 0; D7: High = 1, Low = 0; Overall: High = 6–9, Unclear = 5, Low = 0–4.

(cross-sectional); Rantis et al., 2022 (cross-sectional); Wardle et al., 2021 (cross-sectional)).

The characteristics associated with a significant increase in land-based gambling identified by the studies were higher problem severity and spending more time at home (Håkansson, 2020a (cross-sectional)). However, contrasting associations emerged considering younger age and female gender. In fact, according to (Håkansson, 2020a (cross-sectional)), younger age and female gender are predictors of increasing gambling, while for Kalke et al. (Kalke et al., 2022 (cross-sectional)), they are predictors of quitting land-based gambling.

Concerning online gambling, the results are not entirely consistent among the studies. According to some research, online gambling habits remained unchanged or decreased during the COVID-19 pandemic compared to pre-pandemic levels for the majority of subjects (Alessi et al., 2022 (cross-sectional); Bellringer & Garrett, 2021 (longitudinal); Claesdotter-Knutsson & Håkansson, 2021 (cross-sectional); Håkansson,

2020a (cross-sectional); Lischer et al., 2021 (longitudinal); Wardle et al., 2021 (cross-sectional)). However, the reported increase in online gambling in these studies reached as high as 27 % in some cases, much higher than that recorded in the case of land-based gambling. On the contrary, according to other studies, an overall increase in online gambling was reported (Balem et al., 2023 (longitudinal); Emond et al., 2022 (longitudinal)). However, when considering the different types of online gambling, only online betting did not show a significant increase (Emond et al., 2022 (longitudinal)).

The most important predictors of increasing online gambling were: higher level of education (Bellringer & Garrett, 2021 (longitudinal)), greater gambling severity problem (Claesdotter-Knutsson & Håkansson, 2021 (cross-sectional); Håkansson, 2020a (cross-sectional)), high alcohol consumption (Bellringer & Garrett, 2021 (longitudinal)), and higher stress level (Claesdotter-Knutsson & Håkansson, 2021 (cross-sectional)). No clear associations were found for age and gender. Finally,

being a regular sports bettor seemed to decrease the risk of gambling online more (Gainsbury et al., 2021 (cross-sectional)).

3.5.2. Expenditure

Five different studies investigated the impact of COVID-19 on gambling expenditure among those who gambled in the pre-pandemic period.

The results showed that overall and land-based gambling expenditure decreased significantly during the SARS-CoV-2 pandemic (Otis et al., 2022 (cross-sectional); Sharman et al., 2022 (cross-sectional)), especially when assessing sports betting (Auer et al., 2023 (longitudinal); Balem et al., 2023 (longitudinal); Otis et al., 2022 (cross-sectional)). However, regarding online gambling expenditure, one study reported a significant increase, especially considering online casino, bingo, and poker (Balem et al., 2023 (longitudinal)), while two studies found a decrease in money wagered (Auer et al., 2023 (longitudinal); Auer & Griffiths, 2022 (longitudinal)). However, results changed considering gambling intensity: for low-intensity gamblers, the daily amount of money wagered was larger during the COVID-19 pandemic, while for high-intensity gamblers, there emerged a significant decrease in the daily bet (Auer & Griffiths, 2022 (longitudinal)).

Another characteristic for which gambling expenditure seemed to change was gender. According to Balem et al. (Balem et al., 2023 (longitudinal)), women wagered higher amounts of money in online casino and online bingo, while men wagered more in online poker.

3.5.3. Transitions among different types of gambling

Six different studies assessed transitions among possible gambling types during the COVID-19 pandemic.

Two authors focused on land-based-only gamblers. According to these studies (Kalke et al., 2022 (cross-sectional); Shaw et al., 2022 (longitudinal)), only a minority of subjects migrated to online gambling during COVID-19 (8 % and 17.6 %, respectively). Instead, most subjects preferred to either stop gambling or remain consistent with their previous habits. Among the different types of gamblers, especially sports bettors or casino gamblers switched to online gambling. The variables that were found to be associated with the transition to online gambling services were younger age, high gambling frequency, a history of problem gambling during the pre-pandemic period, and cognitive distortions (Kalke et al., 2022 (cross-sectional)).

Three studies, instead, assessed the transitions in gambling of sports bettors. The results showed that the majority of sports bettors either stopped participating or decreased their gambling habits due to the reduced sports betting market (Håkansson, 2020a (cross-sectional); Håkansson et al., 2020 (cross-sectional); Wardle et al., 2021 (cross-sectional)). However, small percentages of people switched to other types of gambling, in particular lotteries, online betting on virtual sports, online casinos, and horse betting.

Finally, the last study assessing this outcome revealed a significant change in the place of gambling during COVID-19. Specifically, there was a transition from land-based venues to online, with individuals gambling at home or using smartphone and tablet apps (Rantis et al., 2022 (cross-sectional)).

4. Discussion

The spread of COVID-19 has led to significant changes in people's behaviors in social, occupational, and lifestyle aspects, including a shift in gambling habits. This systematic review aimed to evaluate the impact of the COVID-19 pandemic on the diffusion and evolution of gambling, focusing on three different outcomes: frequency, expenditure, and transitions among different types of gambling.

The first important result of this systematic review was that a significant reduction in the frequency and expenditure of land-based gambling emerged ((Lischer et al., 2021; Lugo et al., 2021; Månsson et al., 2021; Rantis et al., 2022; Wardle et al., 2021). The main reason for

the strong decline observed in land-based gambling is the physical closure of many land-based gambling business activities such as casinos and betting stores, and the resulting restrictions imposed on citizens, prohibiting them from leaving their homes except for strictly essential reasons (Ghaharian et al., 2021; Zhang et al., 2023).

However, the evidence concerning online gambling is more complex, with some studies reporting an increase (Bonny-Noach & Gold, 2021; Shaw et al., 2022), and other a clear and significant decrease in sports betting but a notable increase in online casino activities and skill games (Balem et al., 2023; Månsson et al., 2021; Wardle et al., 2021). The possible reasons leading to an increase in online gambling include the increased time spent at home during the more challenging phases of the pandemic (McQuade & Gill, 2020; Savolainen et al., 2020) and the worsened mental state of individuals, characterized by higher levels of anxiety, depression, and stress during this challenging period (Rossi et al., 2020; Santomauro et al., 2021). In fact, the implementation of lockdown measures caused a sudden disruption of daily routines, economic uncertainty, fears about personal and loved ones' health, and social isolation, particularly for those living alone or separated from their support networks. This had a great impact on health mental well-being of individuals. These exacerbating mental health issues during the pandemic contributed to risky behaviors, such as alcohol consumption, tobacco smoking, and also gambling (Barrault et al., 2017; Huțul & Karner-Huțuleac, 2022; Zhao et al., 2023). Focusing on sports betting, instead, the observed decline was mainly influenced by the massive cancellation or suspension of events during the first phase of the COVID-19 pandemic period (Lindner et al., 2020; Russell et al., 2023), which made it impossible to bet on major sporting events that individuals used to bet on before COVID-19, such as football, baseball, basketball, tennis, and volleyball.

Another important result is the apparent migration of people from land-based points to online platforms (Kalke et al., 2022; Rantis et al., 2022; Shaw et al., 2022). These migrated gamblers had no differences in gambling habits (i.e., those who were used to playing slot machines in land-based points moved to online slot machines, and those who were used to playing casino games in land-based points moved to online casino games), although a decrease in frequency and an increase in expenditure arose from studies (Månsson et al., 2021). One possible explanation for the failure to initiate new online gambling habits might be in the type of people: individuals who played video poker or sports betting tended to be younger, better educated, and more knowledgeable about the dynamics of these games (Gainsbury et al., 2014; Holmes, 2005).

In general, the studies included in this systematic review suggested that the most vulnerable segments of the population, including the unemployed or precarious workers, individuals with mental health issues, and those prone to alcohol (or other substances) consumption problems, were the most affected by the restrictions. The increase in free time resulting from stay-at-home measures exacerbated addictions and mental health problems (Breslau et al., 2021; Rolland et al., 2020; Rossi et al., 2020; Santomauro et al., 2021). Consequently, these groups experienced a worsening of their conditions during the pandemic, and individuals with a pathological addiction faced an elevated risk of relapse to due to the limitations imposed by stay-at-home measures and the resulting greater desire (Alessi et al., 2022). Within this context, these vulnerable groups of people were more prone to an increase in their gambling frequency.

Focusing on individuals accustomed to gambling before the outbreak, some studies of this review highlighted a surge in both the frequency and expenditure of online gambling activities, which is probably attributed to the increase in leisure time spent at home. Additionally, the review also emphasizes unchanged habits regarding the types of games played and an increase in the amount of money spent (Bonny-Noach & Gold, 2021).

Another significant aspect concerns the impact of the COVID-19 pandemic on younger populations. During the most severe phase of

the pandemic, restrictions are known to have significantly impacted the mental and physical well-being of younger segments of the population. The closure of schools and universities along with restrictions on social gathering resulted in a substantial increase in the time spent at home by young people, leading to heightened levels of anxiety, depression, and frustration (Lee et al., 2021; Sundler et al., 2023; Volpe et al., 2022). In this context, adolescents' technological proficiency played a key role in maintaining distant social relationships with friends, through the use of social media and online games. However, this proficiency also led to negative implications and internet addiction. Gambling is one of these possible implications: accessibility to online gaming platforms, coupled with available free time and the attractiveness of possible monetary winnings, has contributed to an increase in gambling among young people. Nevertheless, it is important to note that the results are not entirely consistent across the studies included in this review (Claesdotter-Knutsson & Håkansson, 2021; Gainsbury et al., 2021; Håkansson, 2020a; Håkansson & Widinghoff, 2021; Kalke et al., 2022; Lugo et al., 2021).

Finally, inconsistent results emerged considering gender: while some articles evidenced a decrease in gambling for both males and females, others evidenced an increase in expenditure for women. Otherwise, some differences in the type of games played arose: women seemed to be more prone to casino and bingo, while men spent more time on poker games.

As we move forward, potential future directions could involve conducting systematic research into not only the effect of COVID-19 on gambling behavior but also exploring its impacts on other addictions or problematic habits prevalent among individuals. This broader scope of investigation could offer valuable insights into the multifaceted impacts of the pandemic on various aspects of human behavior and mental health, ultimately aiding in the development of comprehensive strategies for intervention and support, especially to the most vulnerable subjects.

5. Limitations and strengths

This systematic review has some limitations. Firstly, it was conducted across all countries, without considering possible differences in the restrictive measures implemented by local governments to limit the spread of COVID-19 and how gambling was regulated, both of which may differ from country to country. Another aspect is that this review did not assess studies that assessed illegal gambling and its evolution in the pandemic period. in the literature, there is a lack of information about this topic, and due to this fact, this systematic review gives no information about it. An additional limitation regarding, in this case, the studies included in this systematic review, pertains to the fact that a substantial portion of them had an insufficient sample size and did not provide information on the response rates.Moreover, several papers included might be subject to bias due to questionnaire completion. First of all, responses regarding the amount of time and money spent on gambling in the pre-pandemic period may be affected by recall bias. Secondly, many studies provided a reward (monetary or in the form of points convertible into money), potentially leading respondents to provide wrong answers in pursuit of compensation (information bias).

However, this systematic review has several strengths. The first lies in its systematic approach, following protocol registration, and adhering to all typical rules associated with such reviews. The second major strength is that it is the first comprehensive systematic review of the impact of the COVID-19 pandemic on gambling. It deepened various aspects, including frequency, expenditure, and the transition between different forms of gambling.

6. Conclusions

During the COVID-19 pandemic period, a significant reduction in land-based gambling emerged, due to physical closures imposed by local governments and the cancelation of most important sports events. Furthermore, this period seemed to cause a troubling escalation in the risks associated with online gambling, with frequent transitions from land-based to online gambling especially among those who gambled before the pandemic period, due to a confluence of factors, including more time spent at home and an increase in anxiety, stress, and depression levels. With less stigma attached to digital gambling activities, individuals were more inclined to explore these platforms as a source of entertainment and escape during periods of isolation. The dangerousness of this instrument was amplified by the easy accessibility and the allure of potential financial gains, making online gambling a precarious endeavor. Moreover, the association between online gambling and mental health concerns was more pronounced, as the stress and uncertainties of the pandemic drove individuals toward these potentially harmful outlets. The increased habit of online gambling contributed to reduced personal relationships, as individuals might become engrossed in virtual pursuits at the expense of real-world connections. This shift toward negative lifestyles poses significant challenges, requiring a thoughtful and comprehensive approach to monitor and mitigate the negative consequences of this increase in online gambling caused by the pandemic.

Therefore, this systematic review suggests the need for stricter regulation and enhanced monitoring of online gambling, especially during time of crisis like the COVID-19 pandemic. This is crucial to protect players and the most vulnerable subgroups and to mitigate issues associated with compulsive gambling.

CRediT authorship contribution statement

Alberto Catalano: Writing – original draft, Visualization, Validation, Supervision, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Lorenzo Milani:** Formal analysis, Conceptualization, Validation, Visualization, Writing – original draft. **Matteo Franco:** Methodology, Validation, Visualization, Writing – review & editing. **Federica Buscema:** Visualization, Writing – review & editing, Methodology, Validation. **Ilenia Giommarini:** Visualization, Writing – review & editing. **Barbara Sodano:** Visualization, Writing – review & editing. **Winston Gilcrease:** Visualization, Writing – review & editing. **Luisa Mondo:** Visualization, Writing – review & editing. **Michele Marra:** Writing – original draft, Visualization, Conceptualization. **Chiara Di Girolamo:** Writing – review & editing, Visualization, Supervision. **Antonella Bena:** Writing – review & editing, Visualization, Supervision. **Fulvio Ricceri:** Methodology, Formal analysis, Data curation, Conceptualization, Project administration, Supervision, Validation, Visualization, Writing – original draft.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.addbeh.2024.108037.

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