Covid-19 and Gambling Behaviour in Industrialized Countries: a Systematic Review

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Abstract *During Covid-19 related lockdowns land-based casinos were generally closed. Following that, several actors raised concerns that a switch to online gambling might intensify addictive gambling behaviour. To investigate the effect of Covid-19 and related policy measures on gambling behaviour in industrialized countries, we review 22 empirical peer-reviewed articles published before October 4, 2021. Our main findings are that (1) online gambling activities generally increased, but to a lesser extent than land-based gambling decreased; hence, the total number of active gamblers declined during lockdowns; (2) on average, active gamblers did not engage in more intense gambling. However, multiple studies suggest that a minority of gamblers developed a more problematic and intense relationship to gambling during the pandemic; and (3) we identify a vulnerable group – generally young, male and with addictive, financial and psychological problems – which was most likely to engage in (more) problematic gambling due to Covid-19 related lockdowns. However, the present literature heavily relies on online surveys, which are prone to bias. Moreover, most reviewed studies merely analyse the change in gambling behaviour during the first half of 2020, so that evidence on long-term effects and the impact of the removal of restrictions is still missing. To address these shortcomings, future research is needed.*

1 Introduction

Covid-19 has tremendous and pernicious impact not only on the world economy, but also on the mental health of many people across the globe. Since the onset of the crisis, several actors have raised concerns about the consequences of the pandemic on gambling. It was feared that the closure of land-based casinos would contribute to a shift towards online gambling, which seems to be more problematic to a large extent given its solitary nature and ease of accessibility. Following a scoping review published in February 2021 (Brodeur et al. 2021) and a narrative review dated September 2021 (Sachdeva et al. 2021), this systematic review aims to extensively cover and analyse all the empirical work published on this topic so far.

2 Methods

2.1 Identification

The search strategy follows the PRISMA guidelines (Page et al. 2021).[1] On 4 October 2021, we searched for articles on the databases PubMed and Web of Science. To capture the most recent articles published after 4 September, we supplemented the search using Google Scholar. Following the search algorithm of Brodeur et al. 2021, we identified references by permutations of the two keyword categories "Covid" and "gambling":

[1] For documentation purposes, please refer to the PRISMA checklist in Table 1 in the appendix.

- Covid OR coronavirus OR “sars-cov-2” OR “cov-19” OR “lockdown” OR pandemic* OR "2019-ncov"
- "gambling" OR betting OR "electronic gaming machines" OR lotto OR casino OR poker OR bingo OR blackjack OR lottery OR "slot machine*".

As a result, 401 articles were identified across all 3 data bases. After removing duplicates (n = 110), 291 articles constituted the screening sample (Figure **1** in the appendix).

2.2 Screening

For screening, references were randomly split among 4 screeners to avoid selection bias (screener A: 77 references; B: 73; C: 73; D: 68). Each screener independently assessed the relevance of articles by analysing study title and abstract. Articles were excluded if they were:

- non-English references,
- references published prior to January 2020,
- references not published in peer reviewed journals,
- references not mainly dealing with both Covid/Lockdowns and gambling,
- studies about developing countries,
- studies about children, or
- reviews

As a result, 239 articles were excluded, leaving 52 articles for retrieval. 1 publication was dropped due to inaccessibility.

To consider eligibility, the remaining 51 articles were assigned randomly to the 4 screeners (screener A-C: 13 articles per screener; D: 12). References were considered ineligible if they were:

- duplicates,
- not about gambling behaviour during Covid,
- not empirical research papers (i.e., exclude protocols or commentaries),
- reviews, or
- study protocols.

Overall, we apply stricter criteria than earlier reviews, which also included study protocols and non-empirical publications. To resolve ambiguities regarding 6 studies, we assessed eligibility collectively. Eventually, we included 22 articles in the review.

2.3 Data collection

For each eligible article, data was independently collected by the same screener in a shared sheet (screener A: 10; B: 6; C: 3; D: 3). Data on the study framework include the country studied, study period, general setting, study design, research design, interviewing mode, target population, and sample size.

Following the reasoning of our research question, outcome data encompass:

- online and/or land-based gambling,
- extensive and intensive margin of gambling behaviour, and
- covariates associated with more/less gambling.

Details about each considered study can be found in the online sheet.[2]

3 Main Findings

3.1 Study characteristics of included studies

Among 22 articles, 5 were published in 2020 (Frisone, Alibrandi, and Settineri 2020; Håkansson 2020; Lindner et al. 2020; Price 2020; Xuereb et al. 2020) and 17 in 2021 (Albertella et al. 2021; Aslan and Kilincel 2021; Auer and Griffiths 2021; Black et al. 2021; Bonny-Noach and Gold 2021; Daglis 2021; Donati et al. 2021; Emond et al. 2021; Fino, Hanna-Khalil, and Griffiths 2021; Håkansson et al. 2021; Håkansson and Widinghoff 2021; Lischer et al. 2021; Lugo et al. 2021; Miela et al. 2021; Salerno and Pallanti 2021; Sharman et al. 2021; Shaw et al. 2021).

[2] The sheet can be found here: Link.

2 studies covered Australia (Albertella et al. 2021; Black et al. 2021), 2 Canada (Price 2020; Shaw et al. 2021), 1 Israel (Bonny-Noach and Gold 2021), 4 Italy (Donati et al. 2021; Frisone, Alibrandi, and Settineri 2020; Lugo et al. 2021; Salerno and Pallanti 2021), 5 Sweden (Auer and Griffiths 2021; Håkansson 2020; Håkansson et al. 2021; Håkansson and Widinghoff 2021; Lindner et al. 2020), 1 Switzerland (Lischer et al. 2021), 1 Turkey (Aslan and Kilincel 2021), 2 the United Kingdom (Emond et al. 2021; Sharman et al. 2021), 2 the USA (Miela et al. 2021; Xuereb et al. 2020), and 2 multiple countries (Daglis 2021; Fino, Hanna-Khalil, and Griffiths 2021)

8 studies analysed longitudinal data (Auer and Griffiths 2021; Black et al. 2021; Daglis 2021; Emond et al. 2021; Håkansson et al. 2021; Lindner et al. 2020; Lischer et al. 2021; Shaw et al. 2021) while the remaining 14 articles utilized cross-sectional data.

The majority of references were online-based surveys, whereas 1 survey was conducted by telephone (Donati et al. 2021) and 4 studies examined secondary data, e.g., data bases of national authorities (Auer and Griffiths 2021; Daglis 2021; Fino, Hanna-Khalil, and Griffiths 2021; Håkansson et al. 2021; Lindner et al. 2020; Miela et al. 2021). Furthermore, 2 studies use alternative research designs to investigate the effects of the pandemic on gambling. Analysing English language Tweets, Fino, Hanna-Khalil, and Griffiths 2021 find that awareness for problem gambling is high during the onset of the pandemic. Moreover, Daglis 2021 analyses stocks of the eleven biggest online gambling platforms using econometrics and multifractal methods. The author finds that stocks of online casinos have risen persistently since the onset of the pandemic and concludes that the pandemic has long-run economic effects on the online gambling industry.

3.2 Extensive Margin: Do more people gamble since Covid-19?

We find 13 articles which provide insights into the change in overall gambling since the onset of the pandemic. With varying magnitudes, 9 studies find that total gambling activities decreased because of (or during) lockdowns (Albertella et al. 2021; Black et al. 2021; Emond et al. 2021; Lindner et al. 2020; Lischer et al. 2021; Sharman et al. 2021; Shaw et al. 2021; Xuereb et al. 2020). Meanwhile 2 studies find no significant change in gambling consumption habits (Donati et al. 2021; Håkansson and Widinghoff 2021). 7 studies explicitly distinguish between online and land-based casino gambling. Among them, 6 reveal an increase in online gambling, yet not so large as to compensate for the slump in land-based casinos attendance (Auer and Griffiths 2021; Bonny-Noach and Gold 2021; Emond et al. 2021; Lindner et al. 2020; Lischer et al. 2021; Xuereb et al. 2020). Hence, they are overall consistent with the rest of the literature. Only Lugo and colleagues (2021) find a decrease in both land-based and online gambling, deviating from the general literature.

3.3 Intensive Margin: Do gamblers gamble more?

We find 14 empirical studies investigating how gambling behaviour of pre-Covid gamblers changed since the onset of the pandemic and during lockdowns. Seven studies find that gambling frequency and money spent decreased for the average gambler since the beginning of the pandemic (Auer and Griffiths 2021; Black et al. 2021; Donati et al. 2021; Håkansson 2020; Lischer et al. 2021; Shaw et al. 2021; Sharman et al. 2021). Analysing data on all 133,286 Swedish online gamblers, Auer and Griffiths (2021) find that the daily average amount of money bet by online casino gamblers decreased significantly between January and May 2020. Regarding the time spent gambling during lockdown, results are mixed. Black and colleagues (2021) report that Australian *low-key gamblers* reduced their gambling frequency between May and November 2020. However, based on a cross-sectional online survey with 6,003 Italian participants, Lugo and colleagues (2021) find that the median time of gambling grew from 4.5 to 5.1 hours per month among gamblers. Overall, we find no evidence for the

hypothesis that gambling intensity increased significantly since the onset of the pandemic.

Although gambling intensity does not seem to have increased for average gamblers, multiple studies suggest that there is a minority of gamblers who developed an even more problematic and intense relationship to gambling during the pandemic (Emond et al. 2021; Håkansson 2020; Håkansson and Widinghoff 2021; Lugo et al. 2021; Miela et al. 2021; Price 2020). The literature generally refers to this minority as *problem gamblers*. Yet, the literature presents mixed results. Based on an online survey in Sweden, Håkansson (2020) shows that individuals with markedly higher gambling problems before 2020 increased gambling significantly in response to the pandemic. On the contrary, 3 studies claim that problem gambling decreased or did not change since the global outbreak of Covid-19 (Albertella et al. 2021; Lindner et al. 2020; Shaw et al. 2021). Hence, although not all problem gamblers increased their gambling frequency, most studies support the hypothesis that the pandemic was a trigger for vulnerable groups to gamble more intensively and more frequently.

3.4 Characteristics of Problem Gamblers

We identified 16 studies that provide characteristics on which individuals were most prone to developing problematic gambling behaviour during the pandemic. First, men are more likely to develop problematic gambling behaviour than women (Emond et al. 2021; Lugo et al. 2021; Salerno and Pallanti 2021). Second, problematic gambling behaviour caused by Covid-19 is particularly evident in young adults (Albertella et al. 2021; Lugo et al. 2021). Third, unemployment and financial problems are correlated with an increase in problematic gambling (Emond et al. 2021; Salerno and Pallanti 2021; Sharman et al. 2021; Shaw et al. 2021). However, Auer and Griffiths (2021) raise the point that financial problems can also be seen as a (budget) constraint to problematic gambling.

Fourth, problematic gambling during the pandemic is associated with other addictive behaviours: alcohol drinking (Aslan and Kilincel 2021; Emond et al. 2021; Lugo et al. 2021; Price 2020; Xuereb et al. 2020), cannabis consumption (Lugo et al. 2021; Price 2020) and the abuse of other drugs (Aslan and Kilincel 2021; Lugo et al. 2021; Xuereb et al. 2020). We also identify two qualitative studies that investigate the effect of the pandemic on individuals with substance use disorder (Bonny-Noach and Gold 2021; Miela et al. 2021). Both find that, during the first lockdown, recovered and current drug addicts felt a stronger desire for drugs and engaged in more addictive behaviours, including gambling.

Fifth, using established psychological self-assessment questionnaires, several studies find that problematic gambling during Covid-19 correlates with depressive symptoms, psychological stress, loneliness, boredom, emotional instability, and anxiety (Albertella et al. 2021; Donati et al. 2021; Lischer et al. 2021; Lugo et al. 2021; Price 2020). Hence, the literature agrees that there is a vulnerable group – generally young, male and with addictive, financial and psychological problems – which was most likely to engage in more problematic gambling since the onset of the pandemic.

4 Discussion

Overall, our systematic review points to a modest decrease in the frequency and expenditure on gambling as the pandemic struck and lockdowns were implemented. Nevertheless, most studies show evidence of individuals affected by the problem gambling pathology increasing their gambling activity. In-depth analysis of the personal features of this group highlights several comorbidities that likely meant these individuals were disproportionately negatively affected by the pandemic.

One limitation of our review is that it is mostly focused on studies analysing the behavioural change in gambling during the first Covid wave

only. As it is the case for many mental health related issues, consequences could take some time to unravel, which calls for the need of follow-up studies. Moreover, most of the articles are based on online surveys, which implies self-reporting bias could be a concern. Even more than that, since most of the surveys were administered online, online gamblers are likely over-represented with respect to land-based casino gamblers. In addition, the policy responses to the outbreak of the virus have been heterogenous, for countries such as Italy enacted very strict confinement measures whereas in Sweden there was no lockdown at all. All these factors may undermine the external validity of the results observed. Furthermore, due to the nature of the data available, it is very difficult to infer the mediating mechanisms through which Covid-19 affected gambling behaviour. Possible future research could address this issue. Another interesting avenue of research could regard the effect on gambling behaviour of the lifting of restrictive measures, in order to see whether the decrease we observe in the general population is reversed or rather persistent.

As we observe that the consequences of the pandemic are likely to be long-term, it is of the utmost importance that individuals with gambling problems are recognised as a vulnerable group. Policy makers should take this matter into account when addressing the negative consequences of the pandemic measures and increased resources should be addressed to prevent and treat problem gambling.

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Appendix

Figure 1: PRISMA flow diagram (Page et al. 2021).

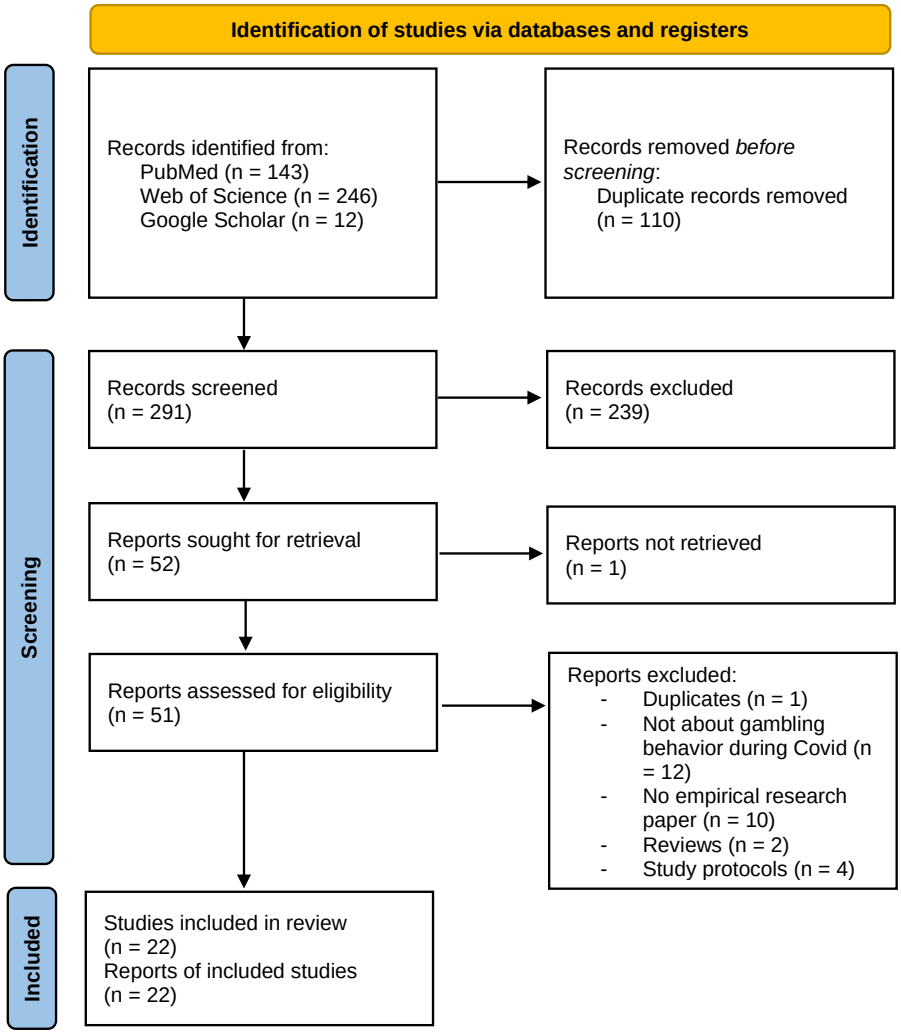

Table 1: PRISMA Checklist (Page et al. 2021).

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	Title
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	2.1
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	2.1
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	2.2
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	2.2
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	2.3
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	2.3

Section and Topic	Item #	Checklist item	Location where item is reported
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	2.2 and 2.3
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	2.3
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	2.2 and 2.3
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	2.1 and Appendix
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	2.2

Section and Topic	Item #	Checklist item	Location where item is reported
Study characteristics	17	Cite each included study and present its characteristics.	3.1
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	4
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	3.2, 3.3 and 4
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	4
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	4
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	
	23b	Discuss any limitations of the evidence included in the review.	4
	23c	Discuss any limitations of the review processes used.	
	23d	Discuss implications of the results for practice, policy, and future research.	4
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	

Section and Topic	Item #	Checklist item	Location where item is reported
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	
Competing interests	26	Declare any competing interests of review authors.	
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	