



The risk potential of online gambling: A systematic literature review

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**13th European Conference on Gambling Studies and Policy Issues – Connecting differences
Session 4 – Prevention, what to do?
Oslo (Norway), 08/September/2022**



Context

Conflict of interest

In the past five years, Tobias Hayer has received financial support as principal investigator from the German Federal Ministry of Health, various German federal states and the legal committee of the German Lotto and Totoblock.

The study on which this presentation is based was financially supported by the legal committee of the **German Lotto and Totoblock**. The funding agency had no influence on the research or publication process.

Further reading in German (Final technical report):

Hayer, T., Girndt, L. & Kalke, J. (2019). Das Gefährdungspotenzial von Online-Glücksspielen: Eine systematische Literaturanalyse. Bremen: Universität Bremen.



Background (I)

Latest population survey in Germany (Buth, Meyer & Kalke, 2022)

Gambling Disorder (4+ DSM-5-criteria): **2.3%** of individuals aged 18 to 70
(this corresponds to approximately 1.3 million people);

At-risk gambling (1-3 DSM-5 criteria): **5.7%** (\approx 3.25 million people).

Gambling regulation in Germany

After years of controversial discussion, a new State Treaty on Gambling came into force on July 1, 2021. All forms of online gambling were legalized nationwide (i.e. **virtual gaming machines, online casinos, online poker**). The **sports betting** market was already opened to private companies in 2020.

Controversial discussion about the risk potential of online gambling

(incl. the option **to restrict / regulate basic aspects of the game design** of legalized online gambling forms).



High risk potential – Main pros

Structural and situational characteristics

Permanent availability, ease of access, **high event frequency**, short payout intervals, lack of social control (anonymity), cashless payment options etc.

Clinical data

24 outpatient treatment centers in Lower Saxony (Brosowski & Hayer, 2022)
All clients were asked: “Which form of gambling causes most of your problems?”
Internet gambling (incl. poker, sports betting, machine gambling, casino games):
17.6% (2017-2019; n = 591); 32.0% (2020; n = 300); **45.5% (2021; n = 385)**

Epidemiological data

Early studies show generally (strong) **bivariate positive associations** between participation in online gambling and problem gambling status (i.e. being an at-risk, problematic, pathological or disordered gambler)



High risk potential – Main cons

Importance of gambling breadth / involvement

The **number of gambling activities** someone is participating in, regardless of the type of game or the location, is the more important risk factor.

Measurement of “online gambler”

Early studies in particular have compared **pure offline** gamblers with gamblers who *also* play online (i.e. **mixed-mode gamblers**).

Lack of controlling confounders

Statistical analyses were mainly based on **bivariate associations**, other variables such as individual characteristics may thus explain the findings to some degree.

Better opportunities for addiction prevention

Finally, the Internet offers unique opportunities with regard to **effective player protection**. For example, every mouse click is recorded and individual (gambling) behavior is recorded in real time (→ problem gambling less likely?).



Study rationale / aims

Overall aim → To determine the risk potential of online gambling. Is participation in online gambling an independent risk factor for problem gambling or is gambling breadth the more important variable?

To our knowledge, this is the **first systematic review** worldwide that has summarized and evaluated available findings in a methodically transparent way.

Initial consideration was to focus only on online casino games (incl. virtual slots) but small number of original papers made it necessary to broaden the scope to **all online gambling forms (except sports betting)**.

Evidence-based **recommendations for policy development and preventive actions** should be derived.



Method – Inclusion / Exclusion criteria

Inclusion criteria:

- (1) Quantitative studies that determined the risk potential of certain online gambling forms or online gambling in general
 - (2) Epidemiological or clinical data in representative surveys, data from population studies and data from convenience samples (here: only single gambling forms)
 - (3) Published in peer-reviewed journals between 2009 and June 2019 in German or English
-
- (!) **Excluded:** Studies that exclusively focused on Internet-based sports betting
 - (!) **Excluded:** Studies that were solely based on behavioral data and did not encompass a PG screening instrument



Method – Search strategy

Selection of 6 databases:

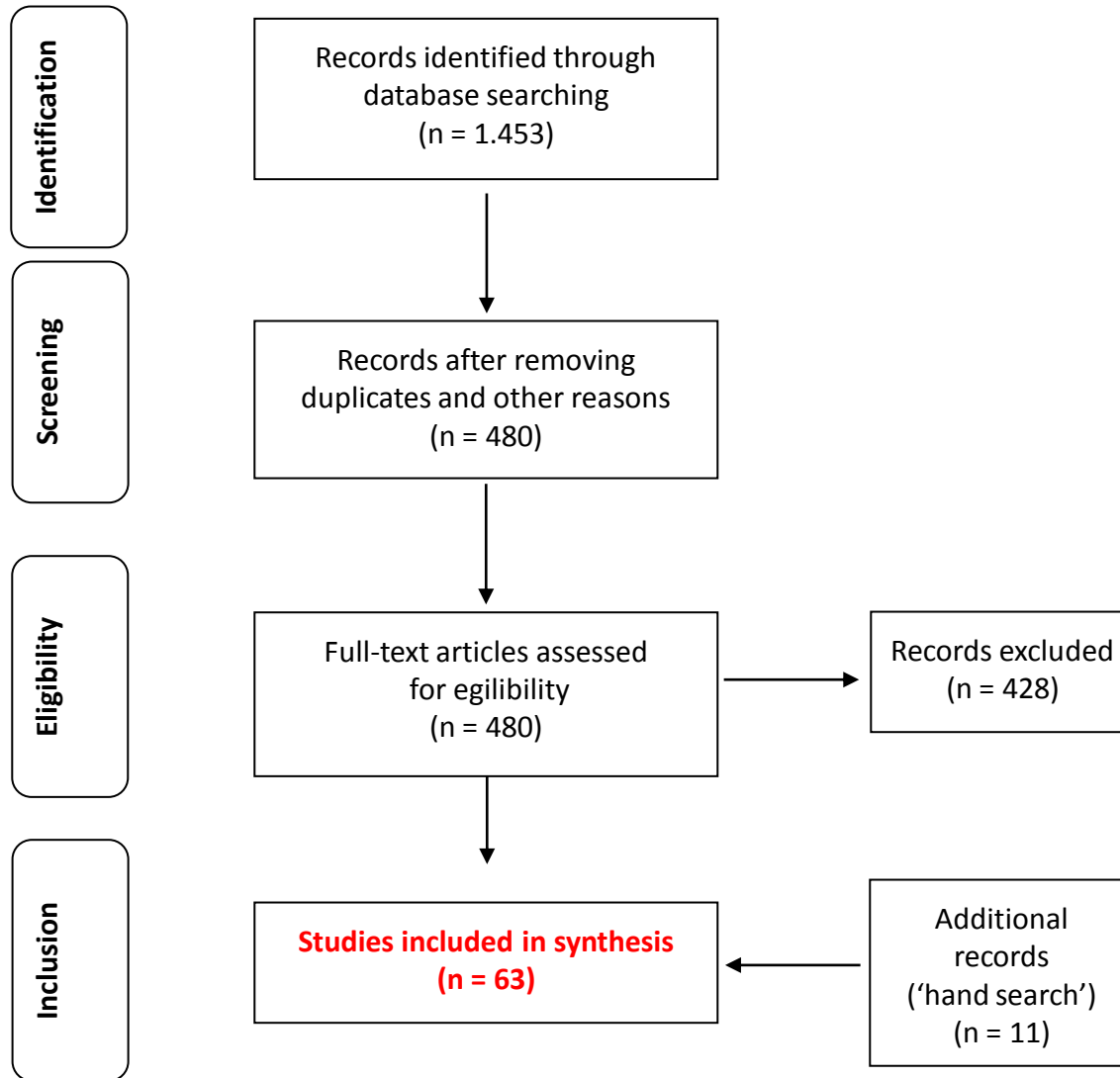
Medline, Web of Science, Psycinfo, Psycindex, CINAHL, Cochrane

Search algorithm:

- “problem or addict* or pathological or risk or disorder”
to map problem behavior
- “gambling or poker or casino or internet or online”
to specify the subject area
- “risk or form or type or potential or involvement or rate”
to cover the risk potential
- “population or representative or epidemiol* or prevalence or survey”
to restrict the search strategy to pre-defined research categories



Method – Flow chart of literature search





Code sheet – Data extraction

Category and running number	
Title	
Author(s)	
Journal	
Year	
Country	
Research category	
Gambling form	
Research design	
Crosssectional or longitudinal data	
Type pf data	
Period of data collection	
Sample	
Response rate	
Screening instrument (gambling behavior)	
Measurement of risk potential (data analysis)	
Proportion of online gamblers	
Main findings	
Conclusion	
Funding	
Annotations	
Abstract	



Method – Study appraisal (1)

A **new evaluation scheme** was developed by the research group because of the lack of comparable and suitable procedures

(1) **Content** of the identified study must be significant to the research question (identifiable by title, abstract, keywords)

(2) Selected **sample** proves to be adequate in terms of its size and composition to answer the research question
(refers to the unit of analysis and not to the overall sample)

(3) "Narrow" **definition of online gambler** (= "pure" online gambler)



Method – Study appraisal (2)

(4) Adequate **operationalization of core constructs**
(in particular use of an appropriate screening instrument)

(5) **Time frame** meets the criteria of timeliness:
- data collection has started not earlier than 2010
- 12-months (or shorter) prevalence for online gambling participation

(6) **Multivariate statistical procedures** are applied
(i.e. systematic control of confounders)

Six criteria: "applies" (= 1) or "does not apply" (= 0)

Overall rating:

"high" (5-6 points), "medium" (3-4 points) or "low" (0-2 points)



Findings – Overview

Research category	Number of studies
Epidemiology: Single online gambling forms (incl. "casino games")	9
Epidemiology: Online gambling in general	32
Population studies: Single online gambling forms (incl. "casino games")	4
Population studies: Online gambling in general	10
Convenience samples: Single online gambling forms (incl. "casino games")	8
In total	63

Countries (n = 71)

USA (7)	Finland (5)
Canada (7)	Spain (4)
France (7)	Worldwide (4)
Great Britain (6)	Iceland (3)
Australia (5)	Sweden (3)
Germany (5)	Other (15)



Findings – Epidemiology (online gambling, youth)

Study	Data collection, sample, year	Measurement - online gambler	Instrument	Main finding	Evaluation
Welte (2009)	Telephone survey n = 1,535 2005-2007	Participation in online gambling at least once in the last 12 months	SOGS-RA	Online gamblers participate in a broad range of different gambling activities. By itself, (more) intensive participation in online gambling does not increase the risk of gambling-related symptom burden.	medium
Kristiansen (2014)	Written survey n = 2,223 2008	Participation in online gambling at least once in the last 12 months	SOGS-RA	Adolescent at-risk and problem gamblers are more likely to use mobile phones and the Internet for gambling participation than adolescents without gambling problems. (+)	low
Tomei (2015)	Written survey n = 335 2012	Participation in online gambling at least once in the last 12 months	PGSI	The gambling location "Internet" does not predict the presence of gambling-related problems in young men.	medium
Elton-Marshall (2016)	Written survey n = 10,035 2012/2013	Participation in online gambling at least once in the last 3 months	Subscale of CAGI	Online gamblers show more likely symptoms of gambling-related maladjustment than pre land-based gamblers. However, online-only gamblers are hardly found in this survey. (+)	medium
Canale (2016)	Written survey n = 14,778 2013	Participation in online gambling at least once in the last 12 months	SOGS-RA	The prevalence of problem gambling behavior is significantly increased among online gamblers compared to offline gamblers. Apparently, gambling incentives conveyed via the Internet pose a high risk for vulnerable gambler groups. (++)	high
Wardle (2019)	Written survey n = 2,881 2017	Monthly participation in online gambling/betting in the last 12 months or participation in online gambling/betting in the last week	DSM-IV-J-MR	Participation in online gambling predicts the presence of gambling-related problems independently of other predictors. Online gambling has the highest risk of all gambling included. (++)	high

Risk potential online gambling increased: + = on bivariate level; ++ = on multivariate level



Findings – Epidemiology (online gambling, adults)

Study	Data collection, sample, year	Measurement - online gambler	Instrument	Main finding	Evaluation
Stefanovics (2017)	Online survey n = 3,157 2011	Participation in online gambling at least once in the last 12 months	BBGS	Based on the number of cases, no association between online gambling and problem gambling behavior could be investigated.	low
Bonnaire (2017)	Telephone survey n = 25,647 2009/2010	Participation in online gambling at least once in the last 12 months	PGSI	Among problem gamblers, weekly online gambling is more widespread than among non-problem gamblers. (+)	medium
Olason (2015)	Telephone survey n = 8,249 2005/2007/2011	Participation in online gambling at least once in the last 12 months	PGSI	Participation in online gambling is clearly associated with problem gambling behavior. Following the collapse of the Icelandic economy, a significant increase in the prevalence of gambling-related problems can be observed, which can be partially explained by increasing participation in online gambling. (++)	high

Risk potential online gambling increased: + = on bivariate level; ++ = on multivariate level



Findings – Epidemiology (online poker)

Study	Data collection, sample, year	Measurement - online gambler	Instrument	Main finding	Evaluation
Tryggvesson (2009)	Telephone survey n = 16,500 2006	Participation in online gambling at least once in the last 30 days	FORS	Online poker increases the risk of problem gambling. On the one hand, it attracts vulnerable players; on the other hand, it independently exacerbates gambling problems. (++)	medium
Halme (2011)	Telephone survey n = 4,273 2007	Participation in online gambling at least once in the last 12 months	SOGS-RA	Online poker players have an increased risk of showing gambling problems. This also holds when controlling for age and gender, but not when the number of forms of gambling participated in as well as gambling expenditures are taken into account. (++)	medium
Mihaylova (2012)	Written/online survey n = 366 2008	Participation in online poker at least once in the last 12 months	PGSI	Online poker players are more prone to problem gambling and more involved in gambling (i.e. more forms of gambling) than offline-only poker players. Even though almost all online poker players also play offline, they use the Internet more often for gambling. (++)	medium
Kairouz (2016)	Written survey n = 368 2008/2009	Participation in online poker at least once in the last 12 months	PGSI	Playing poker online serves as a mediator: The positive association between male gender and the severity of a gambling problems can be partly explained by increased participation in playing poker online. (++)	medium

Risk potential online gambling increased: + = on bivariate level; ++ = on multivariate level



Findings – Summary (Epidemiology / Population)

Risk potential of online gambling (**Adults**; n = 31 original studies)

Research category		++Risk potential increased (multivariate analysis)	+Risk potential increased (bivariate analysis)	Risk potential not increased / unclear results
Epidemiological studies	Total	11	7	8
	High quality	6	-	2
	Medium quality	5	6	4
	Low quality	-	1	2
Population studies	Total	4	0	1
	High quality	2	-	-
	Medium quality	1	-	1
	Low quality	1	-	-
Total		15	7	9

Annotation: The quality of the 9 original studies with null findings do not share any common characteristics, such as the survey period, the country of data collection or measurement instrument (→ a unique methodological bias cannot be identified).



Findings – Summary (Epidemiology / Population)

Risk potential of online gambling (**Youth**; n = 11 original studies)

Research category		++Risk potential increased (multivariate analysis)	+Risk potential increased (bivariate analysis)	Risk potential not increased / unclear results
Epidemiological studies	Total	2	2	2
	High quality	2	-	-
	Medium quality	-	1	2
	Low quality	-	1	-
Population studies	Total	2	3	0
	High quality	1	-	-
	Medium quality	-	2	-
	Low quality	1	1	-
Total		4	5	2



Findings – Summary (Single gambling forms)

Risk potential of online gambling (n = 21 original studies)

Research category		++Risk potential increased (multivariate analysis)	+Risk potential increased (bivariate analysis)	Risk potential not increased / unclear results
Epidemiological studies	Total	8 (mainly poker)	-	1
	High quality	3	-	1
	Medium quality	5	-	-
	Low quality	-	-	-
Population studies	Total	-	2	2
	High quality	-	-	2
	Medium quality	-	-	-
	Low quality	-	2	-
Convenience samples	Total	3	4	1
	High quality	-	-	-
	Medium quality	2	-	1
	Low quality	1	4	-
Total		11	6	4



Conclusion

Overall, there is a clear **trend towards an increased risk potential of online gambling** in general and of individual forms of online gambling (→ 48 out of 63 studies point in this direction).

However, when taking **gambling breadth / involvement** into account (i.e., the number of gambling forms used), this effect weakens to some degree.

The few available **studies on single forms of online gambling** are heterogeneous, both in terms of the types of forms studied and with regard to their methodology (→ weak empirical data base).

From a theoretical point of view, it can be assumed that the **risk spectrum** - analogous to the terrestrial sector - ranges from the relatively harmless online lotteries to the highly addictive online slot machine games (as far as current game designs are considered).



Similar findings

ADDICTION

REVIEW

SSA SOCIETY FOR THE STUDY OF ADDICTION

doi:10.1111/add.15449

A meta-analysis of problem gambling risk factors in the general adult population

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ABSTRACT

Background and Aims Few meta-analyses have been conducted to pool the most constant risk factors for problem gambling. The present meta-analysis summarizes effect sizes of the most frequently assessed problem gambling risk factors, ranks them according to effect size strength and identifies any differences in effects across genders. **Method** A random-effects meta-analysis was conducted on jurisdiction-wide gambling prevalence surveys on the general adult population published until March 2019. One hundred and four studies were eligible for meta-analysis. The number of participants varied depending on the risk factor analyzed, and ranged from 5327 to 273 946 (52% female). Weighted mean odds ratios were calculated for 57 risk factors (socio-demographic, psychosocial, gambling activity and substance use correlates), allowing them to be ranked from largest to smallest with regard to their association with problem gambling. **Results** The highest odds ratio (OR) was for internet gambling [OR = 7.59, 95% confidence interval (CI) = 5.24, 10.99, $P < 0.000$] and the lowest was for employment status (OR = 1.03, 95% CI = 0.87, 1.22, $P = 0.718$). The largest effect sizes were generally in the gambling activity category and the smallest were in the socio-demographic category. No differences were found across genders for age-associated risk. **Conclusions** A meta-analysis of 104 studies of gambling prevalence indicated that the most frequently assessed problem gambling risk factors with the highest effect sizes are associated with continuous-play format gambling products.

Keywords Epidemiology, gambling, gambling disorder, general population, meta-analysis, odds ratio, problem

*“Although all forms of gambling are more common in people with PG compared to controls, the continuous forms of gambling (characterized by high rate of play and short time between wagering and the outcome), notably **EGMs and internet gambling**, are associated with the **largest effect sizes**” (p. 2975).*



Limitations (Own Approach / Primary Studies)

Gray literature (e.g., research reports, dissertations) and qualitative studies were excluded, possibly leaving important empirical findings unconsidered.

Almost all studies do not examine pure online gamblers – often a single participation in online gambling is sufficient for the assignment to this group.

Further main limitations include relatively old datasets in some cases, varying compositions of samples and the use of cross-sectional data.

The lack of longitudinal data does not allow conclusions to be drawn on causal processes (e.g. the association between participation in online gambling and gambling-related problems could be due to the fact that online gambling either triggers problems or attracts problem gamblers or both).



Implications / Policy recommendations

The available scientific findings generally justify **a high level of intervention by the state** in regulating online gambling, which may even include bans on certain gambling forms

Individual online gambling forms - starting with the potentially lower-risk forms - are to be **successively permitted** and accompanied with scientific evaluation research.

Rule of thumb: The more "dangerous" an online gambling form is, the higher the requirements for player protection must be set.

Concerning the conceptualization of player protection for the online gambling sector, **scientific findings on the effects of individual measures and interventions must be taken into account** (see Hayer & Kalke, 2022)



Thank you for your attention!

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