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An interrupted time series analysis

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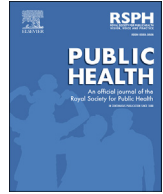
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Original Research

Gambling helpline contacts during COVID-19-related availability restrictions: an interrupted time series analysis



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ABSTRACT

Objectives: Gambling causes significant public health harms that are addressed in the help service network. Helplines are the most widely used service among those experiencing harms. The COVID-19 pandemic changed the global gambling landscape. This study assesses the effect of COVID-19-related restrictions on help-seeking for gambling via helplines.

Study design: We analysed data of national helplines in Sweden, Finland, and Denmark before and during the pandemic. The countries differed in their restrictions on the availability and accessibility of gambling during the pandemic.

Methods: We performed an interrupted time series analysis of contact and web traffic data to helplines in Sweden, Finland, and Denmark before and during the COVID-19 pandemic (2017–2021). We also compared forecasted time series to the actual data to assess change.

Results: The results show diverging patterns across the three countries. In Sweden, the number of helpline contacts remained stable throughout COVID-19, but there was an increasing trend in website visits. In Finland, the number of contacts declined during the first wave but rebounded during the second wave. Website visitation increased moderately. In Denmark, the number of contacts to the helpline soared over the COVID-19 period.

Conclusions: The diverging results suggest that help-seeking behaviour is likely to be impacted by differing policy approaches to gambling availability and limit-setting, visibility of helplines, and the prevalence of different forms of gambling in the three Nordic countries before and during the pandemic. This has implications for a preventive public health approach for gambling.

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Introduction

Gambling causes serious harms to individuals, concerned significant others (CSOs), and societies. Globally, the prevalence rates of self-reported problem gambling range between about .5 and 7.6 percent in the population, with an average rate of about 2.3 percent.^{1,2} Prevalence rates vary according to context but also depending on methodological differences such as measures and samples.¹ In addition to problematic behaviour, gambling also causes a variety of other harms, ranging from financial difficulties and relationship harms to mental health problems and even

suicidality.^{3–5} Some gambling products cause more harms and problems than others. A meta-analysis of problem gambling risk factors⁶ shows that the highest odds ratios (ORs) are for online gambling (OR 7.59), non-casino electronic gambling machine (EGM) gambling (OR 7.20), and casino EGM gambling (OR 6.78). Greater availability has also been connected to increased problems or harms, although levels of problem gambling may plateau over time due to ‘adaptation’ or more effective harm prevention.^{7,8}

After onset, gambling problems are addressed by help, support, and treatment services. Financial and emotional issues have been identified as the main motives for help seeking.⁹ Most help services are aimed at individuals who experience severe harms due to their own gambling. Services include formal approaches such as social work, medical help, peer support, and debt counselling but also informal approaches such as self-help.^{10–12} Overall, a minority of

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individuals with gambling-related problems seek help. A recent systematic review suggested that only four percent of individuals with moderate problems and 20 percent of individuals with severe problems sought help.¹³

Helplines are a first-line support for individuals experiencing problems with gambling.^{14–16} A recent survey found that 82 gambling helplines operate globally.¹⁴ Helplines offer brief interventions, motivational interviewing, emotional support, information, and referrals to other treatment.^{14,17} Helplines provide services via telephone, but in many cases also via chats, e-mail, text messages, as well as online resources.¹⁴ Helplines are also actively promoted, and individuals experiencing gambling problems are usually aware of them.¹⁶

Many helplines routinely collect data on contacts. Data consist either of pre-set questionnaires or spontaneous observations by employees.¹⁴ Statistical data from helplines have been used to inform research about developments in the gambling field, including gambling products that cause problems,^{18,19} the socio-demographic characteristics of help-seekers,^{20–22} the types of harms experienced,²³ and education.²⁴ Helpline data can therefore be useful in measuring trends and changes in problematic gambling within and across societies.

In 2020, the onset of the COVID-19 pandemic caused significant changes in the field of gambling. Across jurisdictions, availability was restricted due to lockdown measures. Regulatory actions were also taken in some jurisdictions to curb possible increases in online gambling. These included stricter limit-setting measures as well as marketing restrictions.²⁵ Evidence on the impacts of the pandemic on gambling suggests an overall reduction in gambling behaviour in most contexts, with no significant substitution from land-based to online gambling.^{26–28} Data from treatment providers have also not indicated increases in treatment uptake during COVID-19.^{29,16} Available qualitative and quantitative evidence suggests that the reduced availability of gambling during the pandemic may have translated to reduced service needs.^{16,30,31}

However, little research has been conducted on the effects of COVID-19 and related restrictions on availability and gambling opportunities using helpline data. Helpline data is a comparatively reliable data source to investigate changes during COVID-19 because unlike many other treatment services for gambling problems, helplines remained operational during the pandemic.³¹ Only one study from Ontario¹⁶ used gambling helpline data from a 5-year period (March 2015–March 2021) and interrupted time series analyses to examine how changes in gambling availability due to COVID-19 was visible in helpline calls. The study showed an initial dramatic decline in contacts after casino closures in 2020, but a later rebound. No comparative evidence currently exists on the effects of COVID-19 on helpline contacts.

The aim of the current study is to examine the impact of COVID-19 restrictions on contacts to gambling helplines in three Nordic countries (Sweden, Finland, and Denmark) with differing approaches to limiting gambling availability during the pandemic. Using longitudinal data (2017–2021) from helplines and a comparative setting allows wider conclusions on the differences between the impact of restrictions during COVID-19, but also gambling policy systems, availability, and effective prevention of harm.

Methods

Context

Sweden, Finland, and Denmark have similar gambling markets with wide availability of different types of gambling both land-based and online. In Sweden and Denmark, online gambling is provided by licensed operators, whereas in Finland, online

gambling is provided by a national monopoly operator. Online gambling is prevalent in each country. Each included country also has a national helpline to assist with gambling-related problems.

The Swedish Stödlinjen helpline is run by the Centre for Psychiatry Research at Stockholm County Council and funded by the Swedish Ministry of Health and Social Affairs. Stödlinjen was established in 1999. It provides support to gamblers and CSOs. Stödlinjen provides service by phone, chat, e-mail, and online resources such as self-testing. The helpline operates on weekdays between 9 am and 4 pm (except Mondays between 9 am and 9 pm and Thursdays between 11 am and 9 pm).

Peluuri is a Finnish gambling help service. It was established in 2004, and it has been financed by the monopolistic gambling operator Veikkaus. The target group of the services of Peluuri are gamblers, CSOs, and other professionals encountering gambling harms. The service also welcomes digital gamers and their significant others. The helpline operates on weekdays between 12am and 6pm via phone and chat. In addition, Peluuri provides online resources, including online peer support.

StopSpillet is the Danish national gambling helpline. StopSpillet was established in 2019 as the first national gambling helpline service, and it is run by the Danish Gambling Authority. The main target groups are gamblers, CSOs, and professionals. StopSpillet also caters for digital gamers and their CSOs. StopSpillet operates via telephone and chat. The telephone services operate during weekdays between 9 am and 9 pm (except Fridays between 9 am and 5 pm). The chat operates from Monday to Thursday between 5 pm and 9 pm.

Data

We used two separate data sets collected in the daily operations of Stödlinjen (SE), Peluuri (FI), and StopSpillet (DK).

The first data set consists of helplines' counselling services (telephone and chat). In each country, contacts are logged into the helpline system automatically or manually. The collected variables differ across helplines, but the data entry procedure is similar: after the call, the counsellor manually enters data about the content of the conversation using an online interface, while the time stamps of calls are automatically logged.

For this study, we focused only on the number of calls, and not their contents. We included all calls or other contacts that had a start and end time, regardless of if the contacts were from gamblers, CSOs, or other types of callers (e.g. from treatment providers or wrong numbers). The wrong numbers mainly consisted of contact attempts to gambling providers. However, these were included because they also provide a possibility for an intervention. The Swedish helpline provided counselling service data for the period 2017 to 2020, the Finnish helpline for the period 2017 to 2021, and the Danish helpline for the period 2019 to 2021 (the Danish helpline started their operations in 2019).

The second data source consists of the number of visitors to helpline websites. In each country, data were collected using Google analytics from 2019 to 2021. In Sweden and Finland, Google analytics data were available daily. In the Danish case, only monthly Google analytics data were available, with a shorter baseline (three months). For this reason, we did not perform a forecast and present only actual data for Denmark.

COVID-19 restrictions

The most important periods of societal restrictions and availability limitations of gambling during COVID-19 were identified based on online scanning of Swedish, Finnish, and Danish governmental websites, websites of gambling operators in these

Table 1
Restrictions on gambling availability during COVID-19 in Sweden, Finland, and Denmark.

Restriction	Sweden	Finland	Denmark
Closure of EGMs, casinos, arcades			
First wave	30.3.2020–5.7.2021 ^a	14.3.2020–15.7.2020	18.3.2020–7.6.2020
Second wave	–	26.11.2020–6.5.2021 ^c	9.12.2020–20.5.2021
Third wave	–	6.8.2021–1.10.2021 ^c	17.12.2021–31.1.2022
Reduced limits for online gambling	30.6.2020–14.11.2021	1.5.2020–18.6.2021	n/a
Sport event cancellations ^b	13.3.2020–15.6.2020		

^a The four land-based casinos in Sweden were closed at the casino's own initiative due to visitor restrictions.

^b Major European football leagues (England, Germany, Italy, Spain, France + Sweden, Finland, Denmark) and major hockey leagues (NHL, KHL + Sweden, Finland). Games cancelled on average on the 13th of March 2020. Games resumed at varying times but starting around the week of 15th of June 2020.

^c Varying regional restrictions, not applicable to the whole country simultaneously.

countries, and information channels of popular sports leagues in the Nordics and Europe. Table 1 summarises the main periods of restrictions used in the interrupted time series analysis.

Analysis

We analysed the influence of COVID-19-related restrictions on help-seeking using interrupted time series analysis. The method allows analysing how events in society (the COVID-19 pandemic) affect subsequent behaviours (help-seeking via gambling helplines).³²

We analysed both sets of data using dynamic harmonic regression models with ARIMA errors, using the R-packages fable and feasts.^{33,34} These models are feasible when a time series contains complex seasonality, as suggested by Hyndman and Athanasopoulos.³⁵ The number of Fourier terms for each seasonal component were selected based on ocular inspection.³⁵ To prevent holiday effects in the counselling service data, we calculated the average number of calls per day and week. Based on this, if a helpline operated only three days instead of five, the average number of calls per day were based on a three-day week. This *modus operandi* is suggested by Hyndman and Athanasopoulos³⁵ to prevent arbitrary patterns in the time series. The Google analytics data on the number of visitors to helpline webpages were analysed

as daily data without holiday adjustments, since webpages are available at any time of day and regardless of holidays.

We modelled counselling contacts by adding monthly and yearly seasonal components to the models and presuming that a 'helpline week' is five days. The monthly period was therefore set to 4.35 (a month contains 4.35 weeks on average), and the yearly period was, in the same manner, set to 52.2. For the Google analytics data, three seasonal components were added to the models: weekly, monthly, and yearly. To determine if the residuals were 'white noise', we performed Box–Pierce tests. Moreover, and to minimise bias, if the residual's mean differed from zero, the residual mean was subtracted from the forecasted point estimates as suggested by Hyndman and Athanasopoulos.³⁵ The forecasted time series were then compared to actual data by calculating prediction errors for each period of interest. The prediction errors are presented in percent with *P*-values and 95% confidence intervals.

The data were forecasted for the period 13.3.2020 to 13.3.2021, except for Sweden where the period ended on 31.12.2020. For all data sets, comparison between predicted and actual data were made for the periods; 1) during cancelled sports events, 2) the first wave of the pandemic, 3) reduced deposit limits (Sweden and Finland), 4) between the first and second wave of the pandemic, 5) the second wave of the pandemic, and 6) the entire forecast period.

Table 2
Difference (%) between actual and forecasted data for Sweden, Finland, and Denmark.

Country	Source	Period	Diff %	95% CI	<i>P</i> -value
Sweden	Web	13.3–15.6 2020^{a,b}	12.7	9.2, 16.1	<.0001
Sweden	Web	30.6–31.12 2020 ^c	.5	–2.1, 3.1	.68
Sweden	Web	13.3–31.12 2020^f	5.3	3.1, 7.4	<.0001
Sweden	Telephone	W11–W25 2020 ^{a,b}	–1.1	–12.1, 9.9	.83
Sweden	Telephone	W27–W52 2020 ^c	.1	–5.9, 7.6	.80
Sweden	Telephone	W11–W52 2020 ^f	.4	–5.0, 5.8	.88
Finland	Web	13.3–15.7 2020 ^{a,b}	2.9	–1.8, 7.6	.23
Finland	Web	16.7–8.12 2020 ^d	1.3	–1.7, 4.4	.39
Finland	Web	26.11.20–13.3.21^e	5.5	1.3, 9.7	.010
Finland	Web	13.3.20–13.3–21^{c,f}	4.0	1.7, 6.4	<.001
Finland	Telephone	W11–W29 2020^{a,b}	–15.8	–26.4, –5.1	<.01
Finland	Telephone	W30–W47 2020 ^d	–10.6	–20.4, 2.6	.055
Finland	Telephone	W48 2020–W10 2021^c	12.5	1.1, 24.0	.033
Finland	Telephone	W11 2020–W10 2021 ^{c,f}	–2.6	–10.2, 5.1	.50
Denmark	Telephone	W11–W25 2020^{a,b}	38.2	4.7, 71.2	<.01
Denmark	Telephone	W26–W49 2020 ^d	–4	–16.0, 15.1	.95
Denmark	Telephone	W50 2020–W10 2021^e	105.8	81.1130.5	<.0001
Denmark	Telephone	W11 2020–W10 2021^f	37.9	20.2, 55.6	<.001

Bolded lines indicate *P*-values of 0.05 or less.

^a Cancelled sports events.

^b The first wave of the pandemic.

^c Reduced deposit limits (Sweden and Finland).

^d Between the first and second wave.

^e The second wave of the pandemic.

^f The entire period.

The code and data used for the analysis are available in a separate repository <https://osf.io/gk42s/>.

Results

Result show that Sweden, Finland, and Denmark differ in terms of how the COVID-19-related restrictions affected contacts to helplines. Table 2 and Fig. 1 show the difference in percentage between actual and forecasted data (contacts and Google analytics). Regarding regression model diagnostics, the Box–Pierce tests showed non-significant results, indicating that the residuals in all models can be considered ‘white noise’.

In Sweden, we found no support for any effect on helpline counselling contacts of the various COVID-19 restrictions on gambling availability (closures of land-based casinos), cancelled sports events, or the temporary deposit limits for online gambling. However, there was a general increase in website visitors, 5.3 percent for the entire period, and a 12.7 percent increase during the period of cancelled sports events.

In Finland, counselling contacts decreased by 15.8 percent during the initial phase of the pandemic (first wave), during which there were restrictions on both land-based and online gambling. However, during the second wave of closures, counselling contacts increased by 12.5 percent. In terms of website visitors in Finland, the number of visitors increased by four percent over the first year of the pandemic.

Denmark showed a different pattern compared to Sweden and Finland. Counselling contacts increased dramatically during the first and second waves of reduced gambling opportunities, by 38.2 percent and 105.8 percent, respectively. This was observed even though many land-based gambling opportunities were closed in Denmark.

Discussion

This paper has investigated changes and trends in help-seeking for gambling-related problems during COVID-19-related restrictions in Sweden, Finland, and Denmark, using longitudinal statistical data collected by national helplines for gambling. The

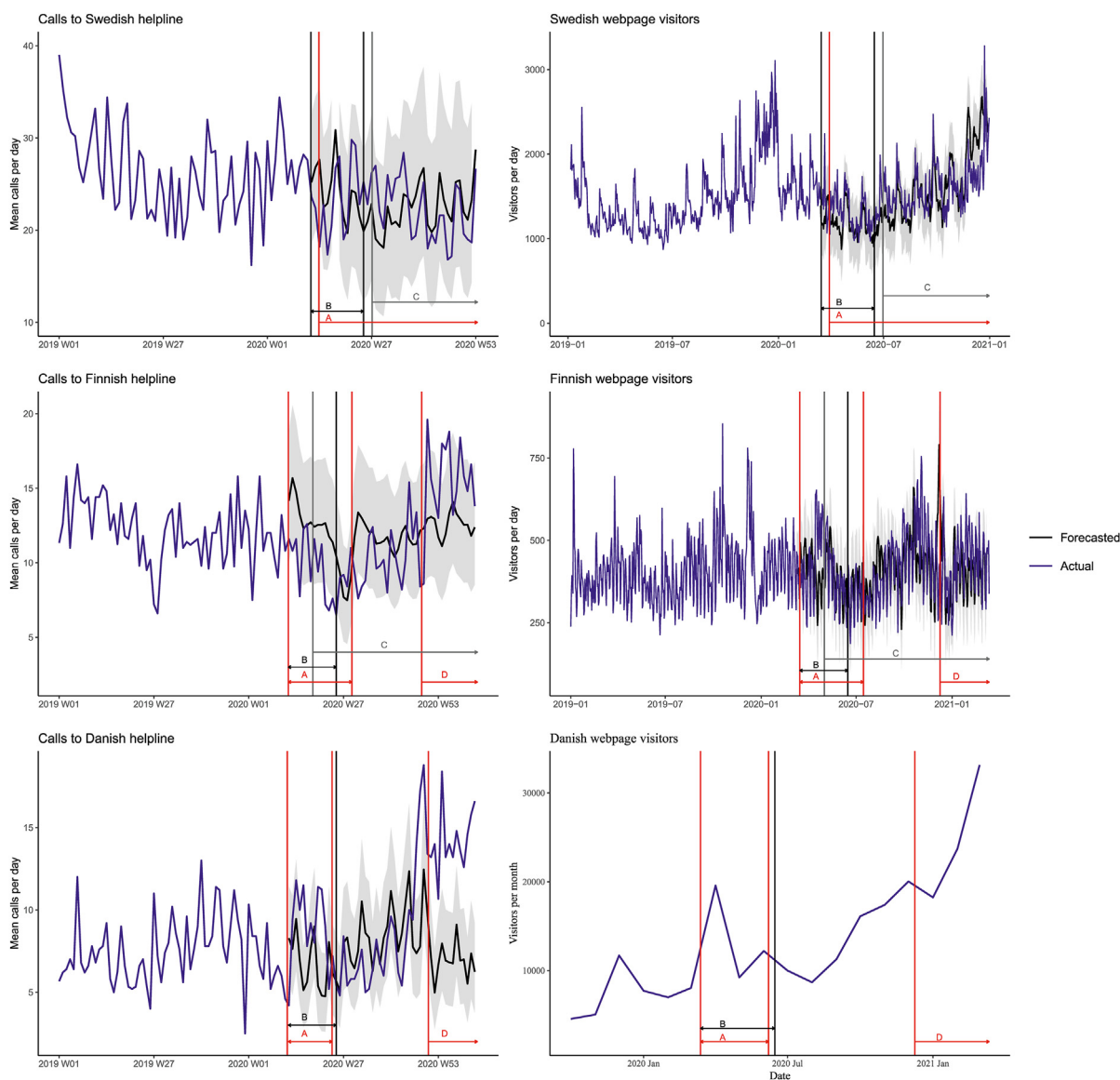


Fig. 1. Time series with forecasted data (with 95% prediction intervals) and actual data for Sweden, Finland, and Denmark. The various COVID-19 restrictions are marked with vertical lines. Note. A = restriction of land-based gambling opportunities during the first wave of the pandemic, B = cancellation of sports events, C = mandatory deposit limits, D = restriction of land-based gambling opportunities during the second wave of the pandemic.

results have shown diverging patterns in terms of the number of contacts. In Sweden, the number of helpline contacts has remained stable, and COVID-19 does not appear to have affected help-seeking behaviour. In Finland, the number of contacts initially declined but later rebounded, whereas in Denmark, the number of helpline contacts soared during the entire period. This divergence can be explained by the baseline prevalence of different gambling forms, the visibility of helplines, and different policy approaches to gambling availability and limit-setting.

First, the results show that COVID-19-related restrictions did not impact all contexts similarly. Previous literature on the effects of the pandemic on gambling has suggested that, in most cases, online gambling did not substitute land-based provision. Instead, land-based gambling participation reduced following restrictions, whereas online gambling intensified among some of those who already gambled online.^{26–28,36} The baseline prevalence of online gambling, and particularly the role of online gambling as a vector for harms and help-seeking before the pandemic, may explain part of the divergence. In Finland, a wide availability of land-based EGMs in non-casino environments had translated into high levels of EGM harms and help-seeking for EGM harms before the pandemic.^{37,38} Unlike in most contexts, in pre-pandemic Finland, online gambling was not connected to higher gambling harms than land-based gambling due to harms caused by EGMs.³⁹ The closure of land-based EGMs is likely to be behind reduced help-seeking in the Finnish context. In Denmark and Sweden, online forms of gambling were more important causes of harms before the pandemic.^{40,41} Previous evidence from Sweden and Denmark also suggests that online gambling did not decrease significantly in these contexts during the first months of the pandemic.^{42,36,43,44} This can explain why closures of land-based gambling opportunities did not translate to similar reductions in help-seeking in Sweden and Denmark.

Second, the results suggest that advertising and visibility of helplines attracts traffic to these services. In each country, licensed or monopolistic gambling companies must advertise helplines. This visibility can drive particularly website visitation. In Denmark, a public information campaign advertising the services for StopSpillet occurred during spring and autumn of 2020 (March 9–April 19; September 14–October 25) in social media as well as outdoors and in cinemas. StopSpillet is also younger than its Swedish and Finnish counterparts, which may partly explain the increase in help-seeking in Denmark. On the other hand, unlicensed online providers do not advertise helplines. Particularly in Finland, with a monopolistic gambling market, a significant part of gambling, and particularly problematic gambling, takes place in non-licensed online websites. In 2021, the market share of the monopoly was only 59 percent in the digital channel (estimation of H2 gambling capital, cited by Veikkaus).⁴⁵ This channelling rate is notably lower than in the licensed markets of Sweden and Denmark (closer to 90 percent in both contexts). This may also partly explain the lower numbers of help-seeking in Finland.

Third, restrictions on mandatory gambling spending and deposit limits may reduce overall harms and problems. Sweden and Finland lowered the mandatory loss limits for online gambling during 2020, whereas Denmark did not. Previous research on mandatory limit-setting suggests that most players appear to stop gambling when reaching their limits. Reaching limits is also more common among high intensity gamblers.⁴⁶ However, particularly in Sweden, the mandatory deposit limit was relatively high even at the lowered level (5000 SEK, or about 500 euros a week per operator, compared to 500 euros a month for the monopoly operator in Finland). Furthermore, the possibility to gamble on unlicensed websites may have reduced the impact of mandatory limits in both countries.^{47,37} It is therefore likely that the lowered limits were rather insignificant, particularly in Sweden.

The current study has been limited to three Nordic countries. The results are therefore not necessarily generalisable to other contexts. The study has also been limited by issues related to data comparability and availability. Data from the three helplines were comparable on a limited set of call frequency variables due to country-specific registration practices. The granularity of web traffic data also limited comparative time series analyses across the three countries. Data collection should, of course, not be the main priority of helplines, but more unified practices across helplines in how data are collected and reported would be useful for further research efforts.

This study has nevertheless shown that helpline data can be a valuable source for research on gambling harms and problems, as well as their evolution within and across contexts. To advance knowledge on the precipitators of help-seeking, it is also necessary to conduct qualitative analyses on the content of helpline contacts, and particularly regarding the types of gambling products that callers identify as causing harm. The results of the current study have also shown that different policy approaches affect help-seeking. Particularly reduced availability, low mandatory limits, as well as visibility of available help resources can be effective in reducing gambling harms and the burden of gambling on public health.

Author statements

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Ethical approval

The study was conducted in accordance with the Helsinki Declaration and was approved by the Swedish Ethical Review Authority (decision number 2022-03651-01), the vice dean at the Faculty of Social Science and Humanities at Aalborg University, and by the University of Helsinki Ethical Review Board in Humanities and Social and Behavioural Sciences (decision number 56/2022).

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Competing interests

HW, VM, and SK have no competing interests to report. DF has received grants from Svenska Spel's research council for projects on concerned significant others and e-sportbetting. OM has received grants from Svenska Spel's independent research council for projects on internet-delivered treatments for gambling disorder and psychiatric comorbidities.

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