The impact of COVID-19 on gambling-related crisis calls in Ontario, Canada: an interrupted time series analysis

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Abstract: The COVID-19 pandemic has placed major strains on programs and organizations designed to help those in crisis. It has also significantly impacted the gambling industry, with incredible shortfalls for traditional land-based gambling, and concurrent record profits in online gambling platforms. The current study explores trends in the calls to gambling crisis helplines in Ontario using interrupted time-series analyses to examine the impact of the pandemic on problem gambling. We found that gambling helpline calls decreased dramatically with the onset of the pandemic. There was also a shift in the types of games people reported playing; the decrease in calls were more pronounced for electronic gambling machines than for gambling related to sports and card games. We also found that the proportion of younger adult callers increased during this time. Taken together, the results from this study indicate a reduction in calls to the Ontario gambling helpline, as well as a shift in the types of gambling people engaged in. The effects of the pandemic on gambling behaviours should continue to be monitored to better understand how it has translated into gambling and non-gambling-related harms.

Keywords: Gambling, Ontario, Covid-19, Electronic, Time Series Analysis.

Introduction

At the time this paper was written, the world had been suffering through the most serious pandemic in a century (Taubenberger & Morens, 2006). For years, scientists have been warning politicians to prepare for such a pandemic (de Jong et al., 1997; Osterhaus & Mackenzie, 2020; Taubenberger & Morens, 2006), but with a few exceptions, governments around the world were caught unprepared as the COVID-19 pandemic rapidly upended life in unprecedented ways in countries around the world (Walker et al., 2020). In addition to catastrophic numbers of hospitalizations and deaths from the disease, the pandemic has caused major economic disruption (Walker et al., 2020). Businesses have scrambled to adapt to the situation by increasing their online presence. For example, restaurants increased their focus on takeout and curb side pick-up (Ryan, 2020) and many industries have been forced to transition online work-from-home options for employees (Mediavilla et al., 2020). In addition to substantial health burdens caused by the virus itself, the pandemic has also led to an increase in mental distress throughout most segments of the general population (Soklaridis et al., 2020; Turner, 2020; Håkansson et al., 2020b). Health care services have also shifted away from traditional in-person consultations towards greater use of digital and tele-health care (Torous et al., 2020).

In June 2020, Turner (2020) published an editorial examining how COVID-19 had affected the numbers of people calling the gambling helpline in Ontario and speculating about the impact on gamblers in general. In this paper, we accessed the helpline call data and conducted an interrupted time series analysis in order to study in more detail, how it changed as a result of the pandemic.

In Ontario, the gambling industry is largely managed by the Ontario Lottery and Gaming (2021) corporation (OLG). This government agency "conducts and manages gaming facilities, the sale of province-wide lottery games, PlayOLG internet gaming, bingo, and other electronic gaming products at Charitable Gaming Centres" (OLG, 2021). Profits generated by OLG operations are used as a form of government revenue.

The Ontario problem gambling helpline is run by ConnexOntario (2021), a non-profit organization that has been funded by Ontario's Ministry of Health and Long-Term Care since 1991. ConnexOntario runs several helplines for individuals seeking help with mental health, substance use, and problem gambling, available by phone, web-chat and email. The staff offer supportive listening, inform the callers about the resources they need from their comprehensive database, and provide callers with referrals to various services without sharing the information to the service provider or tracking if the caller contacts them. While ConnexOntario is the only province wide helpline service, many treatment centres also receive calls directly from problem gamblers. Playsmart centres in Casinos will also

provide referrals—though these were closed during most of the pandemic. The services offered by ConnexOntario have not changed during the pandemic.

Gambling Online

In-person gambling venues have been closed, or open with limited access in many jurisdictions as a result of the pandemic. In Ontario, these shutdowns were mandated by federal and provincial restrictions. While access to live gambling has decreased, there is evidence indicating a spike in online gambling at the same time (Brown & Hickman, 2020; Håkansson et al., 2020a; ResearchAndMarkets.com, 2020; The Economist, 2020), which is concerning for several reasons. First, the pandemic has been marked by substantial job loss, emotional distress, and financial instability, all of which are risk factors for developing a gambling disorder (Blaszczynski & Nower, 2002; Håkansson, et al., 2020a; Turner, 2008; Turner et al., 2018). The pandemic's detrimental effect on mental health problems in general also includes an increased likelihood of engaging in addictive behaviours (Håkansson et al., 2020a, 2020b). Emotional distress and job losses have also been observed to increase risk for gambling disorder in previous disruptive global events (Economou et al., 2019; Olason et al., 2017). Furthermore, the jobs that have been most negatively affected by the pandemic have disproportionately high representations of workers who are women and/or are from low-income, ethnic minority backgrounds (Kantamneni, 2020). This has the potential to exacerbate the vulnerabilities to gambling disorder previously observed in ethnic minorities (Caler et al., 2017; Petry, 2005; Raylu & Oei, 2004).

Because people were generally restricted from most activities outside the house after the onset of the pandemic, there is reason to believe this could result in a shift towards online gambling. This is particularly worrying because online gambling is associated with higher rates of problem gambling (Griffiths et al., 2009b), and high-risk gamblers are more likely to go online to gamble (Price, 2020). In a recent study of online gambling in Sweden, Auer & Griffiths (2021) found that there was a significant increase in active online gambling players during the pandemic, but also a decrease in the number of high-risk players over the same period. Similarly, another Swedish study showed that while overall gambling decreased during the pandemic, online casino gambling increased significantly (Lindner et al., 2021).

Most Canadian provinces have set up online gambling venues that are regulated and licensed to provide online gambling in Canada. But other online gambling platforms that are not regulated in Canada are also relatively easy to access. Those operated by venders from Canada such as the OLG have information available for Ontarians who experience gambling problems, but while some other platforms do provide links to help resources for problem gamblers, this is not a guarantee, and they may not be relevant for Canadians. For example, online venues from Malta (e.g.,

Royalpanda.com and Jonnyjackpot.com) have help-related information for people in the United Kingdom, but not specifically for Canada.

Gambling Revenue

Online casinos have reported dramatic increases in profit during the COVID-19 pandemic (Håkansson et al., 2020a; ResearchAndMarkets.com, 2020). In Ontario, gambling is mainly offered through in-person casinos, racetracks and bingo halls, as well as through lottery tickets. Most live venues have been shut down or had their business curtailed in some way for long periods of the pandemic. Casinos were closed in late March 2020 and remained closed for 4 months. From August to October the casinos were allowed to open, but with limits to the total number of patrons (e.g., 50 people), then closed again in November as the second and third waves of the pandemic hit.

According to the American Gaming Association (2020), gambling revenue in the US dropped sharply from $11B USD in the 4th quarter of 2019, to just over $2B USD during the 2nd quarter of 2020. However, by the 3rd quarter of 2020, revenue had rebounded to $9B USD, which the report describes as "impressive given the capacity restraints facing casino operators across the country" (American Gaming Association, 2020). Worldwide revenue for internet gambling grew from $50B USD in 2018 to $66.7B in 2020, due in part to the pandemic (CasinoBeats, 2020; World Casino Directory, 2020).

Gambling Helplines

Compared with other forms of professional support, hotlines have the highest public awareness among problem gamblers (Asharani et al., 2019; Gainsbury et al., 2014) and are the most frequently utilized resource (Rodda, et al., 2018). This is in part due to the strong promotion of helplines in comparison with other resources (Williams et al., 2007; Marotta, et al., 2014). Helplines are also commonly the point of first contact with professional help for problem gamblers (Weinstock et al., 2011; Darbeda et al., 2020). Thus, gambling helpline activity could be a particularly sensitive measure of changes in problem gambling due to the pandemic.

Research suggests that changes in gambling availability are associated with changes in calls to helplines. An examination of calls to a gambling hotline in South Carolina found that calls dropped dramatically after a ban on Electronic Gambling Machines (EGM; e.g., spinning reel slot machine games, video keno, video poker, video lottery terminals etc.) in 2000, and this lower rate of calls was maintained thereafter (Williams et al., 2007). Similar patterns were observed after Norway enacted a similar EGM ban in 2008. In 2007, 253 callers to a Norwegian gambling helpline reported EGMs as the form of gambling that caused their problems, and after the ban the following year, this number dropped to 10. All other forms of gambling showed a comparatively modest increase of 180 to 244 combined over the same time period (Rossow & Hansen, 2016). Where legal, sports betting is also a common form of gambling for helpline callers. A study in France

from 2011 to 2015, found that 40% of callers to their national gambling helpline sought help for sports or horserace betting (Darbeda et al., 2020)

Study Objectives

The purpose of the current research was to examine changes in the number of calls to a problem gambling helpline during the COVID-19 pandemic. Specifically, we attempted to determine how the dramatic changes in gambling availability observed during the pandemic corresponds with the trends of call activity to Ontario's problem gambling helpline, as a proxy for problem gambling prevalence. We examined the data as an interrupted time series analysis using a segmented regression approach (Moineddin, 2020; Naimer et al., 2017) to determine whether there were significant differences in the number of helpline callers before and during casino closures associated with the pandemic in Ontario. We also examined additional information about the calls to explore changes in the characteristics of the callers and/or the types of gambling they engaging in.

Method

Data

Gambling helpline data for calls from March 2016 to the end of March 2021 were provided by ConnexOntario for analysis. To isolate the effect of the pandemic, we examined differences in trends before and after April 1 2020. In addition to the data for total monthly calls to the helpline for problem gambling, we requested data on calls broken down by age group (<25, 25-54, and 55+), gender, and game type.

It is important to note that a referral to ConnexOntario is defined as the provision of information to the caller and is not a clinical referral. The calls are confidential, so no information about the callers was disclosed.

Measures

The primary variable of interest was the number of calls related to gambling during the study time period. Callers also indicated the type of gambling with which they were having issues. These included Electronic Gaming Machines (EGMs) such as slot machines, video poker, video keno, and video lottery terminals, lotteries such as scratch tickets and large draws, card games such as poker and blackjack, sports betting, and "other" which included stocks, racing, and bingo. The data did not record if these games were played in a casino or online.

The analysis of interest was the amount of gambling on EGMs compared to the amount of gambling on sports and card games such as poker. For in-person gambling, the majority of revenue comes from EGMs (Turner, 2011). In contrast, recent estimates for online gambling have found that sports betting and online poker account for about 47% and 35% of online gambling revenue, respectively (Business Research Company, 2020). This means that poker and sports betting combine to account for more than 80% of the online gambling market. Although EGM type games

such as spinning reel slot machines type games, and video poker are available online, most online gamblers seek out sports and card games rather than EGM type games. We therefore contrasted EGM gambling with online gambling for sports and cards in this study.

Statistical Analysis

We used interrupted time series analyses (ITSA) to assess the changes in call trends before and after the onset of the pandemic. In particular, we used a segmented regression analysis (Moineddin, 2020; Naimer et al., 2017) to measure changes in the slope prior to the pandemic, at the point of the initial lockdown, and subsequent to the initial lockdown. ITSA models have been widely used to evaluate the effect of public health policies (Bernal et al, 2017), and this quasi-experimental design is ideally suited to assess the impact of the pandemic on gambling-related crisis calls. We identified the first month after the royal assent of Canada's federal *COVID-19 Emergency Response Act* (March 25, 2020) as the beginning of the pandemic in our modelling. The full data for gambling-related calls ranged from the beginning of March 2016 to the end of March 2021.

To test whether the time series was stationary, the Dickey-Fuller test was conducted to assess the presence of a unit-root (Dickey-Fuller, 1979). The results of this test were significant, $z = -2.73$, $p < .01$, meaning that we rejected the null of a unit root, suggesting that the time series is stationary and does not require differencing.

An analysis of the correlated error terms revealed that autocorrelations dropped to non-significant after a lag of 2, and the partial autocorrelation for lag 2 was not significant after controlling for lag 1. The 12-month lag autocorrelation was not significant, $r = -.06$, indicating no seasonality. Because the errors followed an AR(1) process, the ITSA models were fit using the Prais method (Linden, 2015). These generalized least squares models are estimated using robust standard errors and remove the first order autocorrelation, allowing for an examination of the intercept (starting level), pre-pandemic slope, post-pandemic slope, and the difference between the slopes (the treatment effect; Linden, 2015). The Durbin-Watson test was used to evaluate how well the Prais model corrected for first-order autocorrelation. All ITSA time series analyses were performed using the ITSA add-on package in Stata (Linden, 2015; Linden 2017).

Results

In total 20,841 calls were made to the helpline between March 2016 and March 2021; 17,405 prior to the pandemic (up to March 2020), and 3,436 during (April 2020 to March 2021). Of these, 20,542 gave their age category and 20,635 provided gender identification (7,203 females, 13,425 males, 7 gender fluid). Only 6,804 reported the type of games they played, so these statistics should be treated cautiously. Test of proportions was computed using an online *z*-test calculator (**Note**).

Figure 1 shows the results from the ITSA predicting gambling-related crisis calls before and after the pandemic. Prior to the pandemic there was a slight general trend of increasing calls to the helpline, but a very sharp drop in calls after the onset of the pandemic and the associated lockdowns. Subsequently, calls gradually increased again from May 2020 to March 2021. Casinos were partially re-opened from August to October of 2020 with a very limited capacity (maximum 50 people) and then closed again in response to a new wave of COVID-19 cases. Nonetheless, the number of calls continued to rise at this point, unlike with the initial lockdowns.

The fitted trend in gambling-related crisis calls prior to the pandemic shows a significant increase in calls prior to the pandemic, $b = 2.37$, $p < .001$. Then, in April and May of 2020, helpline calls were down by about 50% compared to previous months. The difference in slopes following the beginning of the pandemic indicates a significantly decreased number of calls, $b = -173.79$, $p < .001$. Following this exogenous shock of the pandemic, the fitted trend for gambling calls became significantly positive again, $b = 8.09$, $p < .05$. The Durbin-Watson d statistic was 1.92, meaning that the first-order autocorrelation (AR1) term adequately corrected for problems of autocorrelation. Note that the predicted line in these graphs is the best fit for the regression model of the data. Table 1 gives the details of the regression model related to Figures 1 and 2.

Figure 1

Interrupted Time Series Analysis Predicting Calls to the ConnextOntario Helpline for Gambling, May 2018 to October 2020
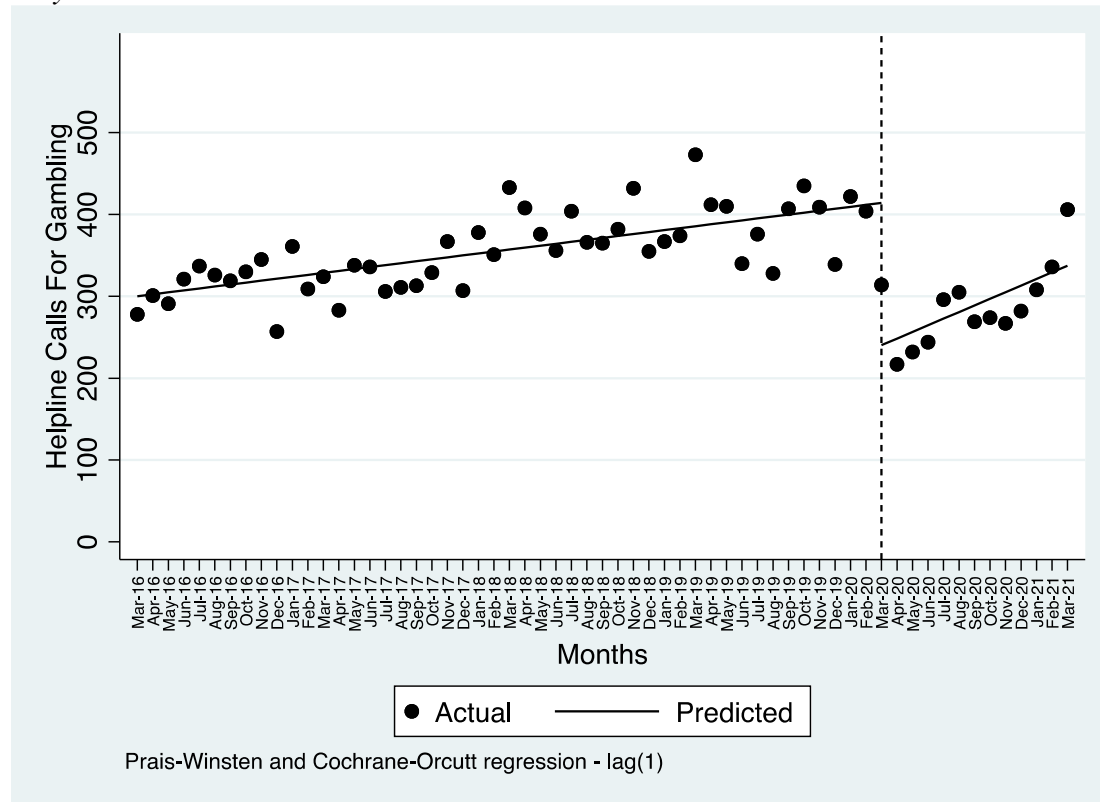
Table 1

Interrupted Time Series Regression Predicting Monthly Gambling-Related Calls to ConnexOntario, Pre- and Post-Pandemic

	Gambling-Related Calls		EGM Calls		Sports and cards related Calls	
	Coef	SE	Coef	SE	Coef	SE
Pre-COVID-19 trend	2.37***	.354	-.41***	.077	-.210*	.087
Intervention effect (COVID-19)	-173.79***	29.13	-35.94***	6.04	-14.50**	4.25
Post-COVID-19 trend	8.09*	3.86	-0.59	.67	.22	.395
Durbin-Watson d statistic	1.92		2.0		1.99	

Notes. models were estimated using Prais-Winston AR(1) regression models; semi-robust standard errors; *$p < .05$, **$p < .01$, ***$p < .001$.

Next, we compared the trends before and during the pandemic by the type of gambling activity reported by the helpline callers. To simplify, we grouped the gambling-related calls into those related to EGMs (including slots machines and VLTS) and those related to any sports and card games. Figure 2 displays the results of the ITSA analysis, which indicated that calls for EGM gambling (the solid line) were the most frequent type of gambling reported by callers before the pandemic. There was also a small but statistically significant downward trend in calls related to both EGM, b = -.14, p < .001 and non-EGM gambling (e.g., sports/cards), p = -.21, p < .05.

After the initial pandemic lockdown, total calls dramatically dropped as mentioned above, so both calls about EGMs and those related to cards or sports followed suit. The decrease was stronger for EGM gambling problems (b = -35.94, p < .001) than for non-EGM (sports and cards) gambling (b = -14.50, p < .01), indicated by the dashed line in Figure 2. Each of the months following the pandemic saw more calls to ConnexOntario for sports and cards gambling than for EGM gambling. The direction of the post-pandemic slope was positive for sports and cards-related calls and negative for EGM-related calls, although neither trend was statistically significant.

Figure 2

Interrupted Time Series Analysis Predicting Helpline Calls for EGM and non-EGM Gambling (Sports/Cards)

Prais-Winsten and Cochrane-Orcutt regression - lag(1)
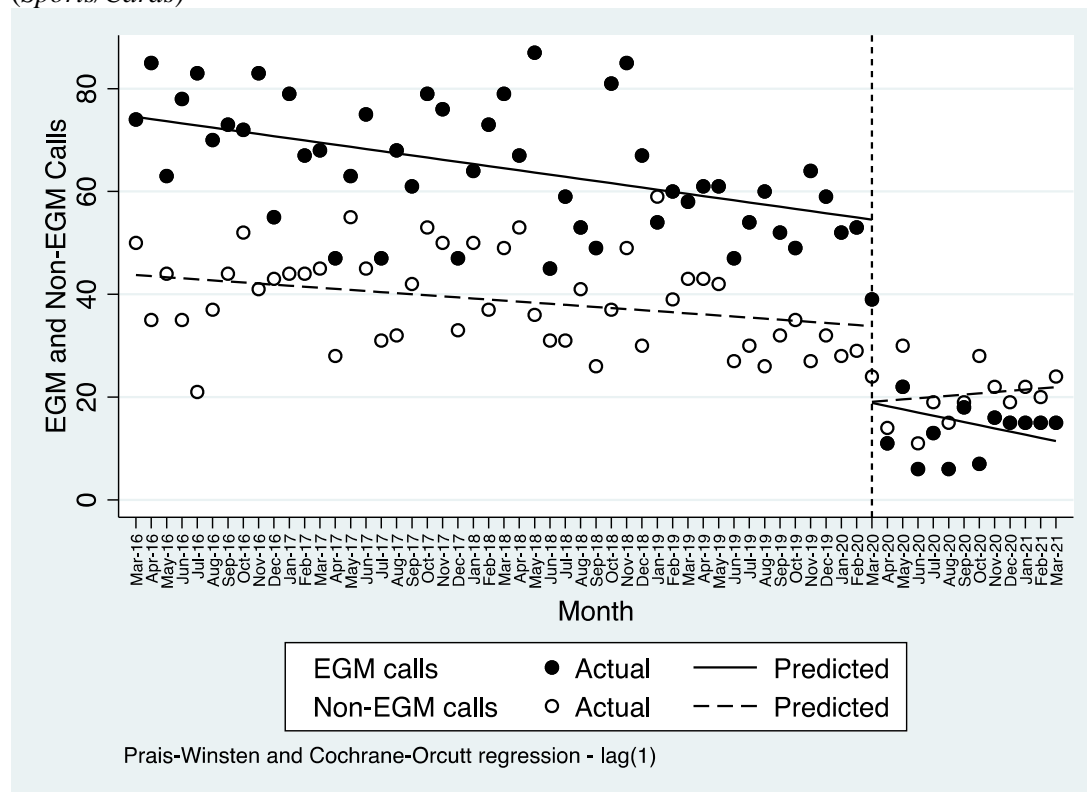
We also looked changes in the number of calls for EGMs relative to sports and card related calls. While both types decreased after the pandemic, the proportion of calls related to EGMs decreased from 50% to 29%, $z = 5.2$, $p < .001$, while the proportion of sports and card game related calls increased from 30% to 45%, $z = -4.7$, $p < .001$.

We also examined changes in the proportions of callers according to gender and age. For gender, the proportion of male callers increased slightly from 61% to 64%, $z = -3.3$, $p < .001$. For age, as shown in Figure 3 the relative number of callers between age 26 and 34 increased from 20% to 28%, $z = -4.4$, $p < .001$ (alpha corrected for multiple comparisons), while those between 55 and 64 decreased from 10.2% to 8.7%, $z = 3.1$, $p < .05$, and those over 65 decreased from 7.8% to 5.4%, $z = 5.4$, $p < .001$. The proportions of callers from other age groups did not change significantly.

Figure 3
Changes in Ages of Callers to the ConnexOntario Problem Gambling Helpline before and During the pandemic
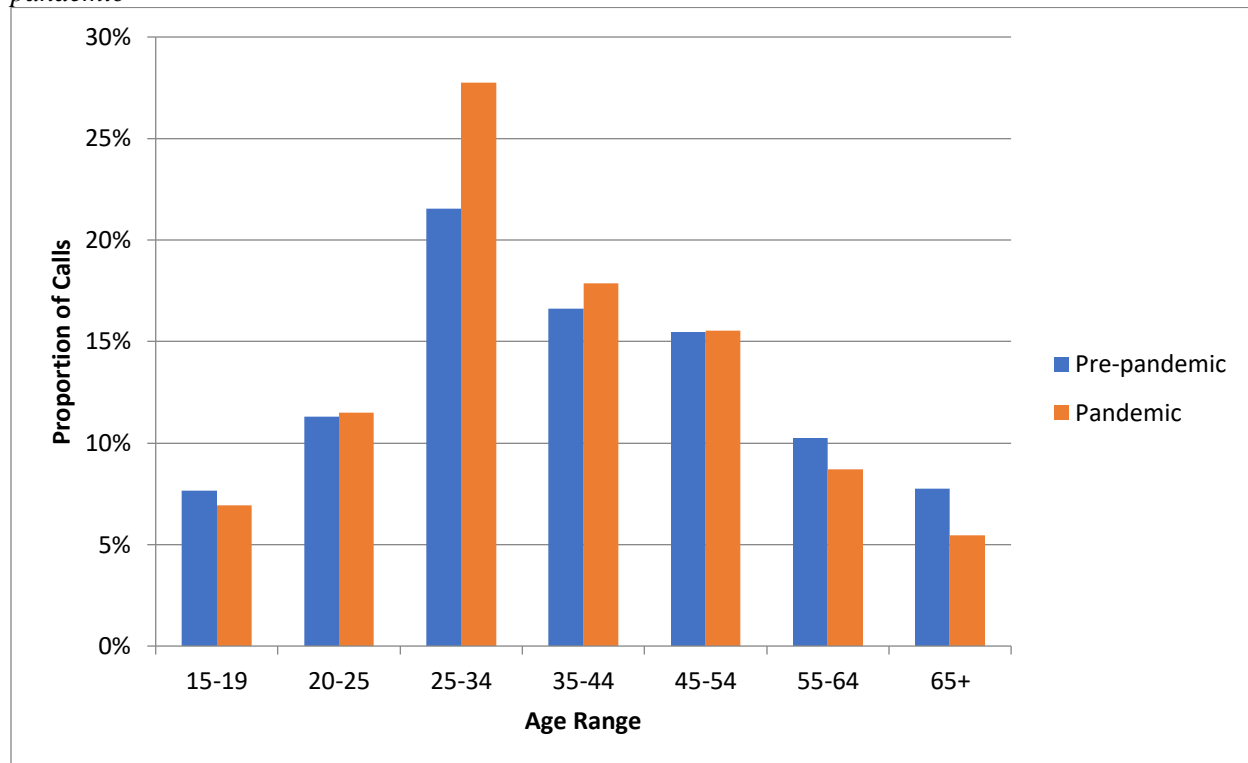
Discussion

The purpose of this research was to examine changes in the number of gambling helpline calls to ConnexOntario as a result of the pandemic as an indicator of problem gambling prevalence. The analyses presented indicate a number of interesting findings about the effect of the pandemic on gambling-related harms. First, the initial reaction to the pandemic led to

a dramatic reduction in the number of people who called the helpline for problems related to gambling. We also observed that the relative number of callers who mentioned EGM type decreased, while calls related to problems with cards and sports gambling were not as strongly impacted as EGM related calls. These findings are consistent with past research on helplines that have noted significant declines in calls related to EGM use after accessibility was drastically reduced (Rossow & Hansen, 2016; Williams et al., 2007).

There was also a small increase in the proportion of male callers, and callers between age 25 and 34, with a corollary decrease in callers age 55 and over. The results for game type and the changes in gender and age distributions are both consistent with a shift from legacy in-person gambling venues such as casinos, to online gambling platforms. However, the data used are indirect proxy measures given that the helpline does not ask about online gambling problems directly. Other studies on gambling participation during the COVID-19 pandemic have noted similar decline patterns overall (Lindner et al., 2020), but a relative increase in online casino play (Auer & Griffiths, 2021; Håkansson, 2020; Lindner et al., 2020). Both of these findings reflect the importance of gambling availability to the prevalence of gambling-related harm.

There are two competing hypotheses about the relationship between gambling availability and gambling disorder. The "access hypothesis" (Storer et al, 2009; Welte et al. 2015) posits that gambling disorder prevalence increases with more access to legal gambling, whereas the "adaptation hypothesis" (Abbott, 2017; Black et al. 2012; LaPlante & Shaffer, 2007) argues that while there may be immediate changes in gambling disorder prevalence when availability changes, this tends to even out over time as the population responds to those changes. The dramatic decrease in availability of legal gambling during the pandemic offers a unique opportunity to evaluate this question in the context of decreased access—the inverse of the typical examples. The current data has thus far been compatible with both hypotheses, as both propose at least initial changes in problems with changes in availability. It will be important to continue to monitor these changes going forward to better understand how lockdown restrictions will affect problem gambling in the future, especially as we come out of this pandemic and return to normal. Depending on the length of casino closures in Ontario, it may be possible to observe whether decreases in gambling availability resulted in less harm overall, or whether there were increases in problems related to forms of gambling that remained available, such as online platforms.

The current findings indicate that reduced availability initially resulted in fewer people experiencing crises related to problem gambling in Ontario. However, as time has passed, there also appears to have been a rebound in calls to the helpline, suggesting that this may have only been temporary, as suggested by the adaptation hypothesis. There is also some evidence of a shift towards online gambling, but this shift seems to have

been gradual. Because many people, especially older gamblers, appear to have stopped gambling during the pandemic, such situations would appear to be an opportune time to help people who have gambling problems regain control of their lives, though this opportunity may be brief.

Although the number of calls to the gambling helpline initially dropped at the start of the pandemic, this number subsequently rebounded. Given that helpline services are one of the first access points for help, greater emphasis should be placed on supporting the participant's motivation for change, and their need for autonomy in particular (Ryan & Deci, 2000). Helpline services and resources should therefore be expanded to support the development of autonomy and competence for individuals attempting to limit or reduce their gambling (Rodda, et al., 2018).

Limitations

There were several limitations in this study related to the information included in the helpline data. First. the results should be interpreted with caution because we only had access to monthly data. Daily or weekly data would have likely increased the statistical power of the analyses and enabled us to detect significant monthly patterns that could not be captured by the current study.

Another limitation is because the helpline is anonymous, one person could call several times, making it possible that the number of unique individual callers is exaggerated. However, this was also true before the pandemic and thus would not affect the conclusions drawn in this paper.

Previous studies have found that only a fraction of those experiencing problems with gambling end up contacting help services and do so as a last resort, even though early interventions would be more effective (see e.g., Slutske 2006; Petry et al., 2017). As note helpline calls are an indirect proxy measure of problem, and it is possible that the prevalence of actual gambling problems may not be accurately reflected in calls for problem gambling. Nonetheless, higher public awareness of helplines and their popularity as a point of first contact with professional help (Gainsbury et al., 2014; Weinstock et al., 2011; Williams et al., 2007) means that helpline data is likely the best indicator of short-term changes in gambling-related crises in the general population.

Finally, the information provided by the helpline was incomplete. While most of the callers provided their age and gender, only some reported the specific game types played, and online versus live gambling was not specifically recorded. Furthermore, the effects of the pandemic are still ongoing, and its impacts on gambling and gambling-related harms is evolving. While our initial analysis found no evidence of a return to pre-pandemic levels in the helpline calls (Turner, 2000), the current data now suggests that the monthly calls have returned to their pre-pandemic levels despite continued restrictions. We will continue to monitor this data to gauge the full impact of the pandemic, which will become more apparent as time passes.

Conclusion

The initial drop in calls to the helpline suggests that the pandemic led to an immediate and significant decrease in the number of people experiencing crises related to gambling problems. The pandemic also appears to have resulted in a shift away from EGMs towards sports and cards, as well as changes in the age and gender distribution of helpline callers——which may be related to a shift from in-person gambling to online.

Although the COVID-19 pandemic has negatively affected mental health broadly (Håkansson, et al., 2020a; Soklaridis, et al., 2020), this has not translated into more problem gambling-related calls to the helpline. When this paper was written, the only regulated online gambling in Ontario was through the Ontario Lottery and Gaming website. Other online gambling websites were not regulated and may not have provided help resources for people who run into trouble gambling (see Turner, 2020). Several months after this study was conducted, Ontario legalized a number of online gambling providers. These regulated online gambling venues do provide help information specific to people in Ontario. We will continue to monitor how this interruption in gambling availability, the subsequent shift towards online gambling, and the recent legalization of online gambling in Ontario, might alter the gambling scene in Ontario in the future, and to ensure the availability of appropriate help resources on online gambling sites, especially those not based in Canada.

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Declaration of conflict of interest

The authors declare that they have no conflict of interest. In the past three years Dr. Turner has received funding from the Ontario Ministry of Health and Long-Term Care, and Gambling Research Exchange (GREO). In all cases, the contract included guarantees of independence and intellectual property rights for the researcher and the funders made no attempt to influence the study at any point. Turner has also acted as a consultant on gambling problems for various government and legal entities, reviewed grant applications and articles for publication, and developed treatment and prevention materials for problem gambling.

Availability of data and material

The data used in this study is publicly available from the ConnexOntario. Go to the following web site for more information about contacting their administration https://www.connexontario.ca/contact-us

Author's contributions

NT conceived of the idea for the study, conducted the literature review, obtained the data, wrote the first draft, and conducted some of the analyses. SC conducted the bulk of the time series analyses. MvdM added to the literature review and conducted some additional analyses. The three authors compared the outcomes of different approaches, worked together on the interpretation of the data, and wrote the final paper together.

Ethics and informed consent

An ethics review is not required because the data used in this study is anonymous and publicly available.

Note: https://www.socscistatistics.com/tests/ztest/default2.aspx

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