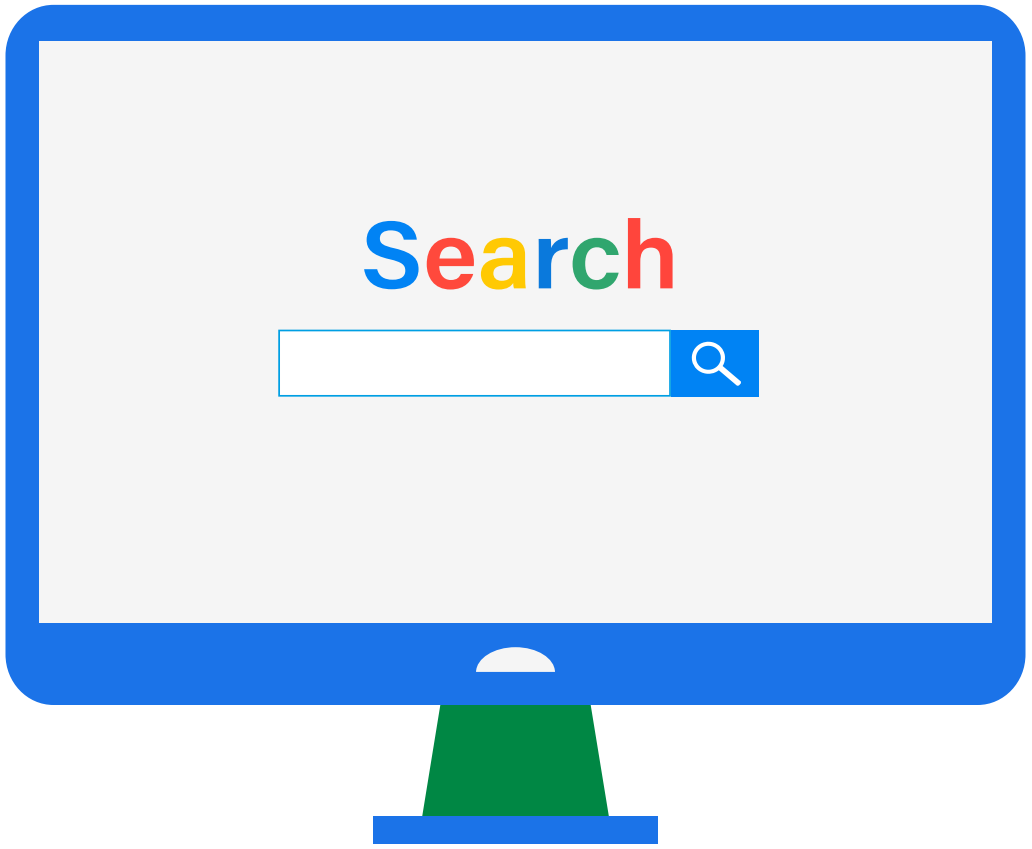

Exploring the Mindset of Problem Gamblers: A Google Trends Analysis of Search Query Data

National Conference on Gambling Addiction and Responsible Gambling 2024

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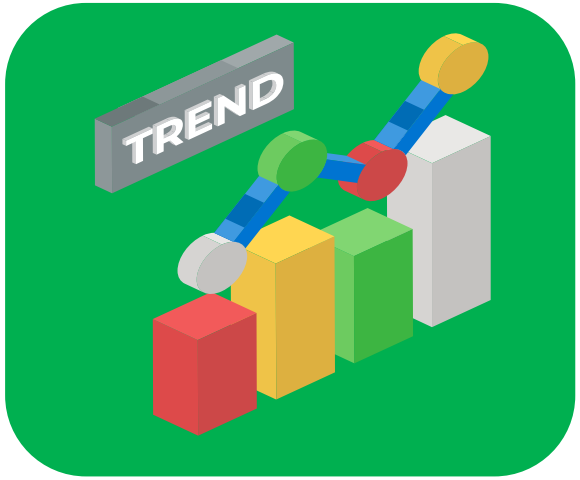
Presentation Objectives



- Provide an overview of Google Trends.
- Provide an example of Google Trends data used in the health sciences.
- Discuss several characteristics that make Google Trends a unique and potentially valuable data source for the study of mental health issues, such as gambling disorder.

- Discuss several problem gambling use-cases for the data:
  - A near real-time problem gambling surveillance tool.
  - Evidence of the effectiveness of state-level problem gambling awareness programs.
  - A simple framework of the evolution of online problem gambling information seeking behavior.

What is Google Trends?

https://trends.google.com/trends/

- Google Trends[1] is a database of search queries submitted from 2004 to as recently as the past hour.
- The data is accessed through a web-based tool that allows users to analyze the popularity of specific search terms within a time period and geographic region.[2]
- The data is available to the public without charge.

1. Google 2024. 2. The Google Trends data is based on a sample of all of the search queries submitted.

Here is an example Google Trends search on "Flu symptoms"

Data Frame

Region: United States

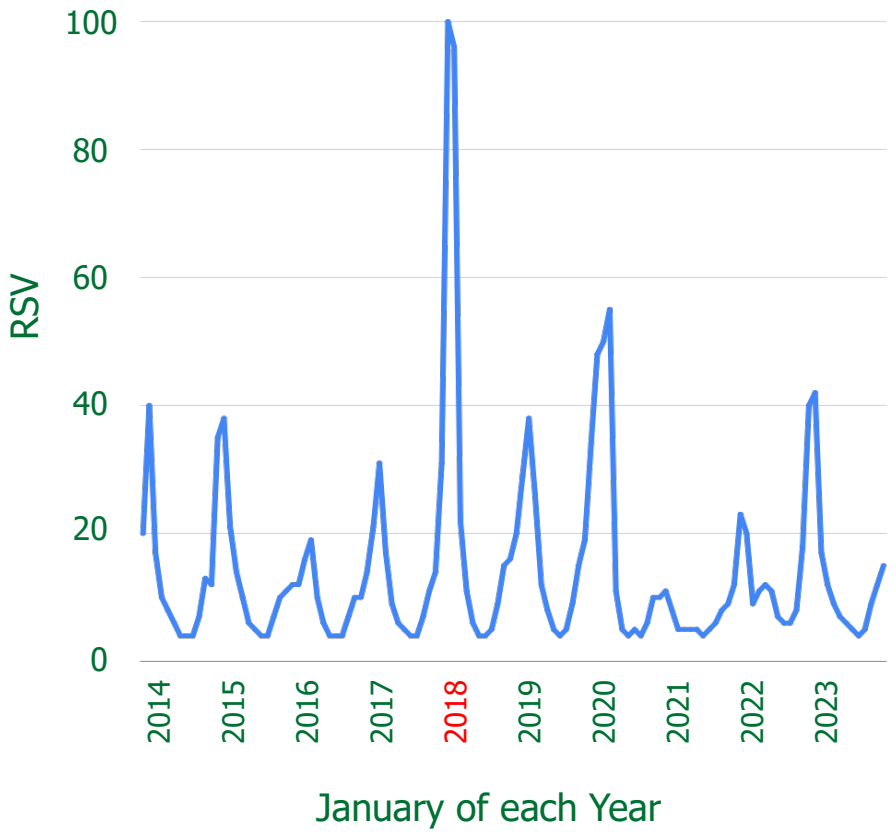
Period: 12/2013 – 11/2023

Frequency: Monthly

Search Query

Flu symptoms

Google Trends Output



Key insights

- Google Trends data is formatted as an index, called Relative Search Volume (RSV), that ranges between 0 and 100. The higher the value the more popular the search term (in relative terms).[1]
- The Google Trends data is highly correlated with the actual number of influenza cases.[2] The peaks in the data align with peaks in the flu season. The 2018-19 flu season had the highest flu-related hospitalizations and deaths in the U.S.[3] – a fact that is clearly displayed in the Google Trends data.
- The Google Trends data contains valuable insights on societal issues and trends impacting segments of the population.

1. Refer to Google, 2024 for an exact definition of RSV. 2. Ginsberg et al., 2009. 3. U.S. Census Bureau, 2022.

What makes Google Trends a unique data source for studying mental health issues, such as problem gambling?

Unfiltered opinions / Genuine reflections

Google search queries offer raw and largely unedited expressions of individuals' interests, curiosities, and concerns. As such, they are less susceptible to social desirability bias (behaving in a manner that is viewed favorably by others) that is often present in conventional survey data.[1] This is particularly relevant for gambling disorder since it is among the most stigmatized mental health problems.

Actions speak louder than words

Google search queries capture what individuals are actively searching for in real-time; the data is not based on what individuals say they would do but what they actually do (which is not always the case for surveys based on self-reported responses).

Data galore

Google search queries can be accessed as far back as 2004 and as recently as the past hour. In some cases, the data is available on an hourly, daily, or monthly frequency. The data can be aggregated to the country level and drilled down to regional areas, such as cities and other municipalities.[2]

1. Althubaiti, 2016. 2. Google Trends does not provide data if minimum sample sizes are not met.

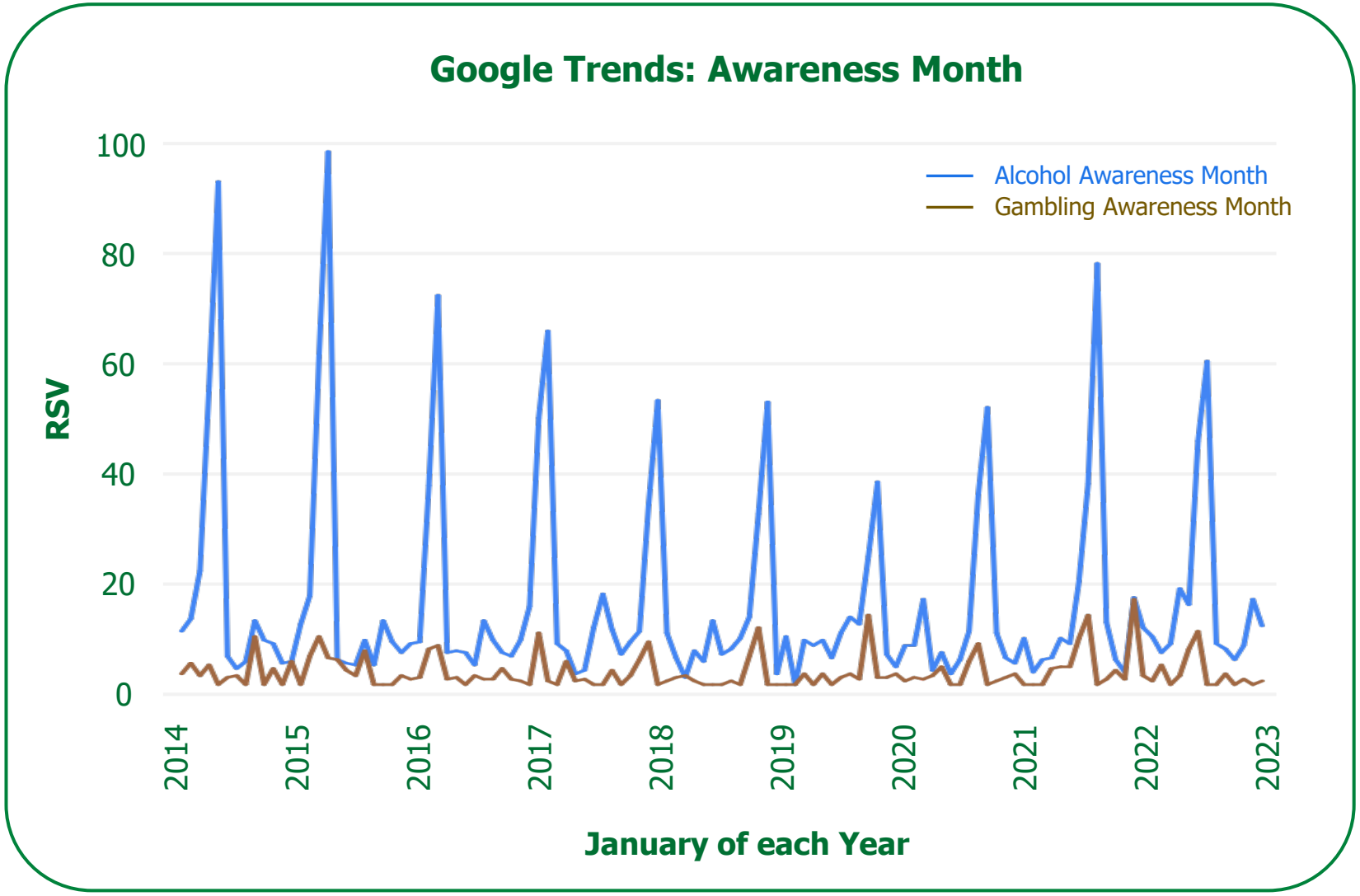
Google Trends revealed over 81 search queries related to "problem gambling"[1,2]

Data Frame

- Region: United States
- Period: 12/2013 – 11/2023
- Frequency: Monthly

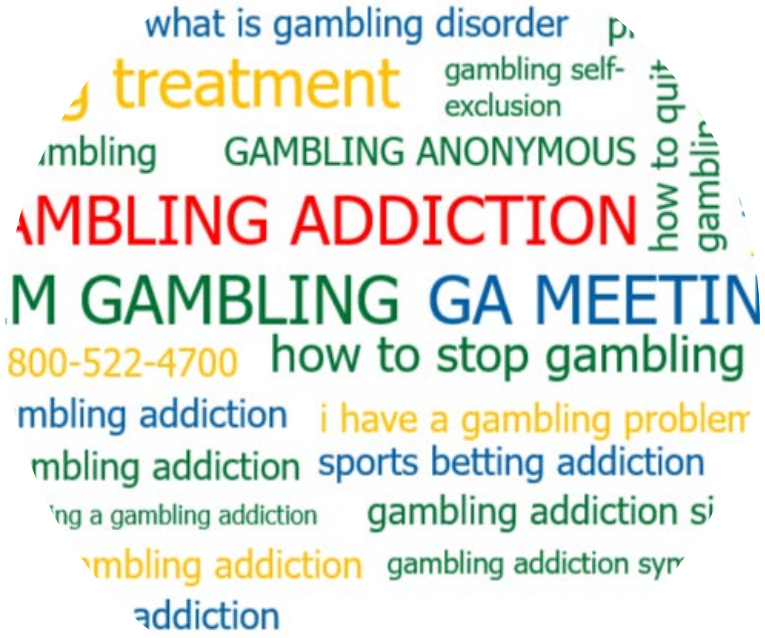
1. The size or orientation of the search terms do not exactly represent relative popularity. 2. Search queries that did not meet minimum samples sizes are not shown.

Google searches on *Gambling Awareness Month* is significantly smaller than on *Alcohol Awareness Month*



- As a basis for comparison, relative searches on *Alcohol Awareness Month* is about 7 times larger than for *Gambling Awareness Month*.
- In both search results, the awareness month is clearly indicated (April for Alcohol and March for Gambling).

For our analyses, a subset of the most popular search queries is grouped into 3 composite search terms[1]



General PG Search

This composite search term represents the broadest definition of problem gambling information-seeking behavior. It captures searches that include the terms *Gambling Addiction*, *Problem Gambling*, *Gambling Disorder*, and *Compulsive Gambling* (without regard to word order and letter case).

Active PG Search

The label Active PG Search is motivated by the search terms that define it. This composite term includes searches such as *How to quit gambling*, *Gambling addiction help*, and *GA meetings near me*. The searches contain verbs such as stop and help that suggest (but not assert) a more action-oriented intent by individuals who are seeking direct solutions.[2]

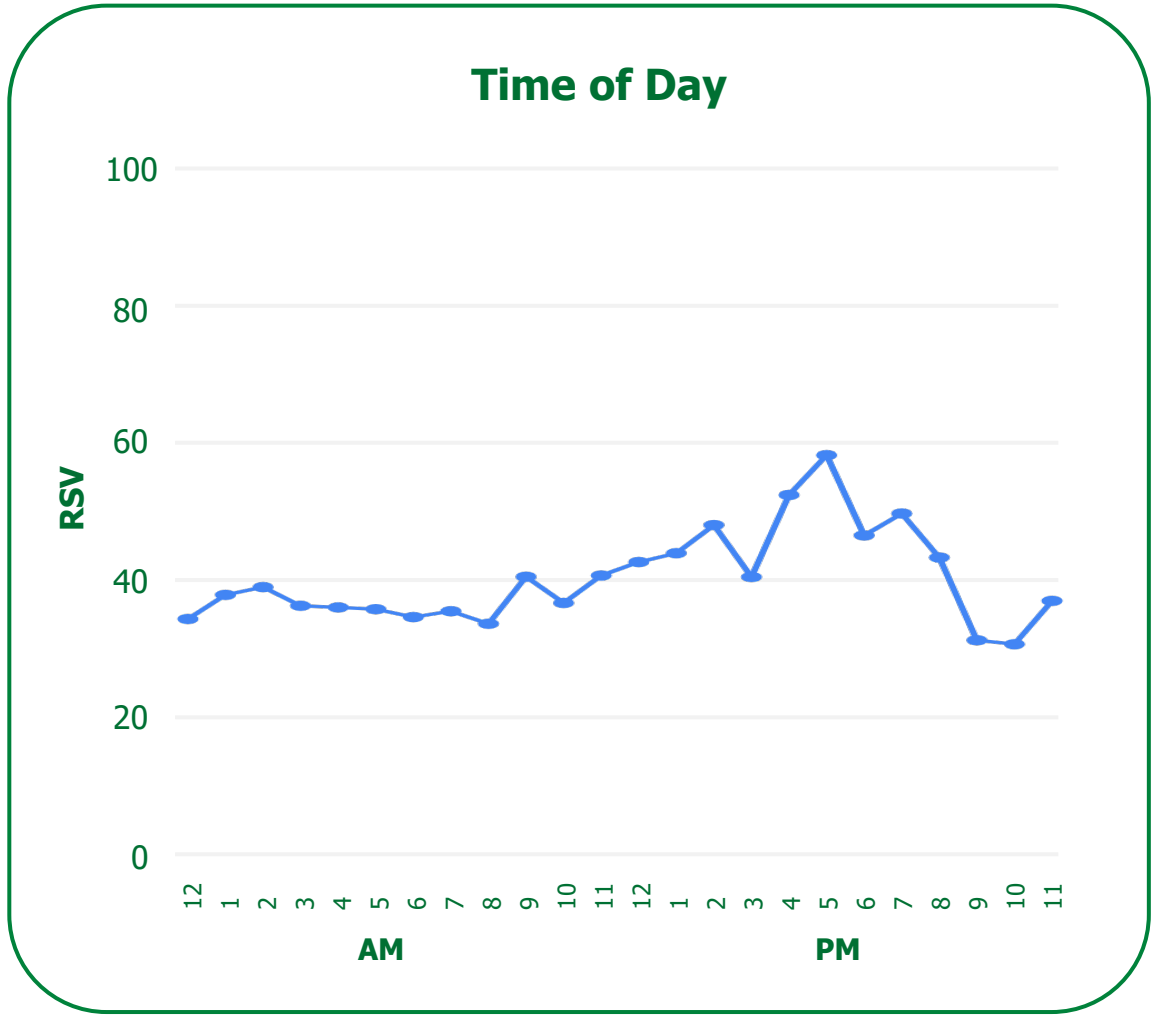
Passive PG Search

The label Passive PG Search is also motivated by the search terms that define it. The terms used, such as *Gambling addiction signs*, *Effects of gambling*, and *I have a gambling addiction*, are more passive, diagnostic, and educational, in comparison to the search terms that define Active PG Search.

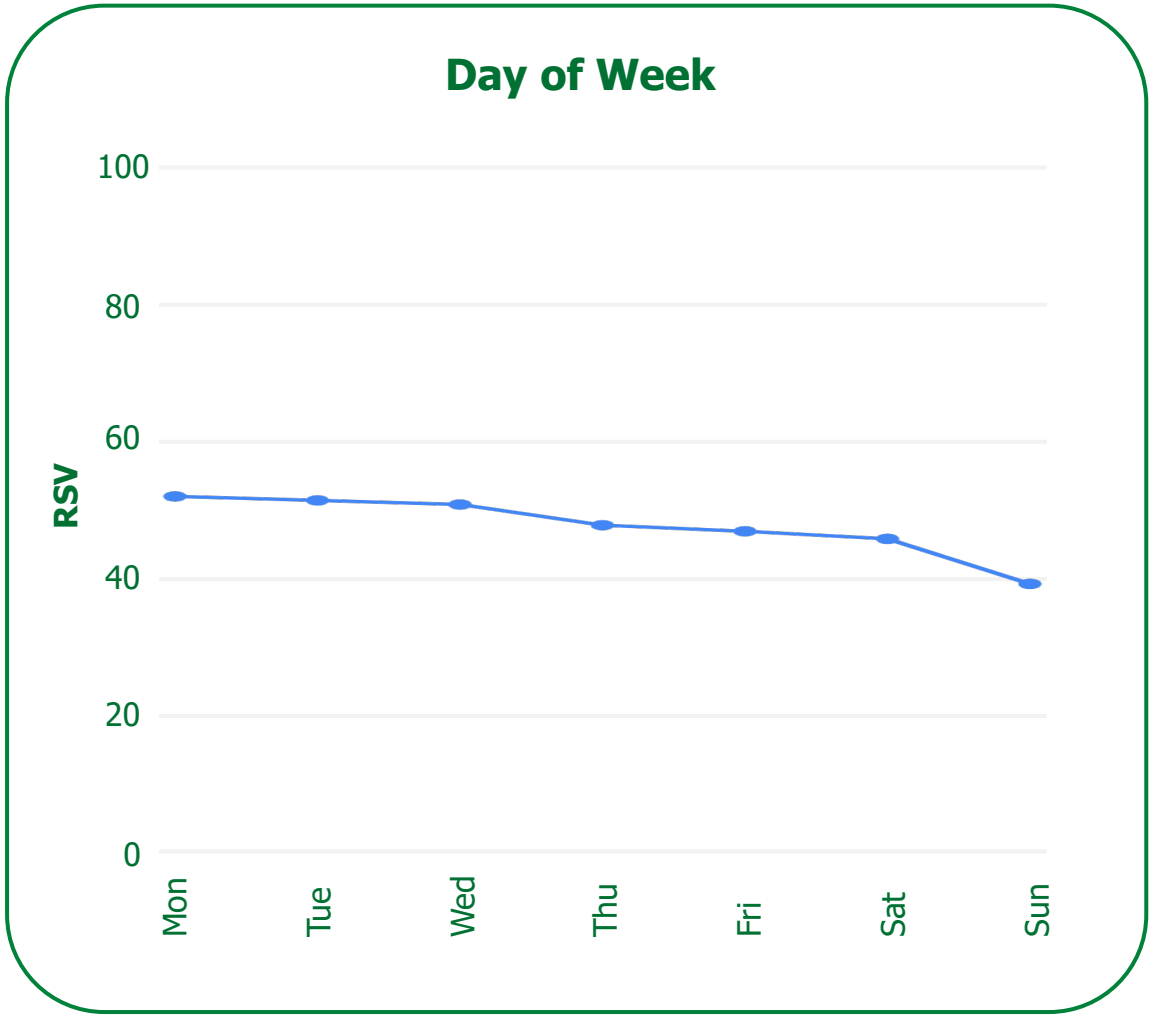
1. Refer to Yamagata et al., 2023 for rationale. 2. Google Trends does not provide any data on the context and motivations for these searches.

Most common periods of General PG Search behavior

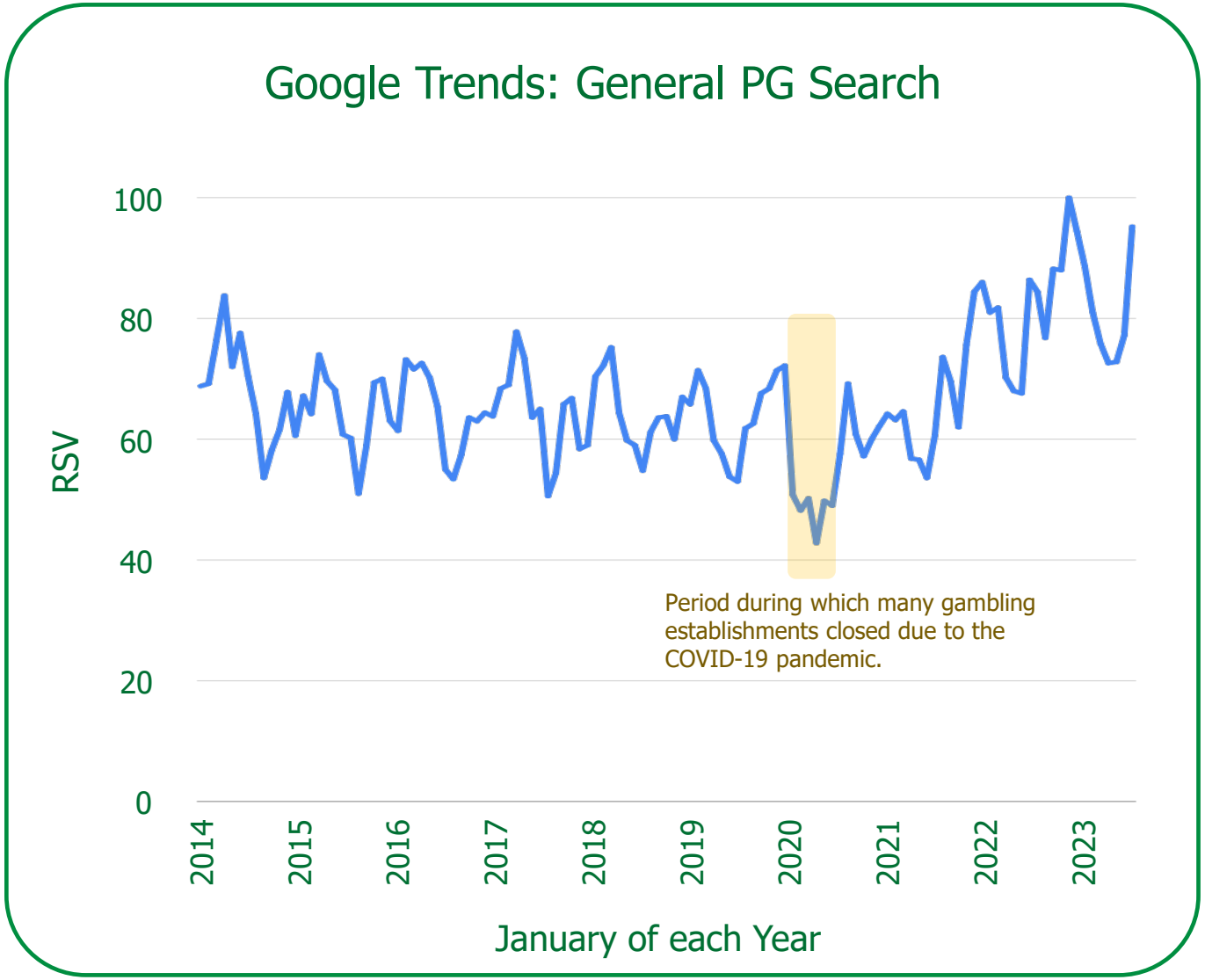
General PG Search peaks in early evening (5pm)



General PG Search is most common Mon - Wed



What does General PG Search look like over the last 10 years?

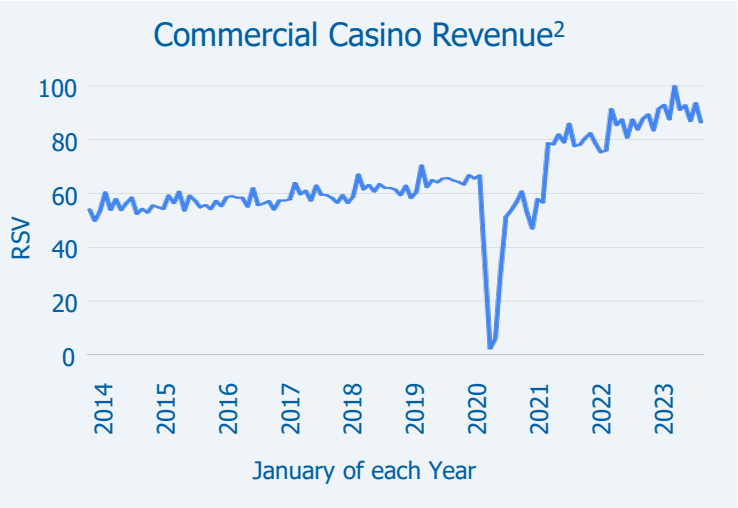


Key Insights

- General PG Search activities have a strong one-year cyclical component, with peaks in March and April and troughs in August and September. This behavior aligns with key periods in the sports calendars of professional and collegiate football and basketball, the two sports that generate the most wagering.[1,2]
- Prior to 2020, the level of search activities was stable, with an average RSV of 65. During the peak of the COVID-19 pandemic (when most commercial gambling establishments closed down) it reaches a minimum value of 43, and then proceeds to trend upwards afterwards.
- The trend upwards represents a statistically significant break[3] in the data series, indicating a substantive change in General PG Search behavior.
- The patterns in the data are not random, meaning the search data is not driven by idiosyncratic searches on problem gambling, infrequent news articles that direct attentions towards gambling disorder, and other arbitrary factors.

1. Walsh, 2023. 2. Both Fantasy Sports activities and sports wagering exhibit these periodic cycles. 3. p-value < .01.

General PG Search is strongly correlated with wagering on gambling activities and an index of Google Trends Fantasy Sports Apps Activities[1]



.67 correlation with General PG Search*

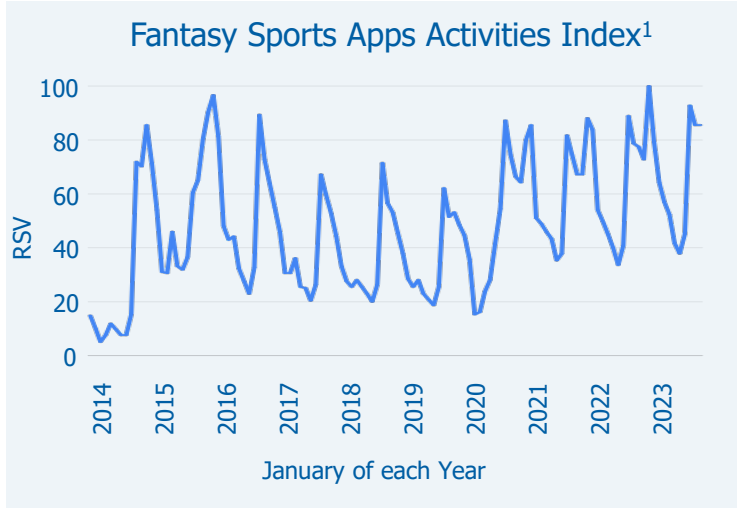
Key Insights

Commercial Casino Revenue exhibits the same steep decline and upward trend as General PG Search.

.66 correlation with General PG Search*

Key Insights

Sports Wagering Handle exhibits similar periodic waves as General PG Search and has a similar strong upward trend.



.22 correlation with General PG Search*

Key Insights

Fantasy Sports Apps GT activities exhibits the strong periodic waves over the entire time period.

The strong correlations of General PG Search with these gambling-related variables provide one possible narrative of the data: increases in gambling spend and Fantasy Sports activities are associated with a rise in gambling-related problems, prompting some individuals to turn to the Internet for information on problem gambling. Thus, similar to how Google Trends flu-related searches were used to predict actual levels of rates of influenza,[4] General PG Search has the potential to be a population-based indicator of levels of problem gambling.

* Statistical tests are not computed because the data are non-stationary. However, the correlation coefficients are provided for illustrative purposes.

1. Fantasy Sport Wagering data was unavailable over the period covered, so DraftKings and Fan Duel Apps Google Searches were used as a proxy. 2. UNLV Center for Gaming Research. 3. https://www.legalsportsreport.com/sports-betting/revenue. 4. Ginsberg et al., 2009.

70% of General PG Search activity can be explained by these gambling-related variables and several seasonality indicators.

General PG Search Model[1]

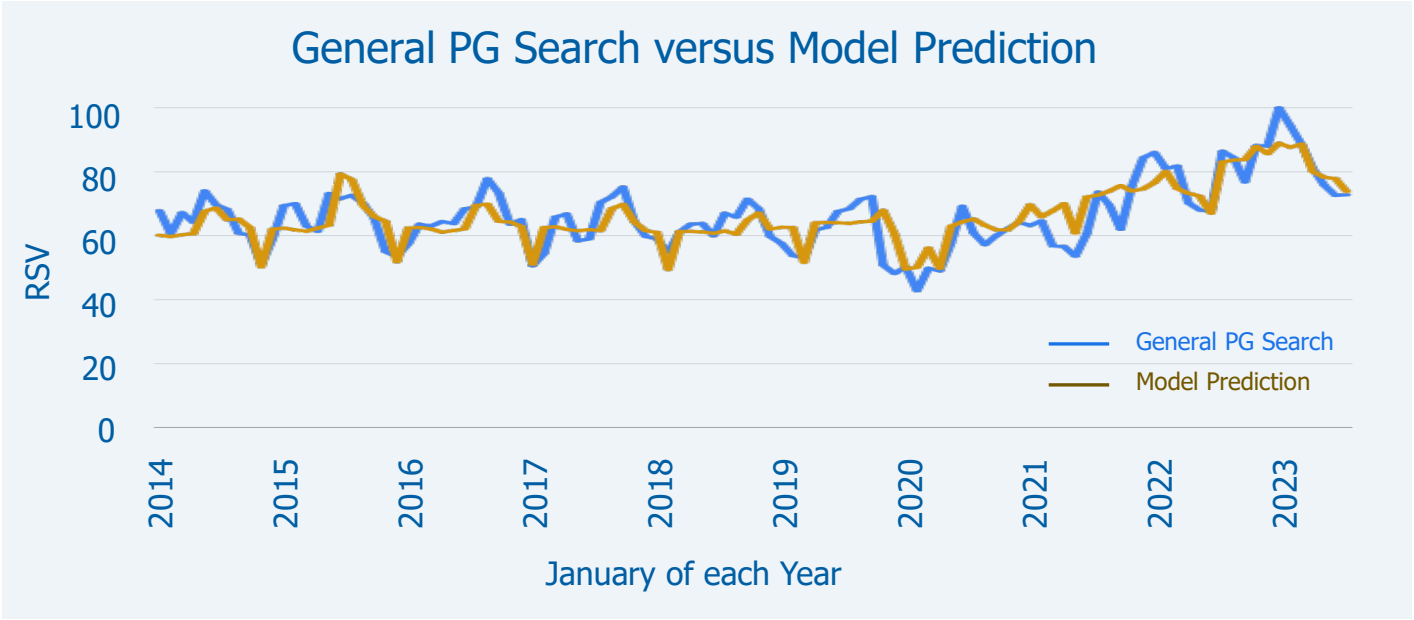
- Linear regression model
- All variables are statistically significant, with p-values < .05.
- R-squared is .70.

Gambling variables[2]

- Commercial casino revenues
- Sports wagering handle
- Fantasy Sports Apps Index

Seasonality Indicators

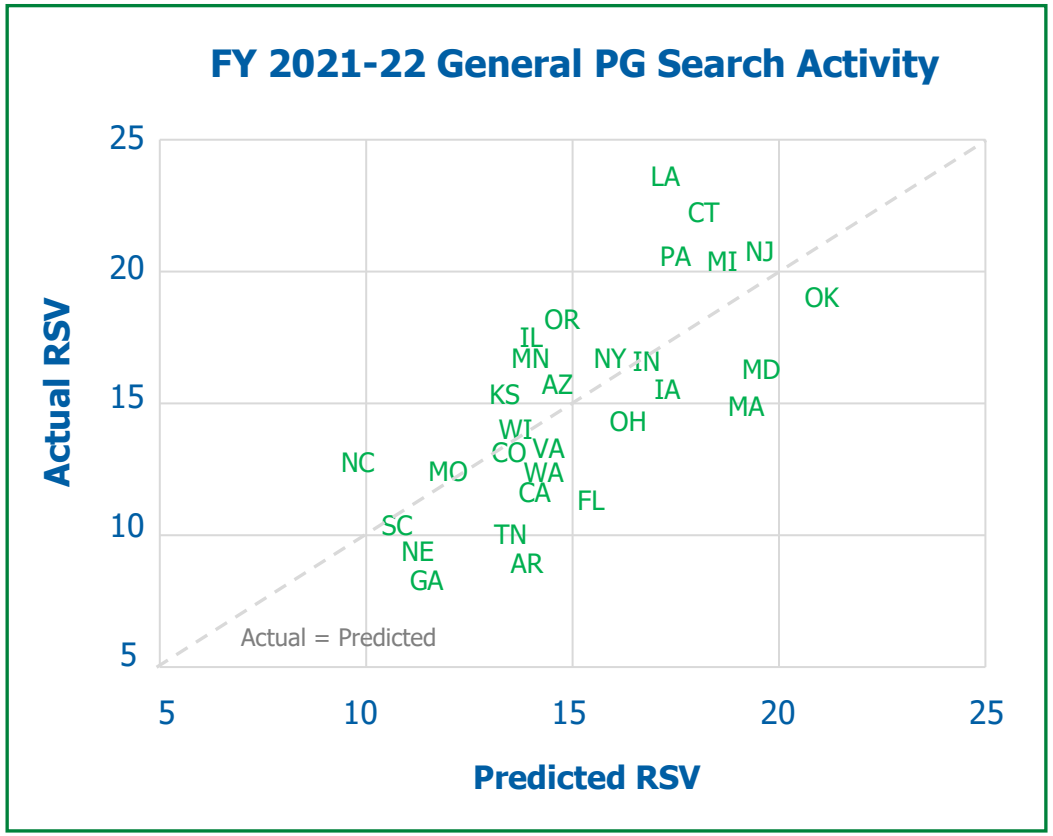
- March & April
- August



- The results of the model indicate that gambling-related spend and Fantasy Sports activities, as well as time-of-year indicators, collectively explain almost three quarters of General PG Search behavior.
- This is a strong result because it indicates that the relationship between these variables has consistently held over a ten-year period during which there has been significant changes in the U.S. gambling landscape (e.g., onset of widespread sports betting, online gambling, etc..)

1. In the paper Yamagata et al., 2023, the model includes a Google Trends RSV 'control' variable that accounts for the overall level of search activity during the sample period and geographical area specified. Adding this variable increases the explanatory power to 75%. 2. The variables in the model are lagged to capture the time-delay that occurs between gambling activities and General PG Search behavior.

Gambling related-variables can also predict General PG Search at the state level



- FY 2021-22 levels of gambling activities, based on commercial and tribal casino revenues and lottery sales, can also predict state-level General PG Search behavior.[1,2] A model using these variables can explain 43% of General PG Search activity.
- In addition, states with problem gambling public awareness programs had statistically higher relative levels of General PG Search. The result suggests that these campaigns raise the visibility of problem gambling issues, helping individuals recognize the signs and risks associated with it, leading some of them to seek more information online.

1. Marotta, J. & Yamagata, G. (2022). 2. The model also includes an indicator variable for state-sponsored problem gambling awareness campaigns.

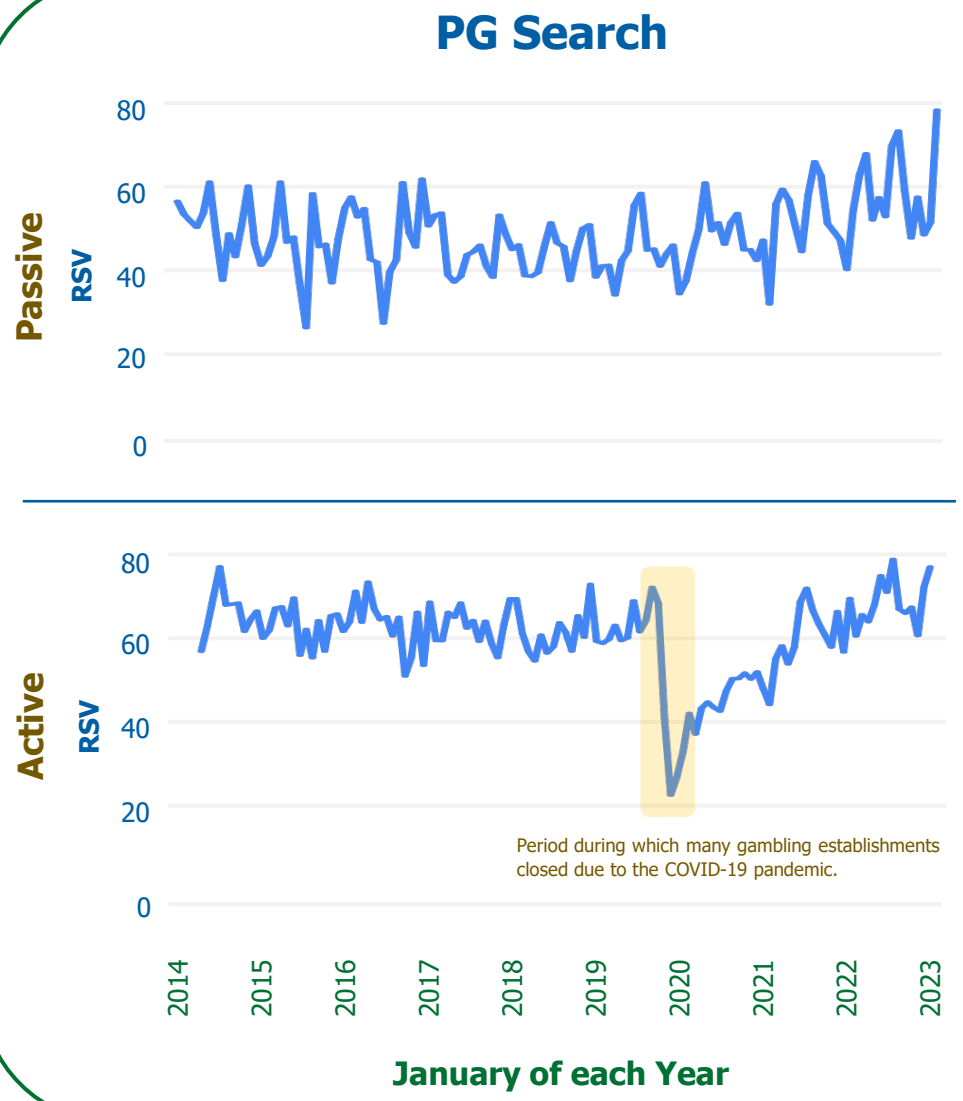
Limitations of using General PG Search Data for surveillance purposes

Google Trends data does not provide information regarding the circumstances, motivations, and specific context behind the observed search query behavior. In other words, it is not possible to definitively determine whether a user is searching topics related to problem gambling for the sake of curiosity, research, mental health, or other reasons – a distinction that renders different interpretations of the data.

Not all individuals who experience issues around their gambling turn to the Internet for information.

In some cases, relatively small sample sizes can render the results unstable.

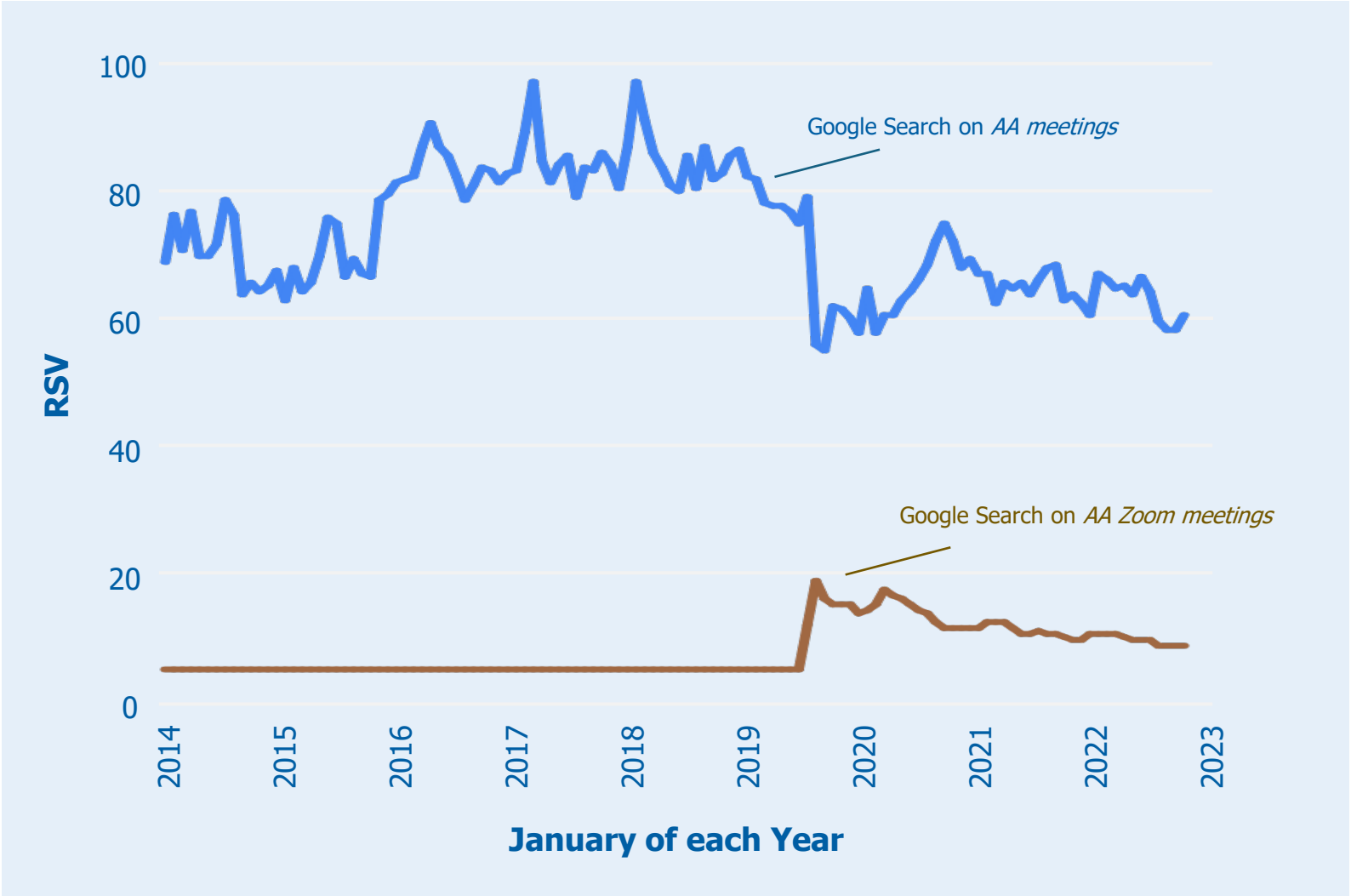
Passive and Active PG Search behaviors



- Passive and Active PG Search behaviors have names that are motivated by the contrasts in their search terms. Passive PG Search includes queries that are more diagnostic and educational (such as *Gambling Addiction Signs*) whereas Active PG Search queries contain verbs (such as *How to quit gambling* and *GA meetings near me*) that are more action-oriented.
- During the peak of the COVID-19 pandemic (in 2020) both the demand and supply of problem gambling preventative and treatment services were severely constrained.[1] This result is clearly shown as a dramatic decline in Active PG Search, not present in Passive PG Search, which is consistent with their definitions.
- There exists many theories on how individuals conduct online information-seeking behavior.[2] A simple theory is that information gathering is progressive, wherein individuals start with initial inquiries of general aspects of the topic and then progress to more action-oriented data gathering. In this context, that would imply that Passive PG Search behavior should predict Active PG Search behavior. This is indeed the case.[3]

1. Yamagata et al., 2023. 2. Lambert, 2007. 3. Passive PG Search is shown to Granger-cause Active PG Search. Refer to Yamagata et al., 2023 for details.

Google search for *AA meetings* also exhibit the stark decline during the peak of COVID-19 pandemic



- Google searches on *AA meetings* exhibit the same stark decline during the peak of the pandemic as Active PG Search behavior because they likely reflect the same decline in the demand and supply of mental health services during this period.
- The chart also displays the emergence of searches for *AA Zoom meetings* during the peak COVID-19 period. There was no corresponding emergence for *GA Zoom meetings*, likely due to small sample sizes.
- Note that following the pandemic, *AA meetings* searches did not experience an upward, sustained surge experienced by General PG Search behavior (hypothesized to be attributed to the rise in sports wagering).

1.

Summary

- Google searches on gambling-related content are statistically related to gambling activities, as proxied by casino revenues and lottery sales, suggesting that the searches may be related to individuals experiencing symptoms of gambling disorder.
- General PG Search is also positively related to the existence of state-funded problem gambling prevention and awareness campaigns. This result provides evidence that these programs reach their intended audience.
- There is evidence that the information contained in Google Trends data might be useful to researchers in the field of problem gambling.

Questions and / or Comments

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