

# Growing Health Concern Regarding Gambling Addiction in the Age of Sportsbooks

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**IMPORTANCE** The US Supreme Court decision *Murphy v National Collegiate Athletic Association* allowed states beyond Nevada to legalize sports betting, including online wagers. How sports betting has evolved and its association with gambling harms has not been studied.

**OBJECTIVE** To describe how US sports betting evolved after *Murphy v National Collegiate Athletic Association* and offer insights into the potential health effects of sportsbooks, which are platforms for wagering on sporting events.

**EXPOSURE** Enactment of (1) *Murphy v National Collegiate Athletic Association* nationally and (2) the opening of retail or online sportsbooks in states.

**DESIGN, SETTING, AND PARTICIPANTS** In this longitudinal study, aggregate US internet search trends for gambling addiction and wagers on sports were described before and after the emergence of legalized sportsbooks.

**MAIN OUTCOMES AND MEASURES** Internet searches per 10 million queries that mentioned *gambling* and *addiction*, *addict*, *anonymous*, or *hotline* (such as *gambling addiction hotline*) made to Google from January 1, 2016, through June 30, 2024.

**RESULTS** The number of states with operational sportsbooks increased from 1 during 2017 to 38 during 2024. Total sports wagers increased from \$4.9 billion during 2017 to \$121.1 billion during 2023, with 94% of wagers during 2023 being placed online. There were 23% (95% CI, 15%-30%) more searches nationally for gambling addiction help-seeking after *Murphy v National Collegiate Athletic Association*. Massachusetts (47%; 95% CI, 21%-79%), New Jersey (34%; 95% CI, 21%-45%), New York (37%; 95% CI, 26%-50%), and Pennsylvania (50%; 95% CI, 35%-66%) each had more searches than expected after the opening of any sportsbooks in their state. Additional analyses suggest the opening of online, vs retail, sportsbooks corresponded with a larger increase in searches.

**CONCLUSIONS AND RELEVANCE** The results of this time series study suggest that access to sportsbooks, sports wagers, and potential help-seeking for gambling addiction increased substantially and highlight the need to address the health implications of sportsbooks, including recognition and treatment of gambling problems and their broader societal implications.

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Before the US Supreme Court *Murphy v National Collegiate Athletic Association (NCAA)* decision on May 14, 2018, gambling in the US was confined to locations like tribal lands; Las Vegas, Nevada; and Atlantic City, New Jersey. The decision to dismantle the 1992 Professional and Amateur Sports Protection Act allowed legal sports betting across the US.

The cultural normalization and rapid commercialization of sports betting since the decision has been striking. Sportsbooks, platforms for wagering on sporting events, have been heavily integrated into mainstream media, as exemplified by the creation of ESPN BET.<sup>1</sup> Partnerships between sports leagues and sportsbooks are now commonplace, as evidenced by the alliance between the New York Jets and BetMGM.<sup>2,3</sup> Sports betting is advertised on billboards, social media, and television.<sup>4</sup> Major casino operators are rebranding to emphasize their sportsbook services, as seen with Caesars Entertainment's rebranding to Caesars Sportsbook and Casino.<sup>5</sup>

Despite the rise of sportsbooks and the recognition within the *Diagnostic and Statistical Manual of Mental Disorders* (Fifth Edition) that gambling can be an addiction,<sup>6,7</sup> research on the public health effects remains scarce.<sup>8</sup> Since the legalization of sportsbooks in 2018, only 59 studies archived by PubMed mention gambling addiction in their titles.<sup>9</sup> This inadequacy in research may stem from the exclusion of gambling-related outcomes in standard health surveillance mechanisms but may also reflect a general blind spot to gambling.<sup>10</sup> For instance, the Pan American Health Organization has disregarded gambling as a mental health risk factor altogether.<sup>11</sup> Health care professionals also lack gambling-focused training, which likely affects their understanding of the prevalence of gambling disorders and the development of resources for patients with gambling addiction.<sup>12</sup> Furthermore, because sportsbooks are regulated outside public health frameworks, data on gambling behaviors are not routinely gathered or reported by health agencies.<sup>13</sup> Consequently, as noted by the Lancet Public Health Commission, gambling is often overlooked in health research, clinical practice, and health policy development, with insufficient governmental efforts to prevent or mitigate harms.<sup>14</sup>

Our goal was to describe how sports betting in the US has evolved post *Murphy v NCAA* and offer data-driven insights into the potential public health effects of sportsbooks. Using aggregate internet search trends, which provide early detection for changes in population behavioral health,<sup>15-18</sup> we investigated the association between the rise of sportsbooks and searches for gambling addiction.

## Methods

Using American Gaming Association reporting, we described the legal status of sportsbooks, including the date sportsbooks came to market, either retail or online, in each state.<sup>19</sup> Annual trends in total sports wagers (the total amount of money staked on sports betting, both retail and online) from 2017 through 2023 were also described (eMethods in Supplement 1).

## Key Points

**Question** How has sports betting in the US evolved since the *Murphy v National Collegiate Athletic Association* decision of the US Supreme Court, and what association has this had with gambling addiction help-seeking?

**Findings** In this time series study of US states with legalized sports betting, it was found that sportsbooks (physical or online places where individuals can place wagers on the outcomes of sporting events) have expanded from a single state to 38 states, with wagers increasing from \$4.9 billion in 2017 to \$121.1 billion in 2023. Pre/post analyses revealed substantial national increases in online searches for gambling addiction after *Murphy v National Collegiate Athletic Association*, with pronounced increases in states that introduced online sportsbooks.

**Meaning** These findings emphasize the need for public health efforts to study and address the potential harms associated with the rapid growth of sports betting.

Using Google Trends, we retrieved monthly search volumes for queries originating from the US that mentioned *gambling* and *addiction*, *addict*, *anonymous*, or *hotline* (such as *gambling addiction hotline* or *am I a gambling addict?*) from January 1, 2016, through June 30, 2024. These terms were selected to capture interest in gambling addiction that may be associated with help-seeking by an affected person, their social network, or general curiosity about the subject. To enable temporal/geographic comparisons, the search engine normalized search volumes in which queries matching our search terms were divided by the total number of searches per 10 million made in a given place (the entire US or a specific state), reported as a query fraction (QF). Additionally, we used Comscore estimates of the search engine's search traffic to estimate absolute search volume ranges from the observed QFs (eMethods in Supplement 1).

First, we studied national monthly search volumes before and after *Murphy v NCAA*. We used a pre/post observational time series design, leveraging autoregressive integrated moving average (ARIMA) modeling to project counterfactual trends based on historical projections in the absence of the policy changes that we describe as the observed and expected search volumes. This approach is widely used for analyses of time series data for policy evaluations.<sup>20-22</sup> Specifically, the percentage increase greater than the expected volume was calculated from the ratio of observed and expected volumes forecasted using an ARIMA of the form (3,1,1) applied to preperiod trends. Alternative selections of other common ARIMA forms were not associated with any changes in the main effect estimates. This method was selected vs a difference-in-differences approach due to the lack of a clear control group for comparison, as sports betting is already legal in other large English-speaking nations. Additionally, using a forecasted or synthetic counterfactual approach minimizes the risk of bias from improperly selected control groups and is considered the criterion standard for pre/post time series analyses.<sup>23,24</sup>

Second, we replicated this analysis with before and after monthly periods for when sportsbooks opened in a given state. To be included in the analysis, states needed to meet the

following criteria: sportsbooks had been introduced, at least 1 year of data were available following the most recent launch (whether retail or online), and sufficient search data were accessible, as the search engine excluded data for regions or periods with low search volume (eg, less populated states).<sup>25</sup> This approach systematically identified the 8 largest states with sportsbooks and no changes in operation for at least 12 months postlaunch. These states were Illinois, Massachusetts, Michigan, New Jersey, New York, Ohio, Pennsylvania, and Virginia. For each state, we used an ARIMA model of the same form as the national model (3,1,1) to estimate the ratio of observed to expected search volumes. The expected volumes were forecasted based on trends from periods before the introduction of sportsbooks, as reported by the American Gaming Association.<sup>19</sup>

Third, we distinguished between the potential association of retail vs online sportsbooks by estimating the change in searches after the opening of retail sportsbooks and online sportsbooks, as reported by the American Gaming Association.<sup>19</sup> We focused on states where there was at least a 4-month gap between the opening of retail and online sportsbooks and where the timing of either retail or online sportsbook openings did not coincide with the COVID-19 pandemic peak, defined as February or March 2020. This resulted in analyses for New York and Pennsylvania, where we estimated increases in searches during the period when only retail sportsbooks were operational compared with the period when online sportsbooks were also operational using the same counterfactual projection from historical data before any sportsbooks opened carried forward. Analyses were conducted using Python, version 3.11, and were exempted from ethical review by University of California, San Diego because they relied on public, nonhuman research data.

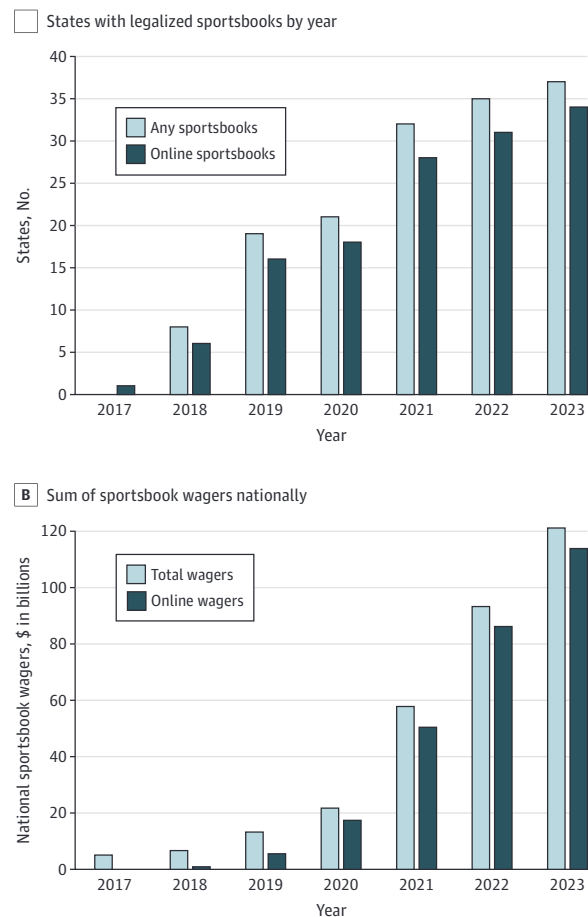
## Results

The number of states with legal and operational sportsbooks before *Murphy v NCAA* in 2017 was 1 (Nevada), increasing to 8 in 2018, 19 during 2019, 21 during 2020, 32 during 2021, 35 during 2022, and 37 during 2023 (Figure 1). Approximately 34 states (92%) with legal retail sportsbooks had also legalized online sportsbooks in 2023, with only Vermont allowing for online sportsbooks without any retail sportsbooks. During 2024, North Carolina became the 38th state to allow sportsbooks, bringing the total population with access to legal sportsbooks to 63% of people in the US.

National sports bet totals were \$4.9 billion during 2017, \$6.6 billion during 2018, \$13.1 billion during 2019 (the first full year after *Murphy v NCAA*), \$21.6 billion during 2020, \$57.7 billion during 2021, \$93.2 billion during 2022, and \$121.1 billion during 2023. These wagers are increasingly occurring online, with online bets accounting for 94% (or \$113.8 billion) of total sports wagers during 2023.

Nationally, gambling addiction help-seeking searches increased following *Murphy v NCAA* after declining or stabilizing during the COVID-19 pandemic (Figure 2). Searches have consistently increased year over year since 2021, when 32 states

Figure 1. Sportsbook Operators and Total Wagers in the US From 2017 to 2023

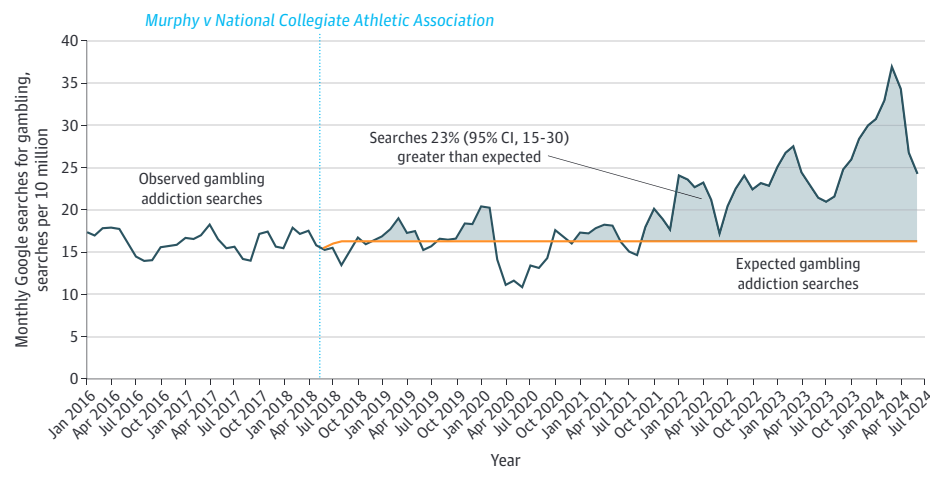


A, The bars indicating the number of states with legalized sportsbooks during the year. If sportsbooks were legalized at any point during the year they were counted in that year. The number of states with retail (brick-and-mortar) sportsbooks and online sportsbooks is separately reported. All states with online sportsbooks offered retail sportsbooks except Vermont, which only allows online wagers. During 2024, North Carolina became the 38th state to allow sportsbooks, including retail and online. B, The bars indicate the sum of sportsbook wagers, nationally, in billions of dollars. The results are reported in total and for online wagers alone.

had sportsbooks, including 22% (95% CI, 21%-24%) during 2022, 25% (95% CI, 23%-27%) during 2023, and 31% (95% CI, 26%-36%) during the first half of 2024. There were cumulatively 23% (95% CI, 15%-30%) more searches nationally than expected since *Murphy v NCAA*, with searches higher than expected for 55 of the 73 months during the postperiod, including every month since September 2021. In the 73 months since *Murphy v NCAA*, there were approximately 6.5 to 7.3 million searches for gambling addiction help-seeking nationally, with 180 000 monthly searches at a peak during June 2023.

Additional analyses demonstrated that Illinois (35%; 95% CI, 18%-53%), Massachusetts (47%; 95% CI, 21%-79%), Michigan (37%; 95% CI, 22%-53%), New Jersey (34%; 95% CI, 21%-45%), New York (37%; 95% CI, 26%-50%), Ohio (67%; 95% CI, 42%-98%), Pennsylvania (50%; 95% CI, 35%-66%), and

Figure 2. Monthly Internet Searches for Gambling Addiction in the US From January 2016 to June 2024



The time trend shows the monthly rate (query fraction: searches per 10 million) for Google searches with the term *gambling and addiction, addict, anonymous, or hotline* (such as *gambling addiction hotline or am I a gambling addict?*), with the interruption showing the *Murphy v NCAA* US Supreme Court decision that overturned legislation that had banned sports betting.

Virginia (30%; 95% CI, 18%-44%) independently had statistically significantly more searches than expected after the opening of any sportsbooks in their state (Figure 3). The significantly higher search volumes observed in all 8 of the independent state evaluations suggest that these results are highly unlikely to be due to chance. Each state's cumulative increase in searches was higher than the aggregate national model and their peak month typically occurred during 2024, suggesting that searches are continuing to rise following the opening of sportsbooks.

In New York, the potential association of retail sportsbook operations was significantly less (−1.27%; 95% CI, −12% to 9%) during the 30-month period leading up to the opening of online sportsbooks, which corresponded with a 50% (95% CI, 41%-59%) increase in searches greater than expected for the remaining 29 months of observation. In Pennsylvania, the introduction of retail sportsbooks corresponded with 33% (95% CI, 21%-45%) more searches than expected during the 5-month period before online sportsbooks opened. When online sportsbooks were opened, searches were 61% (95% CI, 48%-74%) higher than expected and significantly higher than during the retail period for the remaining 61 months of observation. Additionally, for both states, their record highest monthly search volumes were observed after online sportsbooks began operations in their jurisdictions.

## Discussion

The *Murphy v NCAA* decision expanded national access to sportsbooks and sports betting. Concurrently, potential gambling harms, as evidenced by our analysis of internet searches for gambling addiction searches, have markedly increased. Our results suggest that the association may be more acute with the availability of online than retail sportsbooks.

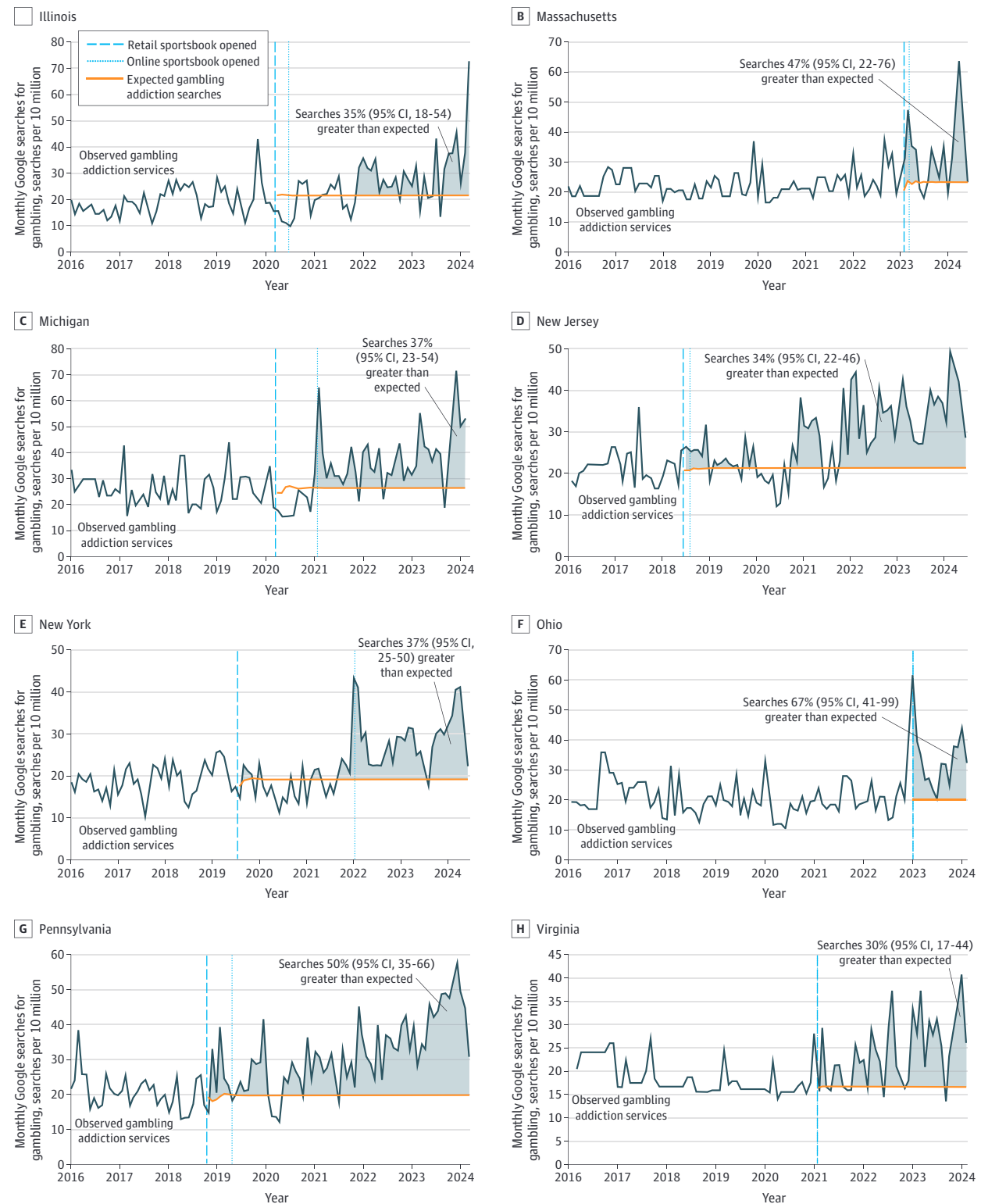
These findings highlight the need for health agencies to engage in sportsbook regulation. While gambling is extensively regulated,<sup>26,27</sup> these frameworks largely ignore public health considerations. However, our results suggest that

sportsbooks pose a substantial health concern. A paradigm shift in how regulatory frameworks and health organizations collaborate to address the complexities of gambling harms is needed. We recommend that state legislatures work with health agencies to establish mandatory health effect assessments and prioritize public health when expanding sportsbooks.

Gambling disorder shares neurobiological similarities with substance use disorders and is associated with many mental health conditions,<sup>28</sup> including depression, bipolar disorder, and suicidality.<sup>28,29</sup> These comorbidities complicate treatment and are associated with more severe clinical presentations and worse outcomes, and a potential syndemic for people harmed by gambling.<sup>30</sup> Gambling addiction also poses several physical health consequences, including tachycardia, angina, and hypertension.<sup>28</sup> Many psychosocial consequences also stem from gambling, including higher rates of bankruptcy,<sup>28</sup> unemployment,<sup>31,32</sup> and homelessness.<sup>33</sup> Societal effects also include fractured social relationships.<sup>34-36</sup>

Gambling treatment and/or prevention also incurs substantial costs. In 1999, pathological gambling cost US taxpayers \$5 billion, decades before sportsbooks proliferated.<sup>37</sup> Yet, legislation that legalizes sportsbooks rarely includes funding for the health costs of gambling. For example, Wyoming allocated \$300 000 in annual funding for gambling addiction services alongside legalizing sportsbooks.<sup>38</sup> More commonly, states appropriate sportsbook-related tax revenues to their general funds. In 2023, states allocated a mean of \$3.1 million annually for gambling addiction services.<sup>39</sup> However, this figure is largely driven by Massachusetts, which allocated \$22.6 million, while most states allocated less than \$1 million and 20 states allocated less than \$400 000,<sup>39</sup> despite ample tax revenues. For example, New Hampshire allocated approximately \$100 000 to gambling prevention and/or treatment during 2023 while collecting \$36.4 million in tax revenue from sports wagers.<sup>40</sup> The delayed regulation of the tobacco industry serves as a cautionary tale, with accountability for health research and damages only following advocacy and litigation after decades of harm.<sup>41</sup>

Figure 3. Monthly Internet Searches for Gambling Addiction in Selected States From January 2016 to June 2024



Each panel shows a time trend with the monthly rate (query fraction: searches per 10 million) for Google searches with the term *gambling* and *addiction*, *addict*, *anonymous*, or *hotline* (such as *gambling addiction hotline* or *am I a gambling addict?*) occurring in the 8 states with available data that met eligible inclusion criteria (had operating sportsbooks and at least 1 year of observation

after the most recent opening of retail or online sportsbooks). The interruption shows the month when sportsbooks opened in that state, including retail (eg, brick-and-mortar) and online providers. The cumulative estimated increase in searches greater than expected volumes after any sportsbooks operating in the state is shown in each plot.

This study's results also concern health care systems and their preparedness. Many practitioners report little to no training or experience with gambling disorders.<sup>42</sup> This gap in clinical expertise is compounded by the lack of medications approved by the US Food and Drug Administration for gambling disorder treatment, with treatment limited to off-label medications or labor-intensive interventions, like cognitive behavioral therapy.<sup>28,43</sup> Furthermore, a lack of research funding may potentially limit the development of effective interventions.<sup>28</sup> These findings underscore the need for increased education and innovation in identifying and treating gambling disorders.

Our findings for online sportsbooks align with research showing that increased access to gambling is associated with raised gambling rates,<sup>44</sup> including higher rates of harmful gambling for online gamblers than retail gamblers.<sup>45,46</sup> Despite these findings, some states are expanding online wagers to include e-gaming (betting on video games), digital casinos, and poker.<sup>47</sup> We caution against such expansion before more research on the health implications of online gaming are available. Given the unique risks posed by online gambling,<sup>46</sup> technological safeguards, such as betting limits, enforcement of mandatory breaks, and credit card bans, may protect the health interests of gamblers.

Sports betting stands apart from other types of gambling. Sportsbooks offer unprecedented opportunities for continuous engagement through in-play bets, such as which player will next score. Australia has banned such bets to reduce wager opportunities, providing a model for the US.<sup>48</sup> People who bet on sports perceive their wagers as safer and skill-based,<sup>49</sup> potentially lowering their awareness of problem behaviors. Some even treat sports betting as an investment, swapping stock portfolios for wagers.<sup>50</sup> Unlike other gambling activities, sports betting is perceived positively by most of the public. About 63% of people in the US view sports betting favorably,<sup>51</sup> complicating intervention efforts and underscoring the need to reshape social narratives to address potential harms.

In light of our findings, we propose several additional actions. First, we recommend the development and evaluation of preventive countermeasures, such as educational materials on gambling, similar to campaigns against tobacco.<sup>52</sup> These should raise awareness about the risks of gambling, particularly among high-risk populations, such as young male individuals.<sup>8,28,53</sup>

Second, advertising restrictions on sportsbooks, which reached \$1.8 billion in the US during 2023,<sup>54</sup> should be considered. Nations, such as Spain, have banned sportsbook advertising as a precedent for US states.<sup>55</sup> Additionally, the association between advertisements and gambling problems should be studied.<sup>56</sup> While the American Gaming Association's Responsible Marketing Code for Sports Wagering<sup>57</sup> encourages advertising that respects the legal gambling age and limits on college advertising, legal rules and penalties governing advertisements vary widely by state, creating a wild west of claims. DraftKing's Risk-Free Bet campaign triggered a class action lawsuit for misleading consumers.<sup>58</sup> Moreover, existing code violations and industry responses have been largely unpublished, leaving the effectiveness of legal regulation in doubt.

Third, pragmatic online interventions should be scaled to reach people who gamble who are seeking help online. Online interventions may rival in-person methods<sup>41</sup> and can be promoted in online sportsbooks in lieu of generic warnings.<sup>59</sup>

Fourth, while we cannot infer the demographic characteristics of those who searched for help, sportsbooks cater to young audiences.<sup>53</sup> Increasing the legal sports betting age from 18 years to 21 years (as New York proposed<sup>60</sup>) aligns with the current understanding of addiction vulnerability in the developing mind.<sup>61</sup>

Finally, we must move beyond traditional responsible gambling approaches that focus on individual player responsibility toward a comprehensive public health framework that addresses sportsbook gambling through multiple intervention levels: universal (eg, restricting availability and marketing), selective (eg, limit setting and age restrictions), and indicated (eg, algorithmic detection of problematic patterns).<sup>62</sup>

### Limitations

This study had limitations. We did not measure clinical outcomes, such as gambling disorder. However, we directly observed instances of concern about gambling addiction as reflected by search behaviors, a marker that has been associated with population trends in numerous settings,<sup>17</sup> including for mental health.<sup>63</sup> Moreover, research suggests that sports betting is significantly associated with being classified as a person who engages in moderate-risk or high-risk gambling.<sup>8</sup> Our results may be confounded, as states with sportsbooks differ from states without sportsbooks. Yet, we were able to observe temporally specific increases in gambling addiction searches within communities after sportsbooks were allowed or came to market. The COVID-19 pandemic may have confounded our results, delaying the population effects of sportsbooks because professional sports teams played abbreviated seasons or did not play and pandemic concerns trumped interest in sports. The search queries in our model were not exclusively submitted by users experiencing gambling problems, and their associations with sportsbook policies are only meaningful across large populations. Some searches may be displaced by users turning to large language models, like online chatbots, resulting in an underestimate of the scope of gambling problems. Lastly, while states and sportsbooks have specific rules and procedures to prevent gambling across state lines,<sup>64</sup> inconsistent enforcement could result in some wagers being placed by residents of other states.

### Conclusions

The results of this time series study suggest that there has been an increase in sportsbooks, sports wagers, and internet searches for gambling addiction, potentially serving as an early warning for public health. This underscores the need for swift action, including prioritizing research on sportsbooks, developing policies to address gambling-related health effects, and implementing a comprehensive health care response. Prompt measures are essential to prevent the escalation of gambling-related harm and its long-term consequences.

## ARTICLE INFORMATION

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**Acquisition, analysis, or interpretation of data:** All authors.

**Drafting of the manuscript:** Yeola, Allen, Desai, Yang, Smith, Ayers.

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**Supervision:** Smith, Ayers.

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