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# Impact of sports gambling on mental health

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ABSTRACT

Utilizing the staggered legalization of gambling across states following the repeal of the Professional and Amateur Sports Protection Act, we provide causal evidence of the impact of gambling on mental health. Our results indicate that legalized gambling leads to a 5.5 percentage points decrease – over 11% – in the likelihood of poor mental health for men between 18 and 24, but a 3.8 percentage point increase – nearly 10% – for men between 30 and 34; there is no discernible effect for women.

## 1. Introduction

Commercial gaming is a large and growing industry. In 2023, the American Gaming Association reported a total revenue of over $66 billion stemming from online and traditional sports betting and casino games. Sports betting in particular has seen exponential growth, largely fueled by its legalization in many states over just the last several years, with revenues from sports betting increasing from $430 million in 2018, when Nevada was only state with legalized sports betting, to $10.92 billion in 2023, when 24 states allowed the activity. As of May 2024, 38 states now have legalized gambling. Participation rates are also very high, but vary significantly by both gender and age. According to the 2023 American Sports Fanship Survey, males are twice as likely as females to engage in weekly sports betting and individuals between 18–34 are more likely than those between 35–49 to place a bet through an online sportsbook and, among those that place bets, are nearly 20 percentage points more likely to bet at least once per week.

A significant body of evidence has linked gambling behavior with a wide range of adverse outcomes. Scholes-Balog and Hemphill (2012) find that online gamblers are more likely to develop difficulties with mental health and substance abuse, and Petry and Weinstock (2007) find similar relationships among young adults. Effertz et al. (2018) show that health care costs increase after the advent of online gambling in Germany. Shaw et al. (2007) discuss the negative impacts of pathological gambling on family relationships. Gambling can also have negative consequences on financial health (Hollenbeck et al., 2024) and stability (Muggleton et al., 2021).

Much of the evidence on the relationship between gambling and health outcomes is correlational, and it is difficult to determine the direction of causality. Indeed, there is significant evidence that those with poor mental health are more likely to decide to engage in excessive gambling (Dussault et al., 2011). Less has been done to credibly estimate the causal impact of gambling, though there are a few studies that attempt to address potential endogeneity. Koomson et al. (2022) use the number of other gamblers in one's neighborhood as an instrument for one's own gambling behavior and find that gambling behavior is positively related to financial stress. Badji et al. (2023) find that individuals who live near gambling establishments are more likely to gamble and suffer from financial difficulties and mental distress. Churchill and Farrell (2018) address the issue of endogeneity in gambling using internally generated instruments, as developed by Lewbel (2012), and document a positive relationship between gambling habits and depression.

## 2. Data and empirical methodology

Given the complexity of the COVID-19 pandemic and its effects on mental health, we focus on the impact of sports betting during the pre-COVID time period.[1] Aside from Nevada, where gambling has been legal for almost a century, sports betting has only been recently been allowed in other states, starting in August of 2018 when New Jersey legalized betting, and December 2018 when West Virginia followed suit. In 2019, six more states legalized sports betting, so a total of eight states legalized gambling during the pre-COVID period between 2018 and early 2020. We can see from Table 1, which provides the full list and dates of legalization of these states, that this is a fairly diverse and representative group. Similar to previous work examining the Australian context (Farrell and Forrest, 2013), we utilize the state-level variation in gambling policies to identify the effect of the policy

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[1] Our results remain qualitatively and quantitatively similar if the COVID period, which is when more than 20 states legalized sports betting and sports betting increased dramatically among young males (Brodeur et al., 2021), is included in our sample.

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**Table 1**
Online sports gambling — Timing by state.

| State | Date of availability |
|---|---|
| Nevada | Always treated |
| New Jersey | August 1, 2018 |
| West Virginia | December 27, 2018 |
| Pennsylvania | May 28, 2019 |
| Iowa | August 15, 2019 |
| Rhode Island | September 4, 2019 |
| Indiana | October 3, 2019 |
| Oregon | October 16, 2019 |
| New Hampshire | December 30, 2019 |

*Notes*: The date indicates the first time that residents could legally make an online sports bet in the given state.

changes on outcomes. Specifically, to identify the effect of access to legalized sports betting on mental health outcomes, we estimate regressions of the following form:

$$Y_{ist} = \beta X_{ist} + \mu_s + \gamma_t + \sum_{j=1}^{5} \delta_j Legal_{ist} \cdot \mathbb{1}[Age_{ist} = j] + \epsilon_{ist} \quad (1)$$

where $Age_{ist}$ is an integer in the range from 1 to 5, where the number represents an individual's age group. After controlling for individual characteristics including education levels, marital status, current employment status, race, and income along with state fixed-effects and month-year fixed effects, the impact of legalized betting ($Legal_{ist}$) for an age group $j$ is identified by the coefficient $\delta_j$.[2] Because legalized betting should have heterogeneous effects for different demographic groups due to documented differences in sports betting behavior (Seal et al., 2022), we estimate these regressions separately by age and gender.

For groups that do not engage in significant amounts of betting, particularly women, the coefficients on legalized betting should be small and insignificant. For men, there may be two opposing effects. As discussed earlier, sports betting has been shown to be linked with various psychological problems such as depression. However, gambling also represents a form of entertainment, so there may be beneficial effects for some (e.g., Humphreys et al., 2013).

To study the effects of gambling legalization on mental health, we use data from several waves of the Behavioral Risk Factor Surveillance System (BRFSS), a nationally representative survey conducted by the U.S. Center for Disease Control.[3] The BRFSS is the world's largest on-going telephone health survey, with several hundred thousand respondents each year. Importantly for our purposes, the BRFSS contains information on a respondent's state of residence and also records the specific interview date.[4] The survey has been conducted every year since its inception in 1984 and our analysis uses the 2017, 2018, and 2019 waves, along with part of the 2020 wave (those interviewed in January or February) before the start of the COVID lockdowns.

In addition to basic demographic information, the BRFSS contains a question that asks about mental health. Specifically, the survey asks respondents the following: "Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?" We generate a dichotomous variable that is equal to one if an individual has at least one day in the last 30 where they deemed their mental health to be poor, and we estimate linear probability models using this as our primary dependent variable ($Y_{ist}$), though we also include results using the total number of poor mental health days in the last thirty as our outcome measure. Mental health is multi-dimensional and complicated to measure, so there are limitations to using the answer to a single item question such as this one. While the BRFSS does contain some additional questions that ask about specific emotions and aspects of mental health such as having difficulty sleeping or getting up in the morning, unfortunately these are only asked of a very small fraction of survey respondents. Nonetheless, a large body of prior empirical research uses these same outcome variables (likelihood of having at least one poor mental health day or total number of poor mental health days in the last thirty) from the BRFSS. For some recent examples, see Solomon and Dasgupta (2022), Gangopadhyaya et al. (2020) and Ransome et al. (2022).[5]

## 3. Results

We begin by showing the effects of access to legalized betting on mental health for various age groups of men. Fig. 1 shows coefficients on the variable *Legal* for linear probability models that are estimated by various age groups, where the dependent variable is equal to one for individuals who report having at least one poor mental health day out of the last 30 days.[6] For men between 18–24 years of age, their mental health improves after the legalization of sports betting in their state of residence. The statistically significant coefficient of −0.055 implies that after one's state of residence legalizes sports betting, men in this age group are about 5.5 percentage points less likely to report having at least one poor mental health day in the last month. Given that a little less than half of this particular demographic suffers from poor mental health, this is effect is large. For men between the ages of 25 and 29, the coefficient is small and statistically insignificant. However, for men between 30 and 34, the legalization of sports betting is associated with a 3.8 percentage point increase in the likelihood of having some poor mental health days in the last month. Figure A.1 shows the same estimation for female respondents. Given that a large fraction of those who gamble on sports are young males under the age of 35, it is unsurprising that we do not see any significant coefficients for women.

As a test of robustness of our results, we also report estimates of specifications where total poor mental health days in the last 30 is the dependent variable; the results are qualitatively similar, as shown in Fig. 2.[7] Moreover, we explore the validity of the parallel trends assumption and address any concerns about negative weights (Goodman-Bacon, 2021) by estimating robust difference-in-difference event studies, as developed by Callaway and Sant'Anna (2021), which are shown in Fig. 3.

What accounts for the differences in effects by age group? While gambling can be enjoyable and improve mental health for some, entertainment value is likely higher for younger age groups and may be more important in forming and maintaining social connections (Deans et al., 2017). Additionally, many young adults below the age of 25 are still being supported financially by their parents, but those in their thirties are much more likely to be responsible for their own financial well-being. Moreover, they may also be more likely to be partnered and supporting someone else financially, which could magnify the

[2] One potential confounding factor is individuals who live in one state but engage in gambling across state borders. This could occur by individuals physically crossing state lines, having friends or family in other states placing bets, or using VPN servers to mask computer IP locations for online gambling. Assuming that the effect of sports betting on individual mental health is similar across states, our estimate will be attenuated towards 0.

[3] To focus on the segment of the population that is impacted by the policy change, we restrict the sample to non-students under 55 who live outside of Nevada.

[4] A survey of publications by Pierannunzi et al. (2013) shows the questions in the BRFSS to be valid and reliable measures of health.

[5] Another potential concern is that self-assessed ratings of health and mental health are not reliable, but a systematic review by Idler and Benyamini (1997) provides strong support for using them.

[6] Our results are qualitatively and quantitatively similar if we estimate a Logit model instead of a linear probability model.

[7] Our results are also qualitatively and quantitatively similar if we estimate a Poisson model.

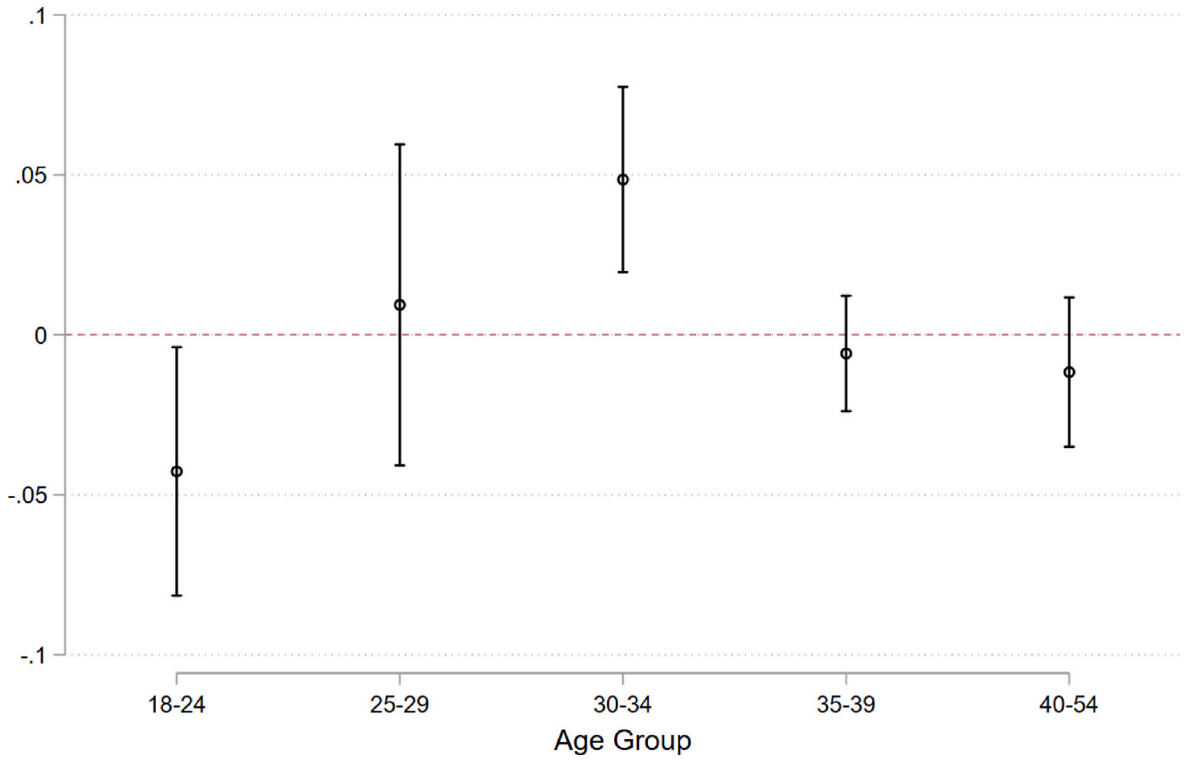



**Fig. 1.** Impact of legalization on probability of a bad mental health by age group for males. *Notes*: This figure plots our estimates for $\delta_j$ from estimating (1) for males 18 to 54, where $Y_{ist}$ is an indicator variable for having at least one poor mental health day out of the last 30 days. Standard errors are clustered at the state level.

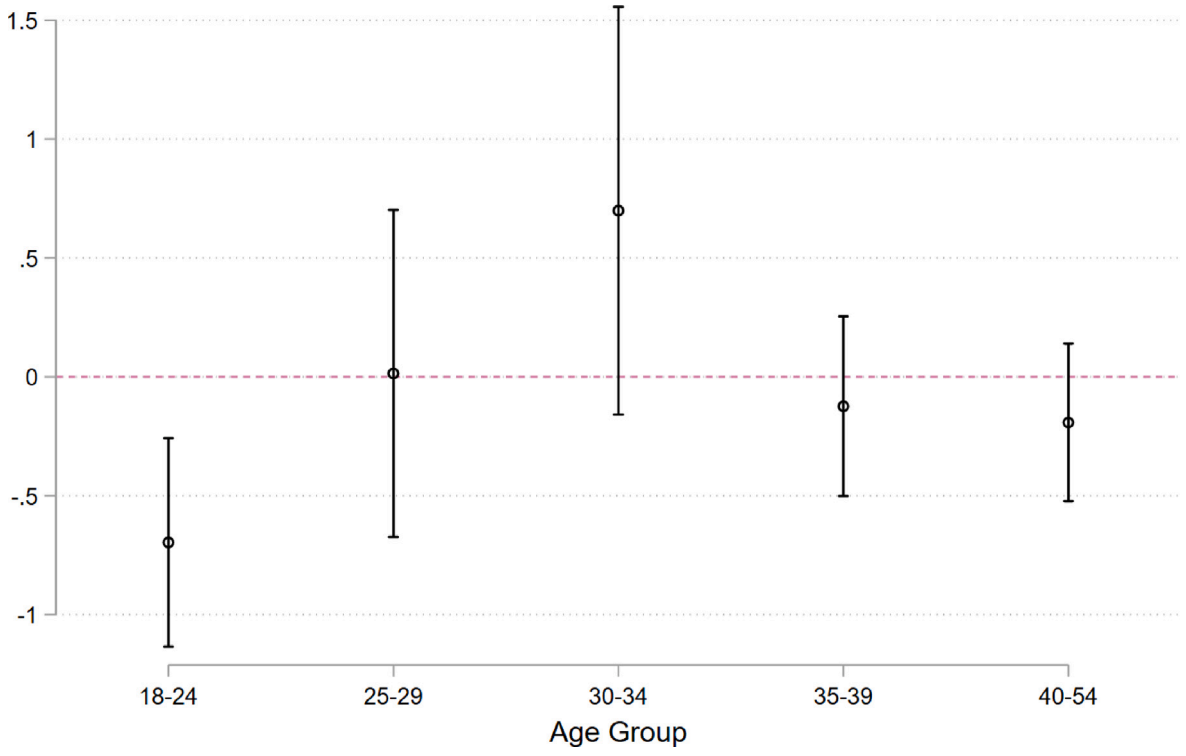
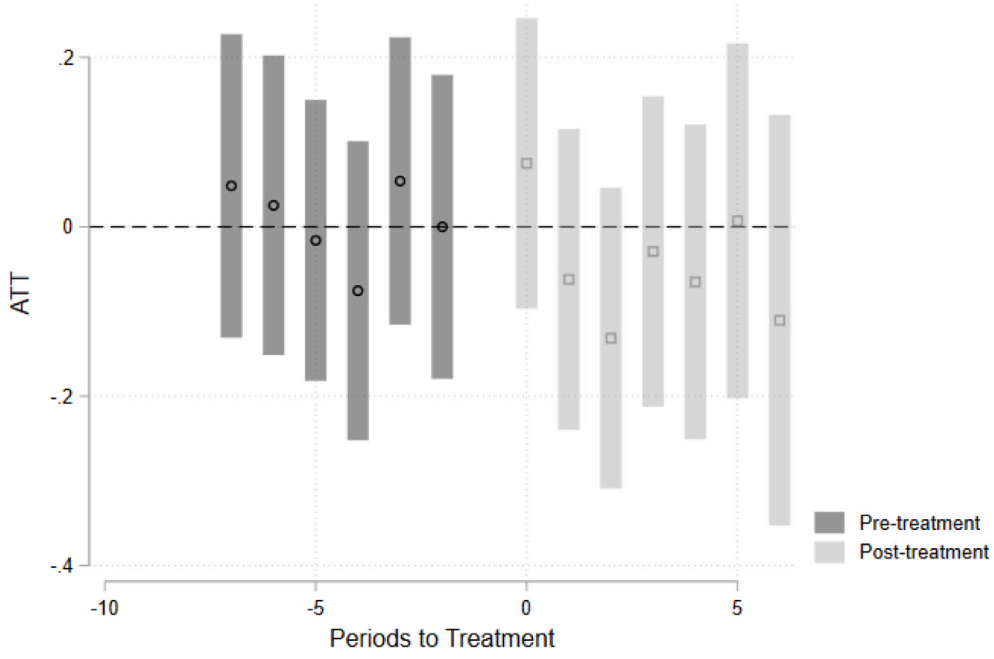



**Fig. 2.** Impact of legalization on number of bad mental health days by age group for males. *Notes*: This figure plots our estimates for $\delta_j$ from estimating (1) for males 18 to 54, where $Y_{ist}$ is the number of poor mental health day over the last 30 days. Standard errors are clustered at the state level.

debt stress (Swanton and Gainsbury, 2020) from problem gambling. As another way to potentially disentangle these effects, we split males in their early thirties into two groups: those who are married or partnered versus those who have never been married. Consistent with our hypothesis, we find that there is a strong deleterious effect of having access to legalized sports betting on mental health for men who are married or living with a partner in the 30–34 age group, while the effect for single men in this age group is statistically indistinguishable

(a) Males: 18-24




(b) Males: 30-34

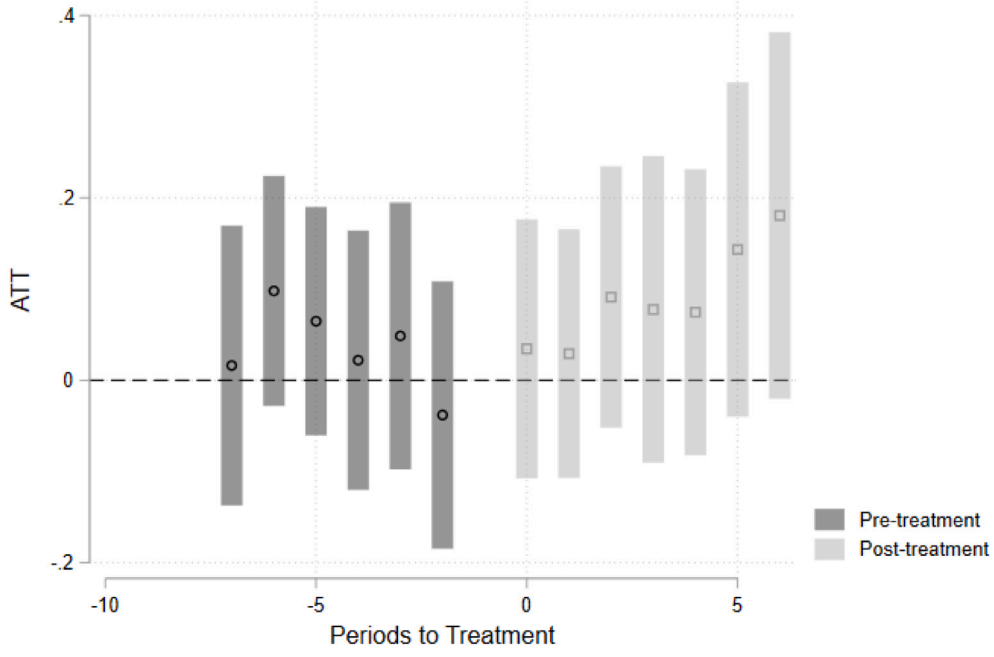



**Fig. 3.** Event study: Probability of a bad mental health day. *Notes*: This figure plots the Callaway and Sant'Anna (2021) dynamic treatment effect coefficients for 6 months before and after states legalized gambling where we control for education levels, marital status, current employment status, race, and income. Standard errors are clustered at the state level.

from zero; see Table A.1 for details. These ideas are supported by prior research that finds that relative to married couples, singles spend significantly more per capita on food and apparel (Hawk, 2011) and less on personal insurance (Wang et al., 2023), and they also derive a greater entertainment value from participating in lotteries (Burger et al., 2020).

## 4. Conclusion

The legalization of gambling across the United States has increased access to betting, particularly sports betting, which has heterogeneously impacted the mental health of residents in those states. Our analysis presents novel causal evidence on the impact of legalized gambling

and finds that young men between the ages of 18 and 24 see an improvement in their mental health due to improved access to a new form of entertainment. However, married men between 30–34 see a substantial decline in their health mental resulting from legalized gambling, possibly due the added stress of being financially responsible for someone else. Documenting the mechanisms that explain these results and exploring the impact of legalization following the pandemic are fruitful avenues for future research.

## Data availability

Data will be made available on request.

## Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.econlet.2024.111922.

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