NBER WORKING PAPER SERIES

THE IMPACT OF SUICIDE HOTLINES ON HEALTH: EVIDENCE FROM 988 IMPLEMENTATION

Benjamin Hansen
Niketana Kannan
Jonathan Zhang

Working Paper 35601
http://www.nber.org/papers/w35601

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
August 2026

Jiae Kim provided excellent research assistance. We thank Shari Eli, Bocar Ba, Jonathan Cantor, Julian Reif, Lise Vesterlund, Tianyi Wang, and seminar participants at ASHEcon 2025, BEDI Health & Wellness Conference, and Southeastern Health Economics Study Group for their valuable suggestions and feedback. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

NBER working papers are circulated for discussion and comment purposes. They have not been peer-reviewed or been subject to the review by the NBER Board of Directors that accompanies official NBER publications.

© 2026 by Benjamin Hansen, Niketana Kannan, and Jonathan Zhang. All rights reserved. Short sections of text, not to exceed two paragraphs, may be quoted without explicit permission provided that full credit, including © notice, is given to the source.

The Impact of Suicide Hotlines on Health: Evidence from 988 Implementation
Benjamin Hansen, Niketana Kannan, and Jonathan Zhang
NBER Working Paper No. 35601
August 2026
JEL No. H51, I12, I18

ABSTRACT

This paper examines the impact of the National Suicide Hotline Designation Act, which introduced the universal 988 calling code and earmarked federal funding to suicide crisis call centers in July 2022. We use a difference-in-differences design that leverages pre-existing cross-state variation in crisis line capacity gaps, measured by the number of pre-988 calls routed to a state but not answered in-state. The rollout substantially improved crisis line operations in states with larger baseline capacity gaps: these states answered more calls in-state and increased their in-state answer rates. However, these operational gains did not translate into detectable reductions in suicide mortality. The mortality estimates are precise enough to rule out even modest short-run reductions. We also find no statistically significant improvements in broader population mental health outcomes. These findings suggest that expanding crisis line capacity alone may be insufficient to reduce suicide deaths.

Benjamin Hansen
University of Oregon
Department of Economics
and NBER
bchansen@uoregon.edu

Niketana Kannan
University of Toronto
Department of Economics
niketana.kannan@mail.utoronto.ca

Jonathan Zhang
Duke University
Sanford School of Public Policy
and U.S. Department of Veterans Affairs
Office of Mental Health
and also NBER
jonathan.zhang@duke.edu

1 Introduction

In 2022, there were 49,476 suicides in the United States. This staggering new level represents a 40 percent increase over the rates since the year 2000 (Marcotte and Hansen, 2024), making it one of the leading causes of death among young people today (CDC, 2022). In an attempt to help address this public health and economic crisis, Congress passed the National Suicide Hotline Designation Act ("988 Act") in 2020. This designated 9-8-8 as a new universal dialing code, replacing the prior toll-free number, and provided federal funding to help states implement local suicide crisis lines.

Unlike conventional treatments, 988 provides immediate, free, and confidential support for individuals in crises, reducing barriers related to access, cost, and stigma. Suicide is often impulsive,[1] which underscores the importance of easily accessible and universally available treatment resources. A 2024 survey (NAMI, 2024) shows strong demand for such services: over 50% of adults rank immediate access to a crisis counselor as the top feature of crisis response, 25% stress the need for no bill, and half say they would not feel safe dialing 911 for a loved one in crisis.[2] These statistics emphasize the potential distinct value of crisis services like 988.

Given its potential to prevent harm in moments of acute crisis, it is critical to assess whether 988 achieved its intended public health objectives. Prior to the national 988 launch, the same suicide crisis centers could be reached through 1-800-273-TALK. These crisis call centers relied on a patchwork of federal, state, local, and philanthropic funding, and therefore differed widely in their resources and operational capacity. This variation was reflected in the share of calls answered in state and in the number of callers who were routed to a state's Lifeline network but not answered by an in-state center (SAMHSA, 2022a). We summarize this pre-existing operational shortfall using a baseline capacity gap: the number of pre-988 routed-but-not-answered calls per 1,000 residents. States with larger baseline capacity gaps had greater scope for 988-related resources and implementation efforts to expand local crisis line response. We therefore leverage cross-state variation in baseline capacity gaps in a difference-in-differences framework to estimate the reduced form effects of 988 rollout on crisis line call outcomes and suicide mortality over the first two calendar years after launch.

Our first finding is that 988 implementation substantially increased the number of crisis calls answered

[1] For example, firearm possession is tied to suicide counts but is not associated with suicide ideation rates (Cook and Ludwig, 2006; Lang, 2013). Other recent evidence suggests that laws that delay the purchase of handguns reduce suicide (Donohue et al., 2023). Moreover, Carpenter and Dobkin (2009) find alcohol access increases suicidality by 40 percent, and alcohol consumption is linked closely with impulsivity (Oscar-Berman and Marinković, 2007).

[2] These concerns are even higher among marginalized populations: 77% of Black respondents, 72% of Hispanic respondents, and 80% of LGBTQ+ respondents reported being afraid that police could harm them or their loved ones during a mental health response. Empirical evidence supports these survey responses (Ang et al., 2025).

in states with greater pre-existing scope for capacity expansion, as measured by larger baseline capacity gaps. States with a one standard deviation larger baseline capacity gap—0.3 additional pre-988 routed-but-not-answered calls per 1,000 residents—answered 1,256 more calls in-state after 988 implementation, a 24% increase relative to pre-988 levels. These states also increased their in-state answer rate by 10.9 percentage points, an effect size of roughly 15%, and average call duration initially rose by about half a minute. Routed calls also increased, but the increase was smaller and emerged later than the rise in in-state answered calls and answer rates. Taken together, the evidence suggests that the majority of the effects are driven by supply rather than by differential growth in crisis line demand.

We then examine whether these operational improvements reduced suicide mortality. We find no evidence that 988 implementation reduced suicide deaths in states with larger baseline capacity gaps. For states with a one standard deviation larger baseline capacity gap, the estimated effect on age-adjusted suicide mortality is small, statistically insignificant, and positive (+0.006 suicide deaths per 100,000 individuals, SE = 0.006). The confidence intervals are tight enough to rule out even modest short-run reductions in suicide mortality. These null effects are robust to using broader external causes of death, adding state-level controls, allowing for differential trends by baseline demand, and using alternative definitions of treatment exposure; we also do not detect mortality reductions for female, Black, or younger subgroups. As a scaling exercise, we also convert the reduced form estimates into implied effects per additional answered call; these estimates likewise provide no evidence of meaningful mortality reductions from the additional crisis line contacts generated after 988 implementation (95% confidence interval of −0.006 to 0.017 suicide deaths per 100,000). We are able to reject reductions in suicide mortality estimated in prior medical observational studies (Niederkrotenthaler et al., 2021; Patel et al., 2026).

Finally, we examine whether the null mortality effects reflect broader limits in the surrounding mental health and crisis response system. States with larger baseline capacity gaps show some evidence of increased employment in crisis-center-related service organizations after 988 implementation, consistent with additional resources expanding call center capacity. However, we do not find corresponding increases in the broader mental health workforce or in facility based treatment capacity. We also do not find statistically significant improvements in downstream mental health utilization or population well-being, including mental health treatment use, psychotropic prescription use, self-reported poor mental health, and mental health symptoms in surveys. These results suggest that 988 expanded crisis line response, but did not measurably increase the broader treatment capacity or population mental health outcomes that may be necessary for hotline contact to translate into mortality reductions.

This research contributes to two main strands of literature. Previous research on suicide hotlines has predominantly examined shifts in callers' distress and perceptions before and after calls, reporting improvements in emotional state (Gould et al., 2007a; Britton et al., 2013; Mishara et al., 2016; Gould et al., 2018). A systematic review by Hoffberg et al. (2020) finds evidence of positive short-term effects among these studies, but notes that long-term outcomes often suffer from high attrition rates, other biases, or are not measured at all. A growing public health literature has also begun to document national trends in calls and mental health-related services following the 988 Act (Saunders, 2024; Suran, 2023). Cantor et al. (2025) find evidence that 988 increased peer support services, while suicide prevention and mobile crisis services were unchanged. Purtle and Lindsey (2025) note that "future research should examine associations between changes in these system-level metrics [and] population mental health outcomes." We answer that call by linking 988 caller metrics to population health outcomes in a quasi-experimental framework. Rather than relying on national trends or realized utilization, our design isolates whether states with greater scope for 988 to expand local crisis line response saw differential changes in suicide mortality. Our paper is most closely related to Patel et al. (2026), who document a reduction in national suicide deaths after 2022, with larger reductions in states with greater 988 utilization. We build on their time series evidence by directly incorporating pre-existing cross-state variation in crisis line capacity gaps in an event study framework.

We also contribute more broadly to the economics literature on the impacts of mental health policies and support. Prior work has studied various interventions, including prescription medications (Biasi et al., 2022; Cuddy and Currie, 2024), insurance coverage (Jácome, 2020; Ortega, 2023), mental health and substance abuse treatment (Serena, 2022; Costantini, 2025; Swensen, 2015), and income support (Ridley et al., 2020; Silver and Zhang, 2026).[3] Another body of work emphasizes the importance of technological infrastructure in facilitating access to emergency medical care. For instance, Athey and Stern (2002) show that the rollout of enhanced 911 reduced mortality rates. Building on these insights, we examine whether 988—a novel, universally accessible crisis intervention—can deliver similar health benefits.

The rest of this paper proceeds as follows. The next section describes the National Suicide Prevention Lifeline and 988 Act. Sections 3 and 4 describe our data sources and empirical strategy, respectively. Section 5 presents the results, a range of robustness checks, and discusses the precision of our results. Finally, section 6 discusses potential explanations for our findings and concludes.

[3]See Laflamme et al. (2022), Currie (2024) and Marcotte and Hansen (2024) for reviews of these papers.

2 Institutional Setting

2.1 988 Suicide & Crisis Lifeline

National Suicide Prevention Lifeline Lifeline and 988 Implementation. The National Suicide Prevention Lifeline (1-800-273-TALK) was originally launched in 2005 by the Substance Abuse and Mental Health Services Administration (SAMHSA). It created a nationally coordinated system linking independent, decentralized, community-based call centers around the country. These centers—often run by non-profits or affiliated with local healthcare clinics—maintained their own funding and staff while adhering to Lifeline's quality standards (988 Suicide & Crisis Lifeline, 2026). Today the average state hosts four call centers, but there is considerable variation: for instance, New York has 15, whereas in 17 states and DC, the number of call centers is just one. This decentralized structure generated substantial pre-988 variation in local call center capacity to answer calls, staffing, and other call center operations.

Following the passage of the National Suicide Hotline Designation Act in October 2020, the Lifeline introduced "9-8-8" as an easy-to-remember, toll-free number, officially implemented on July 16, 2022. In addition to phone calls, the service supports text and chat, as well as specialized sublines including the Veterans Crisis Line (988 then press 1), a Spanish-language subline (988 then press 2), and during our study period, a LGBTQI+ pilot line (988 then press 3). These sublines are national lines and are not affected by local 988 resources. Federal funding for local 988 capacity came in multiple rounds, with SAMHSA allocating over half a billion dollars from fiscal years 2022 to 2024 (SAMHSA, 2022b).[4] The first major state and territory local capacity grant application was due on January 31, 2022, funds became available to states on April 30, 2022. Thus, the initial federal funding became available roughly two and a half months before the national launch, creating a short pre-launch implementation period during which states could begin expanding staffing and operations in advance of the go-live date. On average, states received $19.8 million—roughly $0.50 per resident per year. These funds were not mechanically conditioned on pre-existing operational performance, as we discuss in more detail at the end of Section 4.

Call Process, Backup, and Caller Needs. Calls to 988 during the majority of our study period were routed based on the caller's area code to connect them with a nearby Lifeline call center.[5] If the local center answers the call ("answered in-state"), the caller is connected to a trained crisis responder. If the

[4] States have also contributed through various funding mechanisms, such as imposing surcharges on phone bills that mirror how 911 is financed.

[5] In September 2024, major wireless providers launched geo-locating for wireless 988 calls. Our data mostly cover the period when calls were routed based on area code rather than real-time location.

call is not answered in-state—often because of staffing or capacity constraints—the caller could abandon the call (i.e., hang up) or be routed to the national backup network automatically if not answered in-state within 2 minutes. In-state answering is central to the 988 model because local centers are better positioned to connect callers to community resources, coordinate with mobile crisis teams or emergency services in imminent-risk situations, and align service capacity with state and local funding responsibilities. For this reason, the Lifeline uses a 90% in-state answer rate as a key operational benchmark. Calls not answered in-state flow over to the national backup network so that the caller can still be served; approximately 90% of calls routed to national backup were answered (SAMHSA, 2025). Prior to 988 implementation, 14% of Lifeline calls flowed to national backup and 19% were abandoned by the caller.

988 contacts involve a broad range of concerns, only some of which involve acute suicide risk. State 988 dashboards indicate that social or interpersonal concerns, including family and relationship problems, and emotional concerns, including depression and anxiety, are among the most common and make up for the majority of the reasons for contacting 988. Suicidal thoughts, suicide attempts, or threats to self account for a meaningful but minority share of contacts—roughly 10–20% in state dashboards that report reason-for-contact categories.[6] Within this broader suicidality category, a much smaller share of contacts involve someone actively attempting suicide at the time of the call: approximately 0.7–1.0% of all calls are classified as imminent-risk contacts (Drapeau, 2024). Finally, 988 is used both by people in crisis and by third parties seeking help on behalf of someone else. Older pre-988 Lifeline evidence suggests that roughly 75% of Lifeline callers were initiated by the person in crisis (Gould et al., 2022); more recent state dashboard data suggest that number is closer to 90% for 988.

Downstream Crisis Response. 988 call centers are embedded in broader state and local crisis response systems. In addition to counseling, de-escalation, and safety planning, call centers may connect callers to mobile crisis teams, emergency services, or other community-based behavioral health providers. We do not observe these downstream crisis responses in our main Lifeline data, but state dashboards show substantial variation in the types and frequencies of responses deployed. For instance, in 2024, Colorado diverted 13% of calls to mobile crisis response teams and dispatched medical help for 0.6% of calls, while 6.1% of North Carolina calls were referred to mobile crisis response (Colorado Behavioral Health Administration, 2026; North Carolina HHS, 2026).[7] These differences may reflect variation in call center protocols (Holliday et

[6] Examples include the Colorado Behavioral Health Administration (2026); Oregon Health Authority (2026); North Carolina HHS (2026) 988 Performance Dashboards, accessed June 19, 2026.

[7] Some state dashboards report downstream crisis response rates, but the categorizations are not standardized across states. Another example is that 3.3% of Rhode Island calls in 2024 required an in-person intervention (Rhode Island Department of Behavioral Healthcare, Developmental Disabilities & Hospitals, 2026).

al., 2024), but also differences in the availability of local mobile crisis teams and related crisis response infrastructure, which vary substantially across states and localities (see Ba, 2026, for examples). Our main analysis abstracts from downstream crisis responses, while recognizing that local crisis response systems are an important pathway through which 988 could affect health outcomes. We return to this issue by testing whether effects vary with baseline downstream mental health capacity.

3 Data

3.1 Call Center Data

Data on 988 (and National Suicide Prevention Lifeline prior to July 2022) calls come from 988 Suicide and Crisis Lifeline state-based monthly reports. Lifeline publishes their monthly key performance indicators for each state. For each state-month, we have the number of calls to the Lifeline network that are routed, received, answered in-state, abandoned in-state, flowed to national backup center, as well as the average speed of answer for in-state calls (e.g., time caller waits to be answered), and average talk time. Importantly, these data do not include Veterans Crisis Line, Spanish language sub-network, LGBTQI+, or text/messaging contacts.[8] Our analysis uses data from July 2021, before the establishment of 988, through December 2024.

3.2 Outcome Data

Mortality. We aggregate restricted use vital statistics data to construct state-month mortality counts. Our primary outcome is age-adjusted suicide mortality rate per 100,000, calculated using age-adjusted mortality rates using five-year age bins from the 2021 American Community Survey. We also examine alternative mortality measures, including: (i) the combined category of suicides and accidents, (ii) deaths due to external causes, and (iii) all-cause mortality.[9] Combining suicides and accidents mitigates concerns about misclassification and measurement error (Cutler et al., 2001; Alexander and Schnell, 2019; Huh and Reif, 2021). The broader external-cause category encompasses intentional self-harm as well as fatalities resulting from transport accidents, poisonings, assaults, and other accidental injuries.

Crisis-Related Employment, and Treatment and Workforce Capacity. We use three additional data sources to examine whether 988 implementation differentially changed crisis-related employment and

[8] In the first year of 988, there were roughly 2,900,000 calls in the Lifeline data. Over the same time period, there were one million calls to VCL, 70,000 calls to the Spanish language sub-network, and 665,000 texts (Vibrant, 2023).

[9] The ICD cause of death codes are: X60–X84 for suicides, X60–X84, V05, V15, V80.6, V81.2–V81.9, V90–V99, and W00–X59 for suicides and accidents, and V01–Y89 for external causes.

downstream mental health treatment capacity. First, we use County Business Patterns (CBP) to measure paid employment in NAICS 624190 "Other Individual and Family Services," the most granular industry category that includes crisis hotlines and related services. Because this industry also includes non-crisis social service organizations and excludes volunteers, we interpret it as a proxy for employment in crisis-center-related service organizations rather than as a direct measure of 988 staffing.

Second, we use Bureau of Labor Statistics Occupational Employment and Wage Statistics (BLS OEWS) to measure broader mental health professional employment. We aggregate state-level employment counts for occupations likely to staff or receive referrals from crisis systems, including psychiatrists, clinical psychologists, counselors, and mental health social workers.[10]

Finally, we use the National Substance Use and Mental Health Services Survey (N-SUMHSS) to measure downstream treatment capacity. N-SUMHSS is SAMHSA-administered survey of substance use and mental health treatment facilities. We follow Cantor et al. (2025) and construct state-level measures of the number of treatment facilities that offer emergency psychiatric on-site services, mobile crisis response services, suicide prevention services, and peer support services. These outcomes capture broader treatment infrastructure available to callers after crisis line contact.

Additional Outcomes. In Appendix B, we examine several secondary outcomes that may capture broader changes in mental health care and well-being: mental health treatment utilization from N-SUMHSS, psychotropic prescription use from Medicaid State Drug Utilization Data, and population mental well-being from the Behavioral Risk Factor Surveillance System and Household Pulse Survey. These outcomes are measured less frequently and are generally noisier than our primary call and mortality outcomes.

4 Empirical Strategy

Leveraging the decentralized operation of Lifeline call centers described in Section 2, our empirical strategy exploits cross-state variation in pre-988 crisis line capacity gaps. Before 988, calls to the National Suicide Prevention Lifeline were routed to local call centers, but many calls were not answered in-state and were either abandoned or redirected to the national backup network. The 988 rollout, together with associated federal SAMHSA capacity funding, was designed to expand state and local crisis line capacity. As a result, the national funding and implementation shock had greater scope to improve operations in states with larger

[10]Specifically, Standard Occupation Classification (SOC) codes 29-1223 — Psychiatrists, 19-3033 — Clinical and Counseling Psychologists, 21-1018 — Substance Abuse, Behavioral Disorder, and Mental Health Counselors, 21-1023 — Mental Health and Substance Abuse Social Workers.

pre-existing crisis line capacity gaps. Federal SAMHSA funding was therefore pivotal in standardizing and expanding crisis call center operations, with the largest operational gains expected in states where baseline capacity constraints were most severe (KFF, 2024). This creates quasi-experimental variation similar to that used in other research examining locally provided public goods, such as policing, where federal funding differentially benefited regions with greater scope for service expansion.[11]

We define the state-level pre-988 baseline capacity gap, $BaselineCapacityGap_s$, as the baseline number of crisis line calls routed to the state multiplied by one minus the baseline fraction of calls answered in-state. We then scale this number per 1,000 residents using that state's 2021 population. The baseline statistics are measured from January through April 2022, prior to when states received federal SAMHSA capacity funding.

$$BaselineCapacityGap_s = \frac{Pre988Routed_s \times (1 - Pre988AnswerRate_s)}{Population_s^{2021}} \times 1{,}000$$

This treatment exposure measure incorporates the volume of calls routed to each state, so the treatment captures the scale of the operational shortfall rather than only the share of calls not answered in-state. This directly accounts for "ceiling effects": states that already answered nearly all calls in state have little measured capacity gap, while states with both low answer rates and meaningful call volume have more room for 988 to increase realized crisis line response. Thus, $BaselineCapacityGap_s$ captures the pre-existing call center capacity margin that 988 capacity investments could plausibly address.[12] Table A.1 reports this exposure measure for each state. A state-level metric is a reasonable aggregation for call center capacity because the modal state has a single Lifeline call center and the average state has four.

To estimate the impact of 988, we estimate the following continuous difference-in-differences event-study specification:

$$Y_{s,t} = \sum_{\tau=\text{Jul 2021}\setminus\text{Jun 2022}}^{\text{Dec 2024}} \beta_\tau BaselineCapacityGap_s \times D_{s,t}^{\tau} + \alpha_s + \lambda_t + \epsilon_{s,t}, \tag{1}$$

where $Y_{s,t}$ is the outcome in state s and month t (with quarterly or annual periods used for some outcomes). Our primary outcome is the age-adjusted suicide rate per 100,000 individuals, which allows for standardized comparisons across states. $D_{s,t}^{\tau}$ is an indicator for month τ relative to the 988 rollout in July 2022, and α_s

[11] See for instance: Evans and Owens (2007), Weisburst (2019), Mello (2019), and Chalfin et al. (2022).

[12] Using the baseline capacity gap also reduces concerns about mechanical mean reversion relative to a specification based only on the short-run pre-988 answer rate. A state receives high treatment intensity only if it had both a low in-state answer rate and a substantial volume of routed calls not answered in-state. In addition, we show in Figure A.3 that pre-988 answer rates were highly persistent across pre-period windows; therefore, cross-state variation reflects real structural differences in call center capacity rather than transitory fluctuations.

and λ_t are state and time fixed effects. The coefficients of interest are β_τ, which capture the differential impact of 988 implementation by baseline pre-988 capacity gap. We omit the interaction term for June 2022, setting it as the baseline period.

Equation 1 is weighted by the state's 2021 population count and heteroskedastic-robust standard errors are clustered at the state-level. Because $BaselineCapacityGap_s$ is measured in routed-but-not-answered calls per 1,000 residents, the unscaled coefficients represent the reduced form effect of one additional capacity gap per 1,000 residents. We scale coefficients by 0.3, approximately the cross-state standard deviation, so the reported estimates correspond to a one standard deviation larger baseline capacity gap or a 0.3 call gap per 1,000 residents. To summarize the overall impact of 988, we also estimate a simplified difference-in-differences (DiD) model that replaces the full set of time indicators with a single post-July 2022 dummy variable, again scaling the coefficient by 0.3.[13]

Figure 1 presents the empirical strategy graphically by plotting call outcomes separately for states above and below the median treatment exposure, $BaselineCapacityGap_s$, where the median is 0.452 pre-988 calls not answered in-state per 1,000 residents. Panels (a) and (b) show that states with larger baseline capacity gaps experienced larger increases in calls answered in-state and in calls either answered in-state or routed to the national backup network. SAMHSA state capacity funding became available on April 30, 2022, and call answering outcomes began to rise around this transition period. However, the largest divergence occurs after the national 988 launch in July 2022, consistent with state and local call centers preparing for the national go-live date. We therefore define the post-treatment period as beginning in July 2022. Because the data do not differentiate between answered and unanswered calls routed to national backup network, the combined in-state-or-backup measure should be interpreted as an upper bound on all potentially answered calls.

Identifying Assumption. Our identifying assumption is that, absent the 988 rollout, states with larger baseline capacity gaps would have experienced similar changes in suicide mortality as states with smaller baseline capacity gaps, conditional on state and calendar-month fixed effects. The baseline capacity gap captures the scale of the pre-988 call center margin that 988 could address: it is larger in states where more Lifeline calls were routed but not answered in-state prior to the national launch. Because this measure reflects both the volume of calls routed to a state and the ability of in-state call centers to answer those calls, we interpret the estimates as reduced form effects of 988 implementation in states with greater scope for expanded crisis line response. A related limitation is that lower-gap comparison states may also have used

[13]The two-period DiD estimating equation is: $Y_{s,t} = \beta \cdot BaselineCapacityGap_s \times Post_t + \alpha_s + \lambda_t + \epsilon_{s,t}$.

988 resources to improve operational margins that are not captured in our call data, such as call quality, follow-up, referrals, or coordination with mobile crisis services. We investigate such potential margins in subsection 5.4; however, to the extent this occurred, our estimates capture differential effects by baseline capacity gap rather than the isolated effect of the 988 crisis line.

There are two main classes of threats to this interpretation. On the supply side, the assumption would be violated if baseline capacity gaps reflected temporary disruptions in call center operations rather than persistent differences in local response capacity.[14] We assess this concern by documenting that pre-988 answer rates are highly persistent; the relevant (e.g., strength) of the first stage also directly speaks to this possibility. On the demand side, the assumption would be violated if states with larger baseline capacity gaps were also exposed to other post-July 2022 shocks that differentially changed suicide risk or crisis line demand for reasons unrelated to 988. We assess this concern by examining pre-trends in suicide mortality and by separately estimating effects on routed calls, which more directly capture call demand, and answered calls, which capture realized crisis line response. Furthermore, in a robustness exercise, we control for differential trends by baseline demand. We also estimate specifications including controls for labor force participation rate, unemployment rate, handgun permit checks per capita, and whether the state had legalized recreational marijuana.

Geographic Variation in Realized 988 Take-Up. In Appendix C, we implement a separate empirical strategy that leverages variation across states in realized take-up of 988 following national implementation. Specifically, we estimate an event study around differential realized exposure to a common shock, similar to Yagan (2019) and Finkelstein et al. (2025). Because realized 988 take-up captures potentially endogenous variation, such as latent demand for 988, we view this exercise as a useful descriptive complement to our baseline empirical strategy. Nevertheless, the results are qualitatively aligned with our main finding that states with greater 988 take-up did not experience reductions in mortality.

Funding. The 988 rollout introduced a new federal funding stream intended to expand state and local crisis line capacity. Figure A.1 provides descriptive evidence on how this funding relates to baseline capacity gaps and broader mental health spending. Panel (c) shows that states with larger baseline capacity gaps received, at most, slightly more SAMHSA 988 funding per capita in 2022; the relationship is positive but modest. This suggests that the first stage is not driven by federal grants mechanically targeting high-gap

[14] If call centers also changed operational protocols in ways beyond answering calls, such as improving call quality, follow-up, referrals, or mobile crisis dispatch, this is a limitation on the interpretation rather than a violation of the reduced form estimates. We return to this possibility later in the paper.

states.

Panel (b) provides context on pre-existing mental health resources. States with larger baseline capacity gaps tended to have lower State Mental Health Agency expenditures per capita before 988, though this measure captures broad mental health spending and only a small share is likely devoted to crisis line operations. We do not observe all pre-988 state, local, or philanthropic funding for Lifeline call centers, so we cannot directly measure baseline crisis line funding. Nevertheless, the pattern is consistent with larger capacity gaps reflecting weaker pre-existing crisis line operational infrastructure.

5 Results

We begin by documenting descriptive trends of Lifeline crisis center call activity around 988 implementation. As shown in Table 1, between January and April 2022 (the period in which we measure our treatment variable), the average state received 3,178 National Suicide Prevention Lifeline calls, of which 75% were answered in-state. Figure 2 presents the national time series and reveals two distinct patterns after 988's introduction. First, the number of monthly calls increased rapidly, averaging 4,298 per state between August and November 2022 and eventually reaching 5,575 monthly calls by early 2024, for a nationwide total of more than 250,000 crisis calls per month——representing a 75% increase. Second, the share of calls answered in-state rose to 82% soon after 988 implementation and reached 85% by early 2024. Alongside this growth, cross-state variation in answer rates and wait times narrowed, while average talk time held steady at about 13 minutes, indicating federal funding improved staffing and operations without sacrificing call quality.

The same figure also plots national monthly suicide deaths. In contrast to the sharp increase in Lifeline call volume and call answering after 988 implementation, the aggregate suicide series shows no visually apparent break or sustained decline after July 2022. The 12-month moving average remains flat around the time of implementation and does not fall as 988 call volume expands (with the exception of a documented rise in the second year of the COVID-19 pandemic; CDC, 2023). This aggregate pattern suggests that any mortality effects of 988 are unlikely to be evident from national time series variation alone, motivating the cross-state design below.[15]

[15]The correlation between baseline 2021 age-adjusted suicide mortality rate and $BaselineCapacityGap_s$ is negative but weak (Figure A.1 panel a)

5.1 Call Outcomes

We next examine the first stage by plotting the event study coefficients from Equation 1 for four outcomes in Figure 3: in-state answered calls; in-state answered or flowed to national backup calls; in-state answer rate; and in-state average talk time. Across all four measures, states with different baseline capacity gaps were on comparable trends in the year leading up to national implementation.

Immediately after national 988 implementation in July 2022, states with greater baseline capacity gaps began answering more calls in-state (panel a). Over the next two and a half years, the number of in-state answered calls remained higher. States with a 0.3 greater capacity gap per 1,000 residents before 988—approximately the cross-state standard deviation at baseline—answered an additional 1,256 calls, corresponding to a 24% increase over pre-988 levels.

Calls that are not answered in-state can either be abandoned by the caller in-state, flowed to national backup, or abandoned by the caller after being flowed to national backup. Figure A.2 shows that the rise in calls answered in-state reflects an 67% reduction in calls flowed to national backup and a smaller 14% reduction in calls abandoned in-state. This pattern is consistent with improved local response capacity in higher-gap states. While the data do not differentiate between national backup calls that are answered and those that are abandoned, panel (b) of Figure 3 shows an increase in calls that were either answered in-state or flowed to national backup (i.e., upper bound on total calls that could have been answered). Although the two-period DiD estimate is not significant at conventional levels, the post-988 event study coefficients are consistently above zero: the estimate is 616 additional calls answered in-state or potentially answered by national backup (SE: 472), a 10% effect size.

988 implementation and associated federal funding disproportionately improved call center operations in states with larger baseline capacity gaps. States with a one standard deviation greater baseline capacity gap raised their in-state answer rate by 10.9 percentage points (an effect size of roughly 16%; panel c). Average talk time also increased in the first year and a half, peaking at approximately half a minute longer through most of 2023, relative to a baseline mean of 13 minutes (panel d). However, this gap disappears by 2024. Overall, states with larger baseline capacity gaps were able to answer more calls in-state, answer a greater fraction of their routed calls, and spend a little more time on calls in the first year and a half.

Routed calls increased only modestly among states with larger baseline capacity gaps, suggesting that the first stage primarily reflects improved local response capacity rather than differential growth in call demand across states. States with a one standard deviation higher baseline capacity gap experienced a 6% increase in routed calls beginning in late 2023 (Figure A.2 panel c). This delayed increase could reflect word

of mouth from improved call operations, additional state or local efforts to raise 988 awareness, or changes in underlying demand for crisis services. Because this increase occurs after the initial improvements in in-state answered calls and answer rates and is a third of the increase in answered calls (434 routed vs 1256 answered in-state), it cannot explain the early first stage response. Nevertheless, in the robustness section we control for differential trends by baseline routed call volume to address the possibility of differential demand trends. Taken together, the call outcome findings indicate that 988 substantially expanded realized local crisis line response in states with larger baseline capacity gaps.

5.2 Suicide Mortality

We now turn to the reduced form impacts of 988 implementation on mortality, using differential exposure based on baseline crisis line capacity gaps. Figure 4 presents event study coefficients from Equation 1 and the two-period difference-in-differences estimates for four mortality outcomes: suicides, suicides and accidents, external causes, and all causes.

Panel (a) indicates no statistically significant reduction in age-adjusted suicide mortality rate per 100,000. States with a one standard deviation larger baseline capacity gap—0.3 additional pre-988 routed-but-not-answered calls per 1,000 residents—experienced a small, statistically insignificant increase in suicide mortality rate per 100,000 after 988 implementation (+0.006, SE = 0.006, baseline mean of 1.23 suicide deaths per 100,000). The confidence intervals are tight enough to rule out even modest short-run reductions in suicides: 95% confidence intervals rule out effect size reductions of more than half a percent. In the next section, we translate these reduced form estimates into implied mortality changes per 1,000 additional answered calls, and into the implied number of calls per suicide death averted.

Suicide deaths may be underestimated if they are misclassified as unintentional injuries (Bakst et al., 2016; Snowdon and Choi, 2020), and individuals at high risk of suicide often die from other external causes (Elser et al., 2025). Accordingly, panel (b) examines the combined category of suicides and accidents, panel (c) focuses on deaths due to external causes, and panel (d) presents results for all-cause mortality. Across these alternative mortality measures, we find no statistically significant changes.

Heterogeneity. Our average treatment effects may mask heterogeneity across subgroups, particularly if 988 use is concentrated among populations with higher awareness of or willingness to use the service. We therefore estimate effects on suicide mortality separately for females, Black individuals, and younger adults, three groups that prior survey evidence suggests are more likely to have used 988 or to report being very

likely to use it in the future (Purtle et al., 2023a).[16] As shown in Table A.3, we find no statistically significant reductions in suicide mortality for any of these groups—note that these are suicide counts as opposed to age-adjusted per 100,000. Although subgroup analyses are necessarily less precise, the point estimates do not indicate large mortality reductions among populations most likely to engage with the service. These results suggest that the average null effects are not masking large short-run mortality improvements for higher-use groups.

5.3 Implied Mortality Effects per Policy-Induced Answered Call

The large first stage effects raise a natural scaling question: how large a mortality effect is implied by the additional crisis line contacts induced by 988 implementation? Table 2 reports estimates scaled per 1,000 additional answered calls (in-state and in-state or flowed to national backup). Columns 1 and 2 first report OLS specifications that relate contemporaneous answered calls to the monthly age-adjusted suicide rate, conditional on state and month fixed effects.[17] These estimates provide a descriptive benchmark: state-months with more answered calls do not have lower suicide mortality. Columns 3 and 4 then instrument answered calls with $BaselineCapacityGap_s \times Post988_t$.

We emphasize that the 2SLS estimates are best interpreted as an implied scaling exercise rather than as our preferred causal specification. A causal interpretation would require that baseline capacity gap exposure affects suicide mortality only through additional answered calls. This exclusion restriction is strong: states may have used 988 resources to improve other operational margins, such as call quality, follow-up, referrals, or mobile crisis coordination; answered calls are only one component of the broader 988 treatment; and the identifying variation comes from a national, all-treated, relative-exposure setting rather than from a true untreated group. In addition, although the event study first stage is visually clear, the first stage is noisy. For these reasons, our preferred estimates remain the reduced form impacts of 988 implementation by baseline capacity gap. The estimates in Table 2 are instead useful because they provide an intuitive benchmark: the mortality change implied by 1,000 additional answered calls.

Consistent with the reduced form findings, the implied per-call estimates do not demonstrate meaningful mortality reductions. The OLS estimates in columns 1 and 2 are positive and statistically insignificant.

[16] Purtle et al. (2023a) survey adults one year after 988 implementation and find that, conditional on psychological distress, individuals under age 30 and college-educated individuals are more likely to have heard of 988, while individuals under age 30, college-educated individuals, Black individuals, and females are more likely to have used 988 or to report being very likely to use it in the future.

[17] The OLS specifications are two-way fixed effects regressions of state-month suicide mortality on contemporaneous answered calls, analogous in spirit to panel models relating state-level mortality to contemporaneous state-level conditions, such as unemployment in Ruhm (2000). In our setting, measuring calls and mortality in the same month is natural: to the extent crisis calls avert suicide deaths, the relevant effect is likely to occur over a short horizon rather than much later.

IV-scaled estimates are also positive and small: using in-state answered calls (column 3), the implied effect is 0.0053 suicide deaths per 100,000 residents, per 1,000 additional answered calls, with a 95% confidence interval of $[-0.0064, 0.0170]$. Relative to the baseline monthly age-adjusted suicide rate of 1.23 per 100,000, the lower end of this confidence interval rules out reductions larger than 0.52% per 1,000 additional in-state answered calls. Using calls answered in state or flowed to backup (column 4), the implied effect is 0.0111, with a 95% confidence interval of $[-0.0134, 0.0355]$, ruling out reductions larger than 1.09% per 1,000 additional overall answered calls. Equivalently, for a state with 5 million residents, the lower endpoints of the confidence intervals imply that the estimates rule out effects larger than one suicide death averted per 3,125 additional in-state answered calls, or per 1,493 calls answered in-state or flowed to backup.[18]

Precision and Benchmarking. Prior observational medical studies have found statistically significant reductions in suicide mortality associated with Lifeline crisis line. Niederkrotenthaler et al. (2021) estimate that a viral song "1-800-273-8255" was associated with 9,915 excess Lifeline calls and 245 fewer suicides over a 34-day period and a 5.5% reduction in suicides. This implies one suicide death averted per 40.5 additional calls, far below the lower-bound implied calls per suicide death averted we calculate above. More recently, Patel et al. (2026) estimate an 11% reduction in adolescent and young adult suicides in a national time series after July 2022, as well as a 7.6 percentage point larger reduction in the 10 states with the largest increases in answered calls relative to the 10 states with the smallest increases. As discussed above, our design cannot speak to national impacts. However, applying our reduced form estimate to the difference in baseline capacity gaps between high- and low-uptake states implies a change in age-adjusted suicide mortality of -0.7% to $+2.0\%$ (95% confidence interval), ruling out a 7.6% differential reduction.[19] Finally, although not directly comparable, our mortality results are also not consistent with reductions in suicidal intent documented in prior work translated into detectable population-level reductions in suicide mortality (Gould et al., 2007b).[20]

[18] The lower endpoints of the 95% confidence intervals imply reductions of 0.0064 and 0.0134 suicide deaths per 100,000 residents, per 1,000 additional calls. For a state with 5 million residents, this corresponds to $0.0064 \times 50 = 0.32$ deaths per 1,000 in-state answered calls and $0.0134 \times 50 = 0.67$ deaths per 1,000 calls answered in state or flowed to backup. Thus, the implied calls per suicide death averted are $1{,}000/0.32 = 3{,}125$ and $1{,}000/0.67 \approx 1{,}493$, respectively.

[19] The difference in mean $BaselineCapacityGap_s$ between the 10 states with the largest and smallest increases in answered 988 calls is 0.428 ($=0.797 - 0.369$). Multiplying this difference by the reduced form estimate and dividing by 0.3 (the scaling parameter used) yields -0.0086 to $+0.0256$ deaths per 100,000. Dividing by the baseline age-adjusted suicide mortality rate of 1.23 gives a relative effect size of -0.7% to $+2.0\%$.

[20] Gould et al. (2007b) find that intent to die among suicidal callers decreased by 16% immediately following the call and by 20% one to two weeks later; related measures of psychological pain and hopelessness decreased by 30% and 40%, respectively.

5.4 Mechanisms and Robustness

Why did suicide mortality not fall in states with greater 988 exposure? One possibility is that most 988 callers are not at imminent risk of suicide (Drapeau, 2024). Crisis line contact may improve emotional distress, perceived support, or connection to resources without producing detectable changes in suicide mortality. Consistent with this possibility, prior studies find that surveyed hotline callers report improvements in emotional state after a call (Gould et al., 2007a; Britton et al., 2013; Mishara et al., 2016; Gould et al., 2018). In Appendix B, we examine broader measures of mental health utilization, prescription drug use, and overall mental well-being, but do not detect statistically significant changes. These outcomes should be interpreted cautiously, since they are broad population-level measures observed at discrete points in time.

A second possibility is that expanded crisis line response may have limited impacts when callers cannot be connected to downstream mental health services. Since the average 988 call lasts about 13 minutes and may include counseling, safety planning, and referrals to local services,[21] the effectiveness of 988 may depend on the availability and accessibility of community-based mental health resources. This concern is especially relevant given broader evidence of mental health workforce shortages and constraints in treatment capacity in the U.S. (Kuehn, 2022; Hoffmann et al., 2023).

We examine this downstream capacity explanation in two ways. First, we test whether states with larger baseline capacity gaps differentially expanded crisis-related employment, mental health workforce capacity, or treatment capacity after 988 implementation. This analysis serves both as a mechanism check—whether higher capacity gap states used 988-related resources to expand relevant capacity—and as a robustness check against broader exclusion restriction concerns, such as whether lower capacity gap states improved mental health operations along margins not captured by call outcomes. Figure 5 shows no statistically significant effects on the number of employed mental health professionals or the number of facilities offering mental health services.[22] The one exception is a marginally significant increase in total employment at crisis-service-related organizations in 2023. We interpret this estimate cautiously because the industry code includes non-crisis social service organizations, and because many crisis centers rely on volunteers (Matthews et al., 2023), who are not measured in the BLS employment data.[23] In general, we cannot rule out that lower capacity gap states invested 988 funds in operational margins we do not observe.

Because 988 is one component of broader crisis response systems, its effectiveness may depend on the

[21] In the North Carolina HHS (2026) 988 dashboard, approximately 20% of 988 calls were referred to a service in 2025.

[22] This finding is broadly consistent with Cantor et al. (2025), who find that specialty mental health care did not expand nationally after 988's launch. They do, however, document a rise in peer support services—a relatively low-intensity intervention—which we do not find increased differentially in states with larger baseline capacity gaps.

[23] We scraped job postings from various 988 crisis centers in late 2024 and found that 18 out of 55 non-managerial call responder positions were volunteer positions. Appendix D provides examples of a few of these postings.

availability of downstream services such as mobile crisis teams, emergency medical services, capacity in mental health care, and other local response options (Holliday et al., 2024). We therefore test whether the effects of 988 exposure vary with baseline downstream mental-health capacity. Table A.4 interacts 988 exposure (baseline capacity gap interacted with post-988) with pre-988 state-level mental health workforce measures from BLS and facility-based service measures from N-SUMHSS. The call outcome results provide little evidence that downstream capacity moderated the operational first stage, suggesting that the improvement in call outcomes after 988 was similar across states with high versus low baseline mental health treatment capacity and primarily driven by differences in baseline capacity gap.

For suicide mortality, the results provide some suggestive evidence that downstream workforce capacity may matter. The interaction terms are negative for both workforce-based measures, indicating that the mortality effects of 988 exposure are negative in states with above median baseline psychiatrists and psychologists per capita and in states with above median broader mental health professional employment per capita. However, the implied effects in above median capacity states are small, and the analogous interactions using N-SUMHSS facility-based measures—emergency psychiatric on-site care and mobile crisis response—are not statistically significant and are mixed in sign. We therefore interpret these results as limited evidence of heterogeneity by downstream mental health workforce capacity, rather than evidence that downstream service availability mediates the overall effect of 988.

Robustness. Related to the mechanism results above, a final concern is that the estimated first stage and mortality effects may be sensitive to modeling choices rather than reflecting 988 implementation itself. We therefore conclude this section by assessing whether the main findings are robust to alternative samples, specifications, outcome definitions, and definitions of treatment exposure.

Table 3 reports these robustness checks. We first assess robustness to alternative samples and specifications. These checks address potential confounding from state-level shocks, influential large states, differential trends in baseline call demand, and reliance on a linear treatment measure. Specifically, we add time-varying state-level controls for economic conditions, handgun permit checks, and recreational marijuana in row 2,[24] and exclude potentially influential states (Illinois and Texas) in row 3. We also consider two sensitivity analyses around the continuous treatment structure of our design. In row 4, we compare states in the top versus bottom terciles of treatment exposure, excluding the middle tercile. In row 5, we implement the continuous treatment approach of Callaway et al. (2026), defining states with very small baseline capacity gaps as the

[24]Specifically, these are state-month controls for labor force participation rate, unemployment rate, handgun permit checks per capita, and whether the state has legal recreational marijuana.

least-treated comparison group.[25] Row 6 estimates a Poisson regression. These last three specifications relax the linearity and functional form assumptions imposed by the baseline continuous exposure model.

In row 7, we allow for differential trends by baseline routed calls per capita. This robustness check addresses a demand-side violation of our empirical design. Since the baseline capacity gap incorporates both the number of calls routed to a state and the share not answered in state, states with larger gaps may have differed not only in call center capacity but also in underlying demand for crisis line (and mental health services). Allowing for differential trends by baseline routed calls per capita tests whether the main results are driven by states with higher pre-988 call volume following different trajectories after 988 implementation.

We then examine an alternative suicide outcome. Row 8 uses the log age-adjusted suicide rate for a percent effect interpretation. Finally, we consider alternative treatment definitions. Row 9 constructs the baseline capacity gap using September–December 2021 rather than January–April 2022, addressing the concern that the call center operations may be vulnerable to mean reversion concerns over our baseline period. Row 10 uses the baseline capacity gap in levels rather than per capita, and row 11 uses the negative of the pre-988 in-state answer rate, which effectively ignores the volume of calls routed to the state.

Across these specifications, the main conclusions are unchanged. States with larger baseline crisis line capacity gaps experienced substantial improvements in call outcomes after 988 implementation, particularly in-state answered calls and in-state answer rates. In contrast, the estimated effects on suicide mortality remain small and statistically indistinguishable from zero across alternative controls, samples, outcome definitions, and treatment definitions. Together, these checks show that the mortality null is stable and robust. Finally, Appendix C shows that this conclusion is unchanged in a complementary realized take-up design that incorporates both capacity improvements and demand-side responses: states with greater post-988 increases in potentially answered calls do not experience detectable reductions in suicide mortality.

6 Discussion and Conclusion

The National Suicide Hotline Designation Act was one of the most significant national mental health policies in recent decades, establishing 988 as a universal crisis line number and directing new federal resources toward state and local crisis call systems. This paper evaluates the first year and a half of implementation by linking 988 operational metrics to cause of death mortality and population health outcomes and leveraging pre-

[25] Because 988 was implemented nationally, there is no untreated state. Following Callaway et al. (2026), we instead compare higher-gap states to the path of outcomes of the "least treated," defined as the seven states with baseline capacity gaps below 0.2 calls per 1,000 residents. This requires an adapted parallel trends assumption: low-gap states must approximate the counterfactual trend for high-gap states under minimal treatment exposure.

existing cross-state variation in baseline crisis line capacity gaps. We find that 988 substantially expanded realized local crisis line response in states with larger baseline capacity gaps: these states answered more calls in state, more calls overall, increased their in-state answer rates, and initially spent somewhat longer on calls. These operational gains are meaningful in their own right: prior evidence suggests that crisis line contact can reduce short-run emotional distress (Hoffberg et al., 2020), and existing cost estimates indicate that 988 provides immediate crisis support at relatively low cost (Purtle et al., 2023b).[26]

However, these improvements in crisis line response did not translate into detectable reductions in suicide mortality over the study period. The reduced form mortality estimates are small, statistically insignificant, and precise enough to rule out even modest mortality reductions. This conclusion is robust to alternative mortality definitions, alternative treatment definitions, additional controls, and specifications that account for differential trends by baseline call demand. We also find no statistically significant improvements in broader population mental health outcomes or downstream treatment utilization, and little evidence that states with larger baseline capacity gaps differentially expanded broader mental health workforce or facility-based treatment capacity.

These estimates should be interpreted with a few limitations in mind. First, because 988 was implemented nationally, the design estimates the effects of greater exposure to 988-related local capacity expansion, not the total national effect of 988 relative to no crisis line. Second, suicide mortality is relatively infrequent, and suicide deaths can be difficult to classify, so our study cannot rule out broader health improvements that are not well captured in population data. Third, the post-period covers only the first two and a half years of implementation, a period when awareness, operational capacity and staffing, and local crisis-response systems were still evolving. The findings therefore speak to the early suicide mortality effects of expanded crisis line answering capacity, rather than to the full health value of 988.

As 988 awareness grows, georouting changes call routing, and states continue to build crisis response systems, longer run evaluation will be important. The early evidence from implementation indicates that 988 achieved a central operational goal: more callers reached local crisis responders. Whether those operational improvements ultimately translate into population health gains may depend on whether crisis line access is paired with broader investments that allow callers to receive effective support after the call ends.

[26] Purtle et al. (2023b) estimate that the average 988 call costs $82. At an average call length of 13.2 minutes, this corresponds to approximately $373 per hour of crisis line contact. This comparison is intended only as a cost benchmark as 988 crisis counseling differs from licensed psychotherapy.

References

988 Suicide & Crisis Lifeline, "About 988," 2026. Accessed June 19, 2026.

Alexander, Diane and Molly Schnell, "The impacts of physician payments on patient access, use, and health," Technical Report, National Bureau of Economic Research 2019.

Ang, Desmond, Panka Bencsik, Jesse Bruhn, and Ellora Derenoncourt, "Community Engagement with Law Enforcement after High-Profile Acts of Police Violence," *American Economic Review: Insights*, 2025, *7* (1), 124–142.

Athey, Susan and Scott Stern, "The Impact of Information Technology on Emergency Health Care Outcomes," *RAND Journal of Economics*, 2002, pp. 399–432.

Ba, Bocar A., "Alternatives to 911," Working Paper 34933, National Bureau of Economic Research March 2026.

Bakst, Shelly S, Tali Braun, Inbar Zucker, Ziva Amitai, and Tamy Shohat, "The accuracy of suicide statistics: are true suicide deaths misclassified?," *Social Psychiatry and Psychiatric Epidemiology*, 2016, *51*, 115–123.

Bartik, Timothy J., *Who Benefits from State and Local Economic Development Policies?*, Kalamazoo, MI: W.E. Upjohn Institute for Employment Research, 1991.

Biasi, Barbara, Michael S. Dahl, and Petra Moser, "Career Effects of Mental Health: Evidence from Innovations in Treating Bipolar Disorder," 2022.

Britton, Peter C, Robert M Bossarte, Caitlin Thompson, Janet Kemp, and Kenneth R Conner, "Influences on call outcomes among veteran callers to the National Veterans Crisis Line," *Suicide and Life-Threatening Behavior*, 2013, *43* (5), 494–502.

Callaway, Brantly, Andrew Goodman-Bacon, and Pedro H.C. Sant'Anna, "Difference-in-Differences with a Continuous Treatment," *American Economic Review*, 2026.

Cantor, Jonathan, Megan S. Schuler, Rose Kerber, Jonathan Purtle, and Ryan K. McBain, "Changes in Specialty Crisis Services Offered Before and After the Launch of the 988 Suicide and Crisis Lifeline," *JAMA Psychiatry*, 01 2025.

Carpenter, Christopher and Carlos Dobkin, "The effect of alcohol consumption on mortality: regression discontinuity evidence from the minimum drinking age," *American Economic Journal: Applied Economics*, 2009, *1* (1), 164–182.

CDC, "Suicide Prevention: Resource for Action. A Compilation of the Best Available Evidence.," Technical Report 2022.

CDC, "Notes from the Field: Recent Changes in Suicide Rates, by Race and Ethnicity and Age Group — United States, 2021," *Morbidity and Mortality Weekly Report*, 2023, *72* (6), 160–162.

Chalfin, Aaron, Benjamin Hansen, Emily K Weisburst, and Morgan C Williams Jr, "Police force size and civilian race," *American Economic Review: Insights*, 2022, *4* (2), 139–158.

Colorado Behavioral Health Administration, "988 in Colorado Data Dashboard," 2026. Accessed June 19, 2026.

Cook, Philip J and Jens Ludwig, "The social costs of gun ownership," *Journal of Public Economics*, 2006, *90* (1-2), 379–391.

Costantini, Sydney, "How do mental health treatment delays impact long term mortality?," *American Economic Review*, 2025.

Cuddy, Emily and Janet Currie, "Rules vs. discretion: Treatment of mental illness in us adolescents," Technical Report 2024.

Currie, Janet, "The economics of child mental health: Introducing the causes and consequences of child mental health special issue," *Journal of Human Resources*, 2024, *59* (S), S1–S13.

Cutler, David M, Edward L Glaeser, and Karen E Norberg, "Explaining the rise in youth suicide," in "Risky behavior among youths: An economic analysis," University of Chicago Press, 2001, pp. 219–270.

Donohue, John J, Samuel V Cai, and Arjun Ravi, "Age and Suicide Impulsivity: Evidence from Handgun Purchase Delay Laws," Technical Report, National Bureau of Economic Research 2023.

Drapeau, Christopher W., "What Happens When People Are Actively Suicidal? An In-Depth Analysis of 988 Suicide & Crisis Lifeline Imminent Risk Data," Technical Report, Vibrant Emotional Health 2024. Accessed from Vibrant Emotional Health.

Elser, Holly, Mathew V Kiang, Keith Humphreys, and Jonathan Zhang, "High-Risk Emergency Department Visits and Risk of All-Cause Mortality, Suicide, and Fatal Overdose Among US Military Veterans," *American Journal of Epidemiology*, 2025.

Evans, William N and Emily G Owens, "COPS and Crime," *Journal of public Economics*, 2007, *91* (1-2), 181–201.

Finkelstein, Amy, Matthew J. Notowidigdo, Frank Schilbach, and Jonathan Zhang, "Lives Versus Livelihoods: The Impact of the Great Recession on Mortality and Welfare," *The Quarterly Journal of Economics*, 2025, *140* (3), 2269–2328.

Gould, Madelyn S, Alison M Lake, Hanga Galfalvy, Marjorie Kleinman, Jimmie Lou Munfakh, James Wright, and Richard McKeon, "Follow-up with Callers to the National Suicide Prevention Lifeline: Evaluation of Callers' Perceptions of Care," *Suicide Life Threat Behav*, 2018, *48* (1).

Gould, Madelyn S., Alison M. Lake, Marjorie Kleinman, Hanga Galfalvy, and Richard McKeon, "Third-party callers to the national suicide prevention lifeline: Seeking assistance on behalf of people at imminent risk of suicide," *Suicide and Life-Threatening Behavior*, 2022, *52* (1), 37–48.

Gould, Madelyn S, John Kalafat, Jimmie Lou HarrisMunfakh, and Marjorie Kleinman, "An evaluation of crisis hotline outcomes. Part 2: Suicidal callers," *Suicide and Life-Threatening Behavior*, 2007, *37* (3), 338–352.

_ , John Kalfat, Jimmie Lou, Harris Munfakh, and Marjorie Kleinman, "An Evaluation of Crisis Hotline Outcomes Part 2: Suicidal Callers," *Suicide and Life-Threatening Behavior*, 2007, *37* (3), 338–352.

Hoffberg, Adam S, Kelly A Stearns-Yoder, and Lisa A Brenner, "The Effectiveness of Crisis Line Services: A Systematic Review," *Frontiers in Public Health*, 2020.

Hoffmann, Jennifer A., Megan M. Attridge, Michael S. Carroll, Norma-Jean E. Simon, Andrew F. Beck, and Elizabeth R. Alpern, "Association of Youth Suicides and County-Level Mental Health Professional Shortage Areas in the US," *JAMA Pediatrics*, 01 2023, *177* (1), 71–80.

Holliday, Stephanie Brooks, Samantha Matthews, Wendy Hawkins, Jonathan H. Cantor, and Ryan K. McBain, "The Road to 988/911 Interoperability: Three Case Studies on Call Transfer, Colocation, and Community Response," Technical Report, RAND Corporation 2024.

Huh, Jason and Julian Reif, "Teenage driving, mortality, and risky behaviors," *American Economic Review: Insights*, 2021, *3* (4), 523–539.

Jácome, Elisa, "Mental health and criminal involvement: Evidence from losing medicaid eligibility," *Job Market Paper, Princeton University*, 2020.

KFF, "988 Suicide Crisis Lifeline: Two Years After Launch 988 Suicide Crisis Lifeline: Two Years After Launch," https://www.kff.org/mental-health/issue-brief/988-suicide-crisis-lifeline-two-years-after-launch/ 2024. Accessed: 2025-02-06.

Kuehn, Bridget M., "Clinician Shortage Exacerbates Pandemic-Fueled "Mental Health Crisis"," *JAMA*, 06 2022, *327* (22), 2179–2181.

Laflamme, Lucie, Marjan Vaez, Karima Lundin, and Mathilde Sengoelge, "Prevention of suicidal behavior in older people: a systematic review of reviews," *PLoS One*, 2022, *17* (1), e0262889.

Lang, Matthew, "Firearm background checks and suicide," *The Economic Journal*, 2013, *123* (573), 1085–1099.

Marcotte, Dave E and Benjamin Hansen, "The re-emerging suicide crisis in the US: Patterns, causes and solutions," *Journal of Policy Analysis and Management*, 2024, *43* (2), 582–612.

Matthews, Samantha, Jonathan H. Cantor, Stephanie Brooks Holliday, Armenda Bialas, Nicole K. Eberhart, Joshua Breslau, and Ryan K. McBain, "National preparedness for 988—the new mental health emergency hotline in the United States," *Preventive Medicine Reports*, 2023, *33*, 102208.

Mello, Steven, "More COPS, less crime," *Journal of public economics*, 2019, *172*, 174–200.

Mishara, Brian L, Marc Daigle, Cécile Bardon, François Chagnon, Bogdan Balan, Sylvaine Raymond, and Julie Campbell, "Comparison of the Effects of Telephone Suicide Prevention Help by Volunteers and Professional Paid Staff: Results from Studies in the USA and Quebec, Canada," *Suicide Life Threat Behav*, 2016, *46* (5).

NAMI, "Poll of Public Perspectives on 988 Crisis Response," 2024. Accessed: 2025-04-14.

Niederkrotenthaler, Thomas, Ulrich S Tran, Madelyn Gould, Mark Sinyor, Steven Sumner, Markus J Strauss, Martin Voracek, Benedikt Till, Sean Murphy, Frances Gonzalez et al., "Association of Logic's hip hop song "1-800-273-8255" with Lifeline calls and suicides in the United States: interrupted time series analysis," *bmj*, 2021, *375*.

North Carolina HHS, "988 Performance Dashboard," 2026. Accessed June 19, 2026.

Oregon Health Authority, "Oregon 988 Dashboard," 2026. Accessed June 19, 2026.

Ortega, Alberto, "Medicaid expansion and mental health treatment: evidence from the affordable care act," *Health Economics*, 2023, *32*.

Oscar-Berman, Marlene and Ksenija Marinković, "Alcohol: effects on neurobehavioral functions and the brain," *Neuropsychology review*, 2007, *17*, 239–257.

Patel, Vishal R., Michael Liu, and Anupam B. Jena, "Suicide Mortality Among Adolescents and Young Adults After Launch of a Suicide and Crisis Lifeline," *JAMA*, 2026, *335* (19), 1721–1723.

Purtle, Jonathan and Michael Lindsey, "The 988 Suicide and Crisis Lifeline in the US: status of evidence on implementation," *World Psychiatry*, 2025, *24* (1), 135.

_ , Anna-Michelle Marie McSorley, Abigail Lin Adera, and Michael A Lindsey, "Use, potential use, and awareness of the 988 suicide and crisis lifeline by level of psychological distress," *JAMA network*

open, 2023, *6* (10), e2341383–e2341383.

_ , **J Chance Ortego, Sachini Bandara, Alena Goldstein, Jordan Pantalone, and Matthew Goldman**, "Implementation of the 988 Suicide & Crisis Lifeline at the State-Level: Estimating Costs of Increased Call Demand at Lifeline Centers and Quantifying State Financing," *The journal of mental health policy and economics*, 2023, *26* (2), 85.

Rhode Island Department of Behavioral Healthcare, Developmental Disabilities & Hospitals, "988 Suicide & Crisis Lifeline," 2026. Accessed June 19, 2026.

Ridley, Matthew, Gautam Rao, Frank Schilbach, and Vikram Patel, "Poverty, depression, and anxiety: Causal evidence and mechanisms," *Science*, 2020, *370* (6522).

Ruhm, Christopher J., "Are Recessions Good for Your Health?," *The Quarterly Journal of Economics*, May 2000, *115* (2), 617–650.

SAMHSA, "988 Monthly State Report," Technical Report 2022. Accessed: 2025-04-09.

_ , "Cooperative Agreements for States and Territories to Build Local 988 Capacity," 2022. Notice of Funding Opportunity SM-22-015, 988 State and Territory Cooperative Agreements.

_ , "988 Suicide & Crisis Lifeline Performance Metrics," 2025. Accessed: 2025-04-02.

Saunders, Heather, "988 Suicide & Crisis Lifeline: Two Years After Launch," Technical Report, Kaiser Family Foundation (KFF) 2024. Accessed: 2025-04-09.

Serena, Benjamin Ly, "The Causal Effect of Scaling up Access to Psychotherapy," 2022.

Silver, David and Jonathan Zhang, "Invisible Wounds: How Mental Disability Benefits Shape Veteran Well-Being," *American Economic Journal: Economic Policy*, February 2026, *18* (1), 282–317.

Snowdon, John and Namkee G Choi, "Undercounting of suicides: where suicide data lie hidden," *Global public health*, 2020, *15* (12), 1894–1901.

Suran, Melissa, "How the new 988 lifeline is helping millions in mental health crisis," *JAMA*, 2023.

Swensen, Isaac D., "Substance-abuse treatment and mortality," *Journal of Public Economics*, 2015, *122*, 13–30.

Vibrant, "988 Suicide Crisis Lifeline Answered Nearly 5 Million Contacts in Its First Year – 2 Million More Than the Previous 12 Months," https://www.vibrant.org/988-suicide-crisis-lifeline-answered-nearly-5-million-contacts-in-its-first-year-2-million-more-than 2023. Accessed: 2025-01-07.

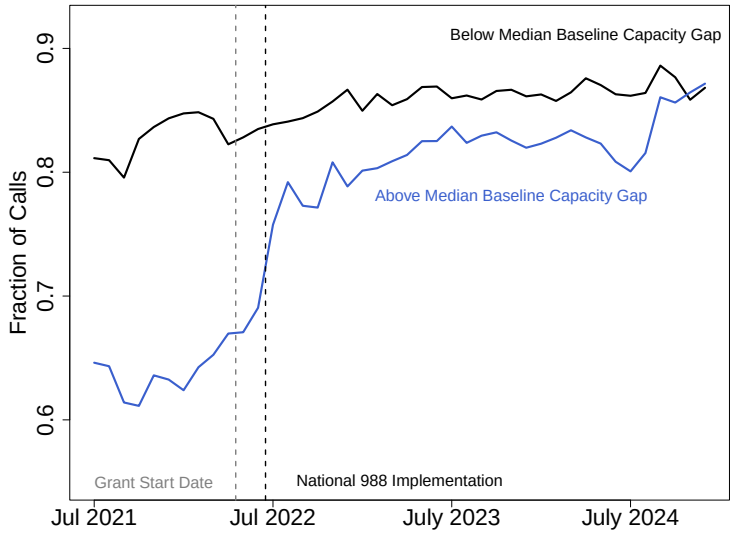
Weisburst, Emily K, "Safety in police numbers: Evidence of police effectiveness from federal COPS grant applications," *American Law and Economics Review*, 2019, *21* (1), 81–109.

Yagan, Danny, "Employment Hysteresis from the Great Recession," *Journal of Political Economy*, 2019, *127* (5), 2505–2558.

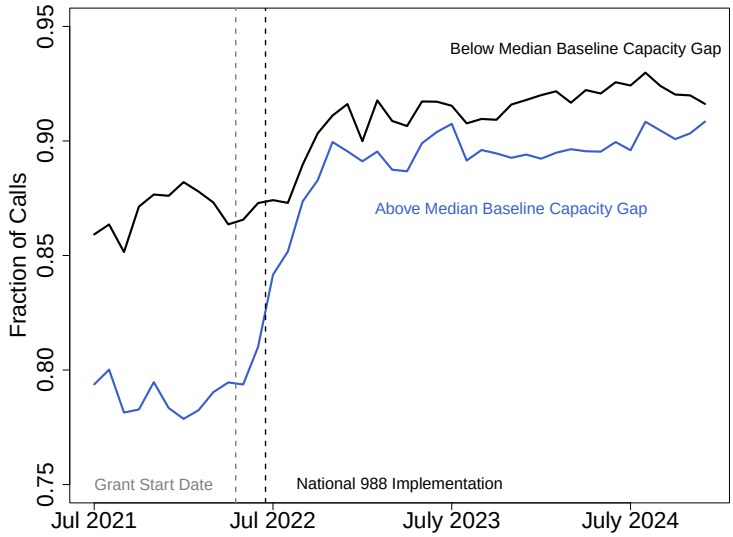
Figures and Tables

Figure 1: Graphical Illustration of Difference-in-Differences Strategy

Panel (a): Calls Answered In-State

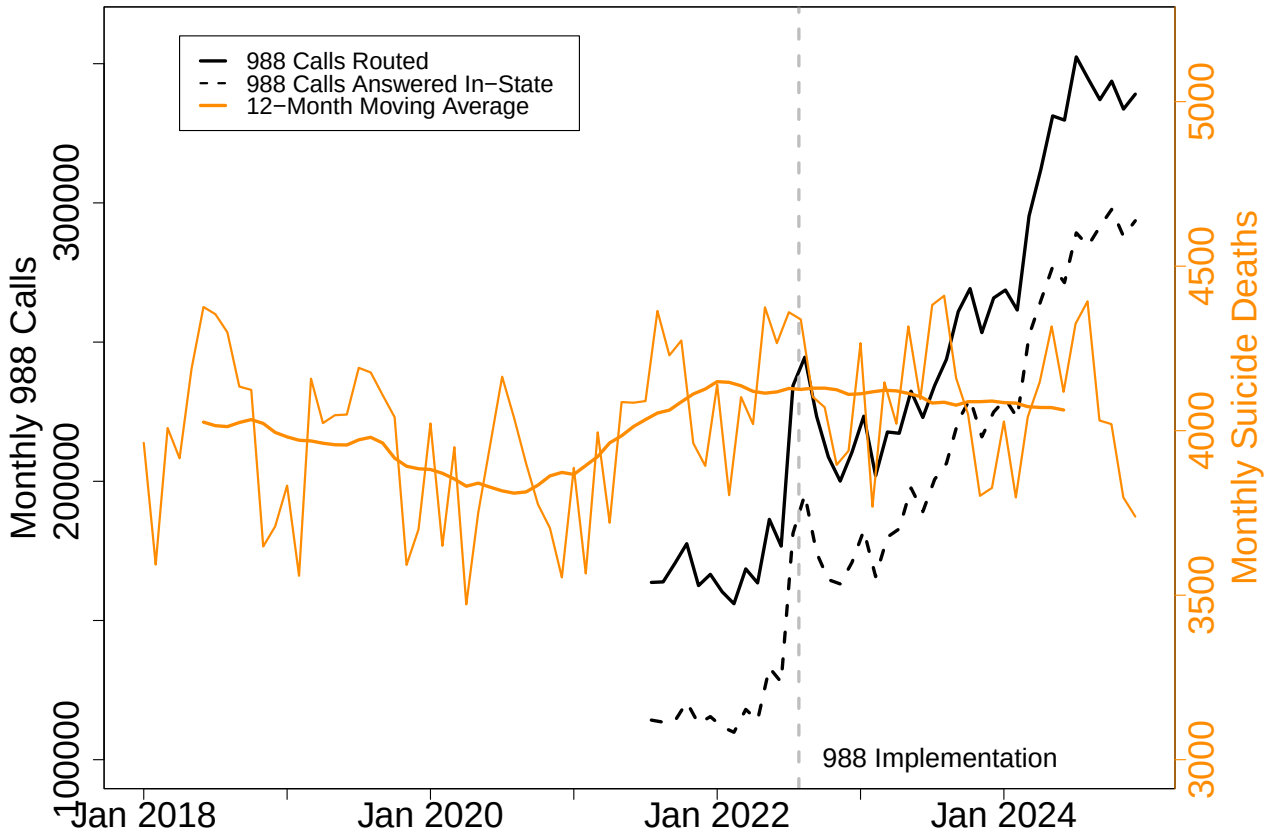


Panel (b): Calls Answered In-State or Flowed to National Backup



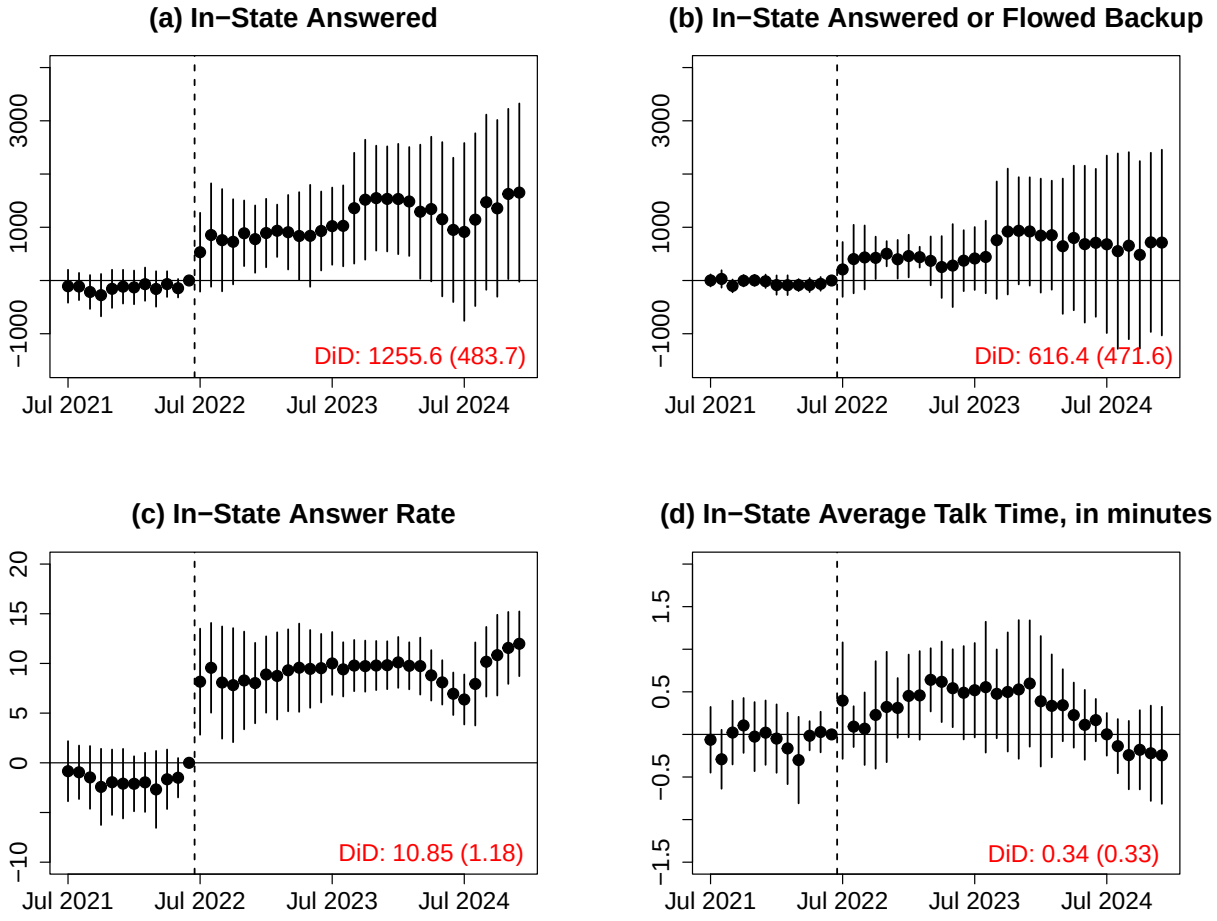
Notes: This figure presents our empirical strategy in Section 4 which compares states with different baseline capacity gaps, $BaselineCapacityGaps_s$, defined as the number of calls per 1,000 residents in a state between January to April 2022 that were not answered in-state. Panel (a) and (b) show outcomes of the fraction of all routed calls that are answered in-state and answered in-state or flowed to national backup. Note that not all calls flowed to national backup are answered; we do not observe the status of these calls in our data. The dashed vertical lines correspond to the grant funding availability date of April 30, 2022 and 988 national launch date of July 16, 2022. The blue and black lines correspond to above and below median $BaselineCapacityGaps_s$, which is equal to 0.452 call gap per 1,000 residents. Our empirical strategy is a continuous (50-state) version of this above versus below comparison.

Figure 2: Time Series of Monthly 988 Lifeline Calls and Suicide Deaths



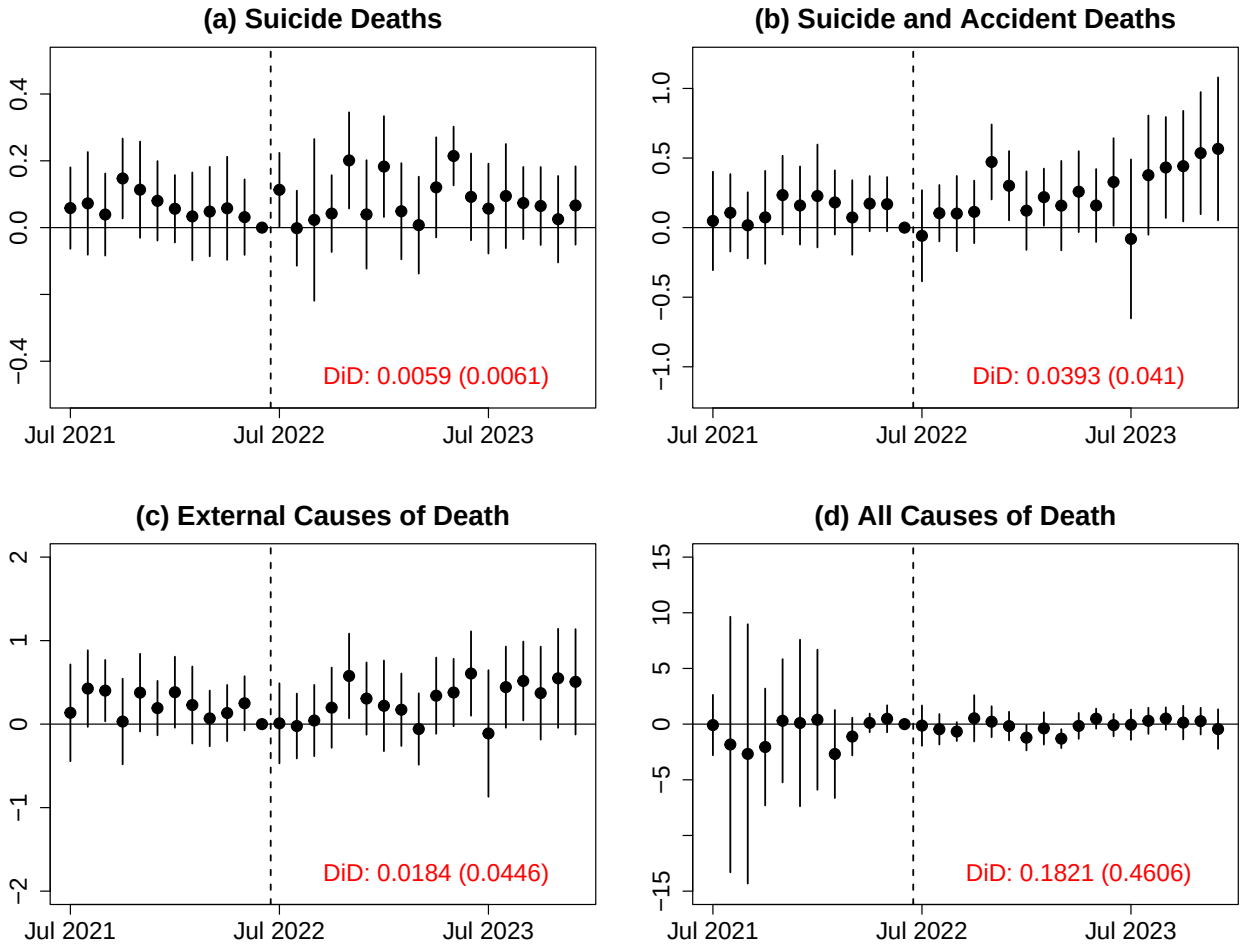
Notes: This figure plots the time series of monthly Lifeline crisis line calls routed and answered in-state on the left y-axis and monthly suicide deaths on the right y-axis. Lifeline call data begins in July 2021. The solid orange line corresponds to 12 month centered moving average. The dashed vertical line shows July 2022, when 988 was implemented nationally.

Figure 3: First Stage Impact of 988 Implementation on Lifeline Crisis Calls



Notes: This figure presents the output of Equation 1 for four monthly outcomes: (a) number of in-state answered calls, (b) number of in-state answered or flowed to national backup calls, (c) in-state call answer rate (in %), (d) average call time, in minutes. The dashed vertical line corresponds to national 988 rollout in July 2022. Note that not all calls flowed to national backup are answered; we do not observe the count of dropped backup calls. The two-period difference-in-difference (DiD) estimates are also displayed. All coefficients, including the two-period DiD estimates are scaled by 0.3, approximately the cross-state standard deviation in $BaselineCapacityGap_s$. Thus, these estimates represent the dynamic differences in outcomes across states with a capacity gap of 0.3 calls per 1,000 residents between January – April 2022. Regressions are weighted by the state's 2021 population count and robust standard errors are clustered at the state-level. The baseline means for each outcome are 5307, 6263, 69.7%, and 13.0 minutes, respectively.

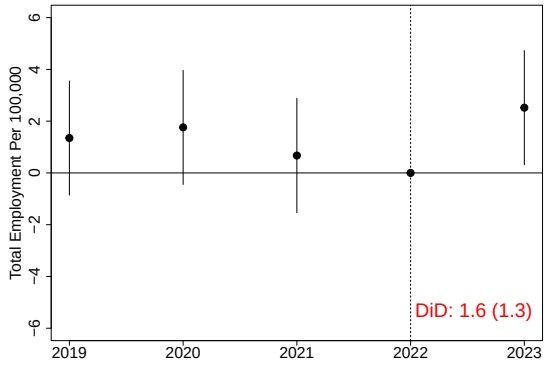
Figure 4: Age-Adjusted Mortality Rate Per 100,000



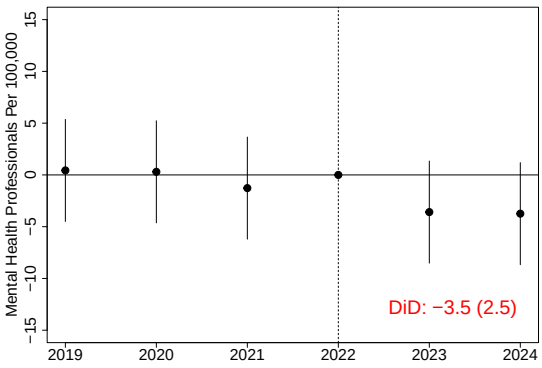
Notes: This figure presents the output of Equation 1 for four outcomes: (a) deaths from suicides, (b) deaths from suicides and accidents, (c) deaths from external causes, and (d) deaths from all causes. Data comes from the restricted use vital statistics. We obtain suicide deaths using the ICD cause of death codes X60-X84, suicide and accident-related deaths using the ICD cause of death codes X60-X84, V05, V15, V80.6, V81.2-V81.9, V90-99, and W00-X59, and external deaths using the codes V01–Y89. The dashed vertical line corresponds to national 988 rollout in July 2022. The two-period difference-in-difference (DiD) estimates are also displayed. All coefficients, including the two-period DiD estimates are scaled by 0.3, approximately the cross-state standard deviation in $BaselineCapacityGap_s$. Thus, these estimates represent the dynamic differences in outcomes across states with a capacity gap of 0.3 calls per 1,000 residents between January – April 2022. Regressions are weighted by the state's 2021 population count and robust standard errors are clustered at the state-level. The baseline mortality means for each outcome are 1.23, 2.84, 7.50, and 73.2 deaths per 100,000, respectively.

Figure 5: Crisis-Related Employment, and Treatment and Workforce Capacity

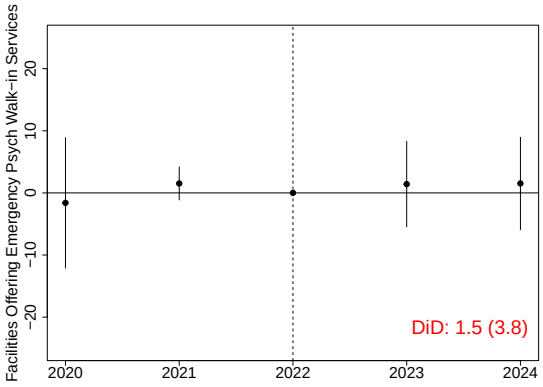
(a) Employment at Crisis Service-Related Firms Per 100,000



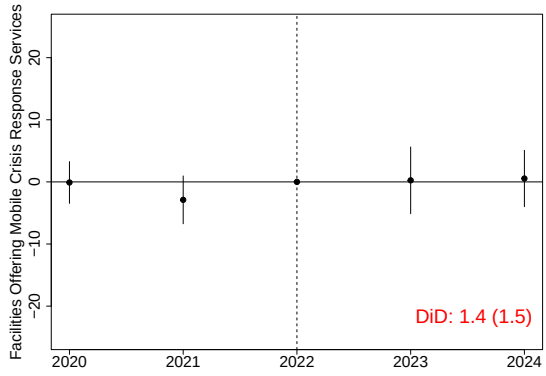
(b) Mental Health Professionals Per 100,000



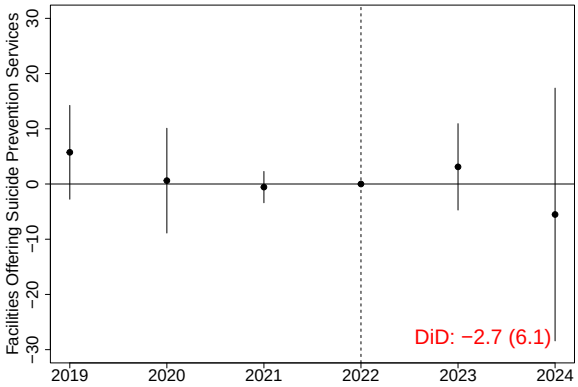
(c) No. of Facilities Offering Emergency Psych On-Site Services



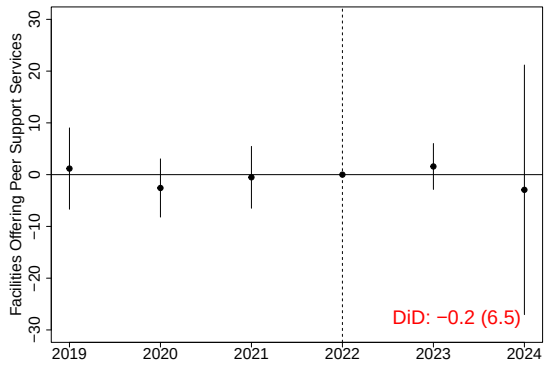
(d) No. of Facilities Offering Mobile Crisis Response Services



(e) No. of Facilities Offering Suicide Prevention Services



(f) No. of Facilities Offering Peer Support Services



Notes: This figure presents the output of Equation 1 for six measures of crisis-related employment, and treatment and workforce capacity. Panel (a) reports total employment from County Business Patterns using NAICS code 624190, which includes crisis lines and other related services, measured in March. Panel (b) reports mental health professionals comes from Bureau of Labor Statistics Occupational Employment and Wage Statistics (OEWS) using SOC codes measured in May (29-1223 — Psychiatrists, 19-3033 — Clinical and Counseling Psychologists, 21-1018 — Substance Abuse, Behavioral Disorder, and Mental Health Counselors, 21-1023 — Mental Health and Substance Abuse Social Workers). Panels (c) to (f) report number of facilities offering various services from the National Substance Use and Mental Health Services Survey (N-SUMHSS). All coefficients, including the two-period DiD estimates are scaled by 0.3, approximately the cross-state standard deviation in $BaselineCapacityGap_s$. Thus, these estimates represent the dynamic differences in outcomes across states with a capacity gap of 0.3 calls per 1,000 residents between January – April 2022. Regressions are weighted by the state's 2021 population count and robust standard errors are clustered at the state-level. The means for each outcome in 2021 are 125.6, 135.4, 124.7, 75.6, 259.3, and 145.6, respectively.

Table 1: State Monthly Lifeline Call Statistics

	Min	Q1	Median	Q3	Max	Mean	SD
Jan-Apr 2022 (Pre-988)							
Routed	247	933	2227	4091	22639	3178	3800
Answered in-state	166	757	1415	2934	19343	2225	2878
Answered in-state or flowed backup	214	800	1809	3266	19439	2597	3160
Answer rate in-state	0.199	0.675	0.759	0.836	0.986	0.746	0.14
Wait time (seconds)	8.0	22.2	28.5	39.9	62.3	31.5	12.7
Average talk time (minutes)	8.1	11.5	13.0	15.1	18.5	13.1	2.7
Aug-Nov 2022 (Post-988)							
Routed	402	1395	2931	5472	27959	4298	4821
Answered in-state	297	1107	2352	4408	24049	3418	3857
Answered in-state or flowed backup	360	1208	2634	4690	24300	3766	4199
Answer rate in-state	0.550	0.773	0.828	0.868	0.970	0.818	0.08
Wait time (seconds)	4.0	18.8	23.3	27.8	46.3	23.5	8.0
Average talk time (minutes)	7.4	11.2	12.8	14.1	18.7	12.7	2.6
Jan-Apr 2024 (Post-988)							
Routed	431	1630	3498	6876	31931	5575	6347
Answered in-state	345	1272	2933	6051	27721	4753	5527
Answered in-state or flowed backup	386	1449	3084	6199	28602	5024	5696
Answer rate in-state	0.581	0.802	0.869	0.893	0.978	0.847	0.08
Wait time (seconds)	0.75	17.1	21.5	26.9	38.5	21.5	8.1
Average talk time (minutes)	7.3	12.2	13.5	14.8	19.6	13.4	2.5
Call centers per state	1	1	2	4.5	19	3.8	4.3

Notes: This table presents summary statistics for state monthly Lifeline call centers for three time periods: January to April 2022 (Pre-988), August to November 2022 (Post-988), and January to April 2024 (Post-988). Statistics come from Lifeline and are at the state-month-level, which we aggregate to the state-period-level before calculating summary statistics. Routed calls are the number of calls that are received by Lifeline and routed to the individual call center, answered in-state are the number of calls answered by the individual call center, answered-in-state or flowed to backup also include calls that are not answered in-state but are flowed to national backup (not all national backup calls are answered), answer rate in-state is the ratio answered in-state to routed. Wait time is the average time, in seconds, it takes for a routed call to be answered (conditional on being answered). Average talk time, in minutes, is the average time the caller and responder are connected. The number of call centers per state are displayed in the bottom row and the list of all Lifeline crisis centers can be found at: https://988lifeline.org/learn/our-crisis-centers/crisis-centers-by-state-and-u-s-territory/. Table A.2 presents additional sample statistics for mortality, cause of death, economic, and health outcomes.

Table 2: Implied Suicide Effects per Additional 1,000 Answered Calls

	Dependent variable: Age-Adjusted Suicide Rate, per 100,000			
	OLS	OLS	2SLS	2SLS
	(1)	(2)	(3)	(4)
Scaled per 1,000 answered calls				
Answered In-State	0.0034		0.0053	
	(0.0024)		(0.0060)	
	[−0.0013, 0.0082]		[−0.0064, 0.0170]	
Answered In-State or		0.0025		0.0111
Flowed to Backup		(0.0028)		(0.0125)
		[−0.0030, 0.0080]		[−0.0134, 0.0355]
First Stage F-Stat			6.7	1.7
Durbin-Wu-Hausman p-value			0.676	0.426
Baseline Mean of Dep. Var.	1.23	1.23	1.23	1.23
Observations	1,530	1,530	1,530	1,530

Notes: This table presents the OLS and 2SLS estimate of the implied impact of 1,000 additional answered calls (either answered in-state in columns 1 and 3 or answered in-state or flowed to national backup in columns 2 and 4) on monthly age-adjusted suicide rate, per 100,000 individuals. Columns 1 and 2 present the contemporaneous impacts of monthly answered calls on age-adjusted suicide rate that month estimated via OLS: $Suicide_{st} = \beta Calls_{st} + \alpha_t + \lambda_s + \epsilon_{st}$, where s and t denote state and month. In columns 3 and 4, $Calls_{st}$ (either in-state; or in-state or flowed to national backup) is instrumented with $BaselineCapacityGap_s \times Post988_t$. The first stage F-statistic and the p-value associated with the Durbin-Wu-Hausman test for equivalence of OLS and IV are displayed for the 2SLS regressions. Baseline mean of the dependent variable is also displayed (mean monthly suicide rate per 100,000 across states prior to 988 implementation). Regressions are weighted by the state's 2021 population count and robust standard errors are clustered at the state-level and displayed in parentheses. 95% confidence intervals are displayed in the square brackets.

Table 3: Robustness

	Dependent variable:		
	In-State Calls	In-State or Flowed Backup	Suicide Mortality
	(1)	(2)	(3)
1. Baseline	1255.6***	616.4	0.00595
	(483.7)	(471.6)	(0.00611)
Alternate Samples or Specifications:			
2. With Control Variables	1157.3***	521.0	0.00429
	(370.9)	(358.8)	(0.00676)
3. Excluding Illinois and Texas	1089.5	791.1	-0.00457
	(1172.4)	(1107.1)	(0.00712)
4. Top vs Bottom Tercile Exposure	1087.5***	468.5	0.00642
	(452.6)	(464.8)	(0.00653)
5. Callaway, Goodman-Bacon, Sant'Anna (2026) Continuous Treatment	418***	382.6***	0.01268
	(159.3)	(140.5)	(0.03855)
6. Poisson Specification (% interpretation)	31.5***	7.4*	0.48
	(5.2)	(4.1)	(0.51)
7. Trend in Baseline Calls Per Capita	1108.4***	328.9	0.00671
	(521.0)	(457.2)	(0.00691)
Alternate Suicide Definitions:			
8. Log Age-Adjusted Suicide Rate			0.00506
			(0.00501)
Alternate Treatment Definitions:			
9. Baseline Period: Sept – Dec 2021	80.0***	51.8*	0.00036
	(26.9)	(30.8)	(0.00021)
10. Baseline Capacity Gap, in levels (in 1,000 calls)	101.2	69.9**	0.00048
	(27.1)	(34.2)	(0.00026)
11. (Negative) Pre-988 In-State Answer Rate	2475.0***	795.4	0.01452
	(1008.5)	(1029.6)	(0.01332)

Notes: This table reports robustness checks for the main two-period difference-in-differences estimates. Unless otherwise noted, cells report effects scaled to represent a 0.3 larger baseline capacity gap per 1,000 residents, approximately the cross-state standard deviation of the baseline capacity gap. Row 1 reports the baseline specification. Row 2 adds state-month controls for labor force participation rate, unemployment rate, handgun background checks per capita, and whether the state has legal recreational marijuana. Row 3 excludes Illinois and Texas. Row 4 compares states in the top versus bottom terciles of the baseline capacity-gap distribution, excluding the middle tercile. Row 5 implements the continuous-treatment difference-in-differences estimator of Callaway et al. (2026), using states with baseline capacity gaps below 0.2 calls per 1,000 residents as the least-treated comparison group. Row 6 estimates a Poisson specification and reports percentage effects, calculated as $100 \times [\exp(0.3\hat{\beta}) - 1]$. Row 7 allows for differential trends by baseline routed calls per capita. Row 8 uses the log age-adjusted suicide rate as the outcome. Row 9 constructs the baseline capacity gap using September–December 2021 rather than January–April 2022. Row 10 uses the baseline capacity gap in levels rather than per capita. Row 11 uses the negative of the pre-988 in-state answer rate as the treatment exposure. Regressions are weighted by the state's 2021 population count and robust standard errors are clustered at the state-level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Online Appendix for

"The Impact of Suicide Hotlines on Health: Evidence from 988 Implementation"

Table of Contents

A Additional Exhibits **A.2**

B Mental Health Utilization and Population Well-Being Outcomes **A.9**

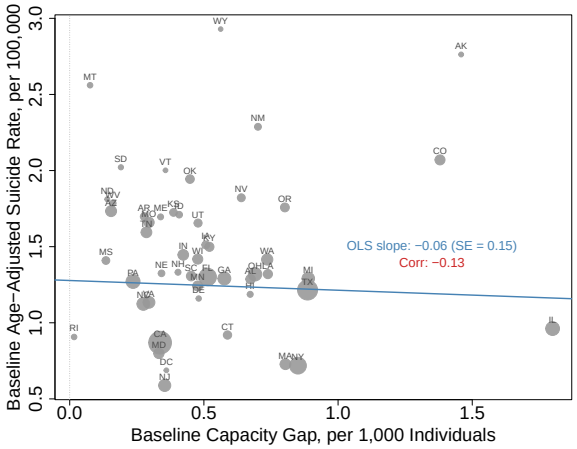
C Differential Geographic Variation in 988 Take-Up **A.12**

D 988 Job Postings **A.17**

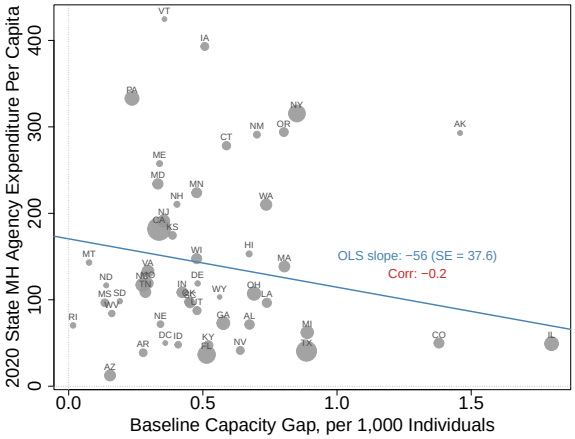
A Additional Exhibits

Figure A.1: Correlations Between Treatment Exposure and Suicide Mortality, State MH Funding, SAMHSA 988 Funding, and MH Professional Staffing

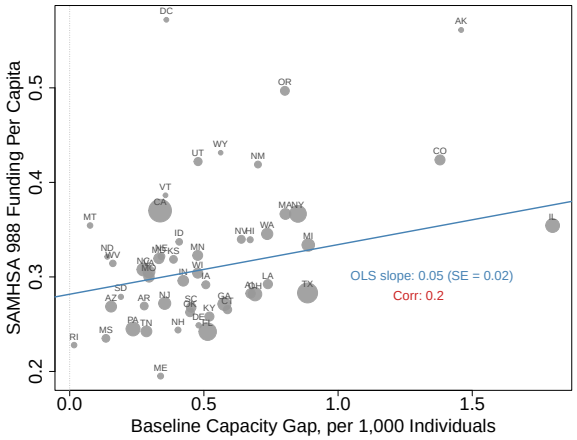
(a) Age-Adjusted Suicide Mortality Rate per 100,000



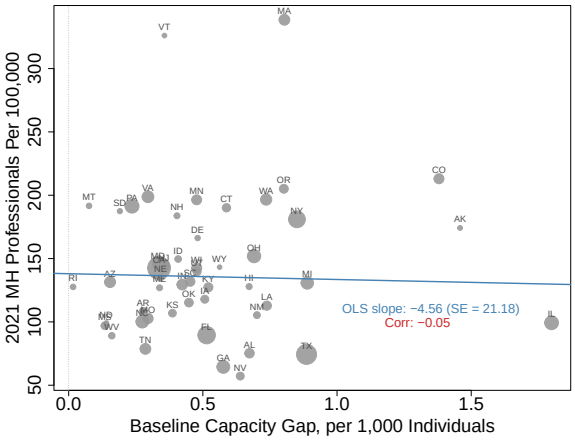
(b) State Mental Health Agency Expenditure Per Capita



(c) SAMHSA 2022 988 Funding Per Capita

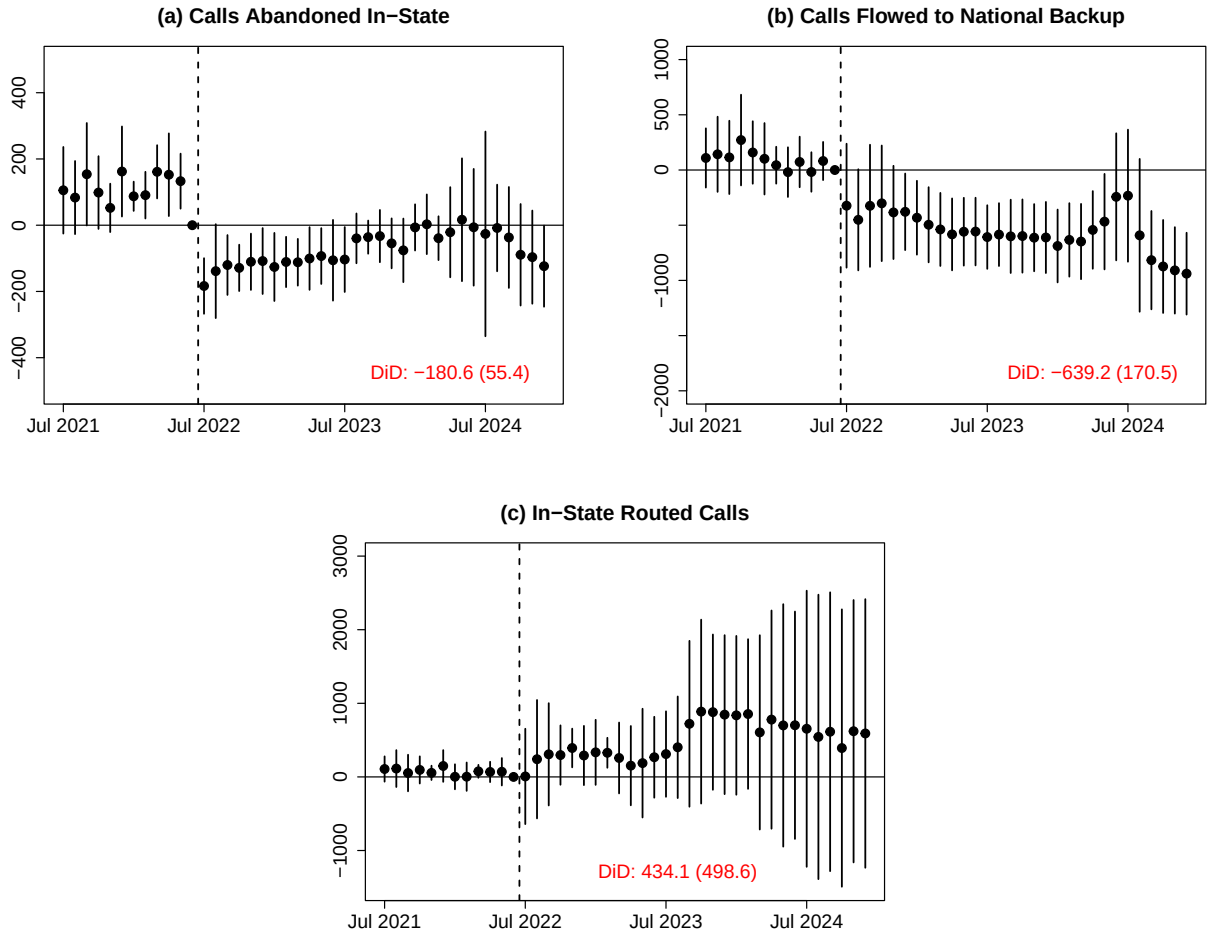


(d) Number of Mental Health Professionals Per 100,000



Notes: This figure displays a series of cross-state correlations between the treatment exposure variable $BaselineCapacityGap_s$ and various other outcomes. All outcomes other than panel (c) are measured in the baseline period prior to 2022. OLS slopes are 2021 state population weighted. The underlying data come from: (a) restricted use NCHS cause of death data, (b) FY2020 Per Capita Total State Mental Health Agencies (SMHA) Mental Health Expenditures Uniform Reporting System to SAMHSA (c) SAMHSA Grants Dashboard for "Cooperative Agreements for 988 Suicide and Crisis Lifeline–Build Local 988 Capacity" (d) Bureau of Labor Statistics Occupational Employment and Wage Statistics (OEWS) data for psychiatrists, clinical psychologists, counselors, and mental health social workers.

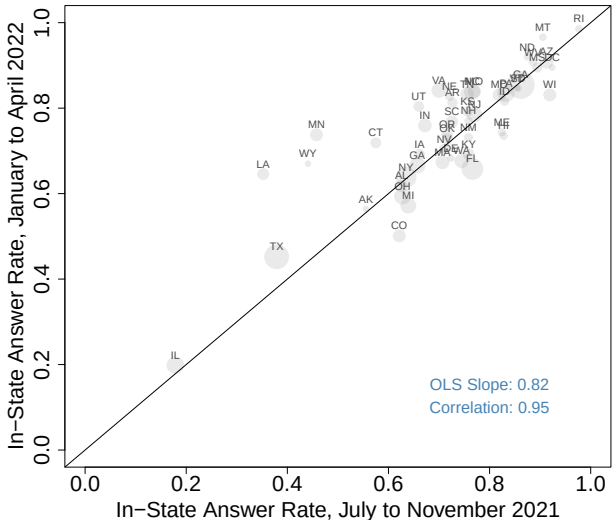
Figure A.2: Additional Call Outcomes



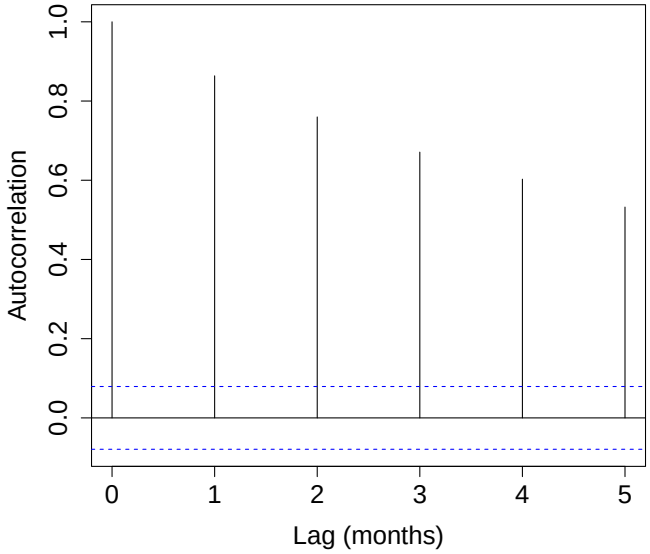
Notes: This figure presents the output of Equation 1 for three monthly outcomes: (a) number of abandoned calls in-state, (b) number of calls flowed to national backup, (c) total number of calls routed. Calls that are flowed to national backup may be abandoned, or experience long wait times; national backup statistics are not reported by Lifeline. The dashed vertical line corresponds to national 988 rollout in July 2022. The two-period difference-in-difference (DiD) estimates are also displayed. All coefficients, including the two-period DiD estimates are scaled by 0.3, approximately the cross-state standard deviation in $BaselineCapacityGap_s$. Thus, these estimates represent the dynamic differences in outcomes across states with a capacity gap of 0.3 calls per 1,000 residents between January – April 2022. Regressions are weighted by the state's 2021 population count and robust standard errors are clustered at the state-level. The baseline means for each outcome are 1316, 956, and 7579, respectively.

Figure A.3: Persistence of Crisis Center Answer Rate Prior to 988 Implementation

(a) Pre-988 In-State Answer Rate Over Time



(b) Autocorrelation Function



Notes: This figure documents the persistence of pre-988 in-state answer rates, defined as the fraction of calls routed to a state that are answered by in-state call centers. Panel (a) plots each state's average in-state answer rate from July–November 2021 against its average in-state answer rate from January–April 2022, the baseline period used to construct $BaselineCapacityGap_s$. The strong correlation indicates that cross-state differences in answer rates were persistent across pre-period windows. Panel (b) reports the monthly autocorrelation of state in-state answer rates for lags of up to five months. The persistence in both panels suggests that pre-988 answer rates capture durable differences in call center operations rather than transitory fluctuations.

Table A.1: Baseline Pre-988 Capacity Gap per 1,000 residents, $BaselineCapacityGap_s$

	$BaselineCapacityGap_s$		
AK	1.46	MT	0.08
AL	0.67	NC	0.27
AR	0.28	ND	0.14
AZ	0.15	NE	0.34
CA	0.34	NH	0.4
CO	1.38	NJ	0.35
CT	0.59	NM	0.7
DC	0.36	NV	0.64
DE	0.48	NY	0.85
FL	0.51	OH	0.69
GA	0.58	OK	0.45
HI	0.67	OR	0.8
IA	0.51	PA	0.24
ID	0.41	RI	0.02
IL	1.8	SC	0.45
IN	0.42	SD	0.19
KS	0.39	TN	0.29
KY	0.52	TX	0.89
LA	0.74	UT	0.48
MA	0.8	VA	0.3
MD	0.33	VT	0.36
ME	0.34	WA	0.74
MI	0.89	WI	0.48
MN	0.48	WV	0.16
MO	0.3	WY	0.56
MS	0.13		

Notes: This table presents the treatment exposure variable, baseline pre-988 capacity gap per 1,000 residents, $BaselineCapacityGap_s$, the average number of monthly calls that were not answered in-state between January and April 2022, per 1,000 residents. Specifically, $BaselineCapacityGap_s = Pre988Routed_s \times (1 - Pre988AnswerRate_s) \times 1,000/Population_s$. See text for additional details.

Table A.2: Pre-988 Act Statistics by Above and Below Median Treatment Exposure

	Below Median (1)	Above Median (2)	Difference (3)	p value (4)
Baseline Capacity Gap, per 1,000	0.281	0.744	−0.463	< 0.001
Age-Adjusted Suicide Death Rate, per 100K	1.445	1.444	0.002	0.749
Age-Adjusted Suicide & Accident Death Rate, per 100K	3.144	2.926	0.218	0.280
Age-Adjusted External Causes Death Rate, per 100K	8.458	7.961	0.497	0.648
Age-Adjusted All Cause Death Rate, per 100K	78.155	74.290	3.864	0.963
Labor Force Participation Rate, per 100K	62.9	62.3	0.6	0.999
Unemployment Rate	3.55	4.09	−0.54	0.92
Handgun Permit Checks, per 100K	269.0	253.2	15.8	0.724
Fraction Legalized Recreational Marijuana	0.207	0.423	−0.216	0.769
Psychiatrists and Psychologists, per 100K	6.088	6.840	−0.752	0.934
MH Professionals, per 100K	142.0	144.3	−2.3	0.685
Employment at Crisis Service-Related Firms, per 100K	132.2	133.7	−1.5	0.927
No. of Facilities w/ Emerg. Psych On-Site Services, per 100K	1.642	1.192	0.450	0.528
No. of Facilities w/ Mobile Crisis Response Services, per 100K	1.049	0.742	0.307	0.246
No. of Facilities w/ Suicide Prevention Services, per 100K	2.969	2.536	0.433	0.473
No. of Facilities w/ Peer Support Services, per 100K	1.904	1.375	0.528	0.164
No. of Poor Mental Health Days	4.805	4.800	0.005	0.706
No. of Mental Health Patients Receiving Treatment, per 100K	318.0	208.1	109.9	0.071
N	25	26		

Notes: This table presents summary statistics for state-level characteristics at baseline (measured between July 2021 and June 2022 when possible, or in 2021 otherwise) for states above and below median pre-988 baseline capacity gap. Mortality data comes from the restricted use vital statistics. We obtain suicide deaths using the ICD cause of death codes X60-X84, suicide and accident-related deaths using the ICD cause of death codes X60-X84, V05, V15, V80.6, V81.2-V81.9, V90-99, and W00-X59, and external deaths using the codes V01–Y89. We then adjust each to reflect deaths per 100,000 in each state. Occupational employment metrics come from the BLS OEWS, firm employment comes from County Business Patterns, facility characteristics and number of patients receiving treatment come from SAMHSA N-SUMHSS, and number of poor mental health days come from the BRFSS. These statistics are not population-weighted. See text for more details on variables.

Table A.3: Heterogeneity in Suicide Deaths Among Subgroups

	Female	Black	Young
BaselineCapacityGap	0.453	0.233	−0.411
	(0.349)	(0.242)	(1.461)
Baseline mean	16.50	6.48	13.87

Notes: This table presents the aggregate difference-in-difference estimates for suicide mortality count in three subgroups: females, Black, and young people aged 20-30. The data comes from the restricted use vital statistics. Regressions are weighted by the state's 2021 population count and robust standard errors are clustered at the state-level.

Table A.4: Heterogeneity by Baseline Mental Health Treatment Capacity

	Dependent variable:											
	In-State Answered Calls				In-State or Flowed Backup				Suicide Deaths			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
BaselineCapacityGap x Post988	1,704***	1,533***	1,091**	1,315**	1,031***	831***	397	498	0.014***	0.016***	0.003	0.005
	(263)	(250)	(491)	(583)	(99)	(102)	(489)	(581)	(0.003)	(0.005)	(0.007)	(0.006)
Three-way interaction with:												
× Above Median Psychiatrists & Psychologists	−374				−57				−0.020**			
	(1,389)				(1,268)				(0.008)			
× Above Median Mental Health Professionals		−459				−129				−0.030***		
		(1,473)				(1,356)				(0.007)		
× Above Median Facilities w/ Emerg. Psych On-Site			−51				337				0.015	
			(595)				(546)				(0.014)	
× Above Median Facilities w/ Mobile Crisis Response				−960				−185				−0.004
				(618)				(616)				(0.011)

Notes: This table investigates heterogeneity in our main outcomes (in-state answered calls in columns 1-4, in-state answered or flowed to national backup in columns 5-8, and age-adjusted suicide mortality rate per 100,000 in columns 9-12) by baseline per capita mental health treatment capacity in 2021. We estimate triple difference regressions and report the baseline effect of $BaselineCapacityGap_s \times Post988$ and its interaction with four measures of above median baseline treatment capacity (all two-way interactions are included in the regressions but not reported in this table; main effects are absorbed by state and quarter fixed effects). Number of employed psychiatrists and psychologists, as well as total mental health professionals come from the Bureau of Labor Statistics Occupational Employment and Wage Statistics. Number of facilities offering emergency psychiatrist on-site services and mobile crisis response services come from the SAMHSA National Substance Use and Mental Health Services Survey. See section 3 for more details on the data sources. All coefficients are scaled by 0.3, approximately the cross-state standard deviation in $BaselineCapacityGap_s$. Thus, these estimates represent the dynamic differences in outcomes across states and across state-by-above-median-treatment-capacity with a capacity gap of 0.3 calls per 1,000 residents between January – April 2022. Regressions are weighted by the state's 2021 population count and robust standard errors are clustered at the state-level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

B Mental Health Utilization and Population Well-Being Outcomes

This appendix investigates additional secondary outcomes related to mental health treatment utilization and population well-being. We construct four outcomes, of which two are utilization-related:

1. **Number of patients receiving mental health care** (inpatient hospital, residential, or outpatient) on March 31 of each year from The National Substance Use and Mental Health Services Survey (N-SUMHSS). The N-SUMHSS is a voluntary survey conducted by SAMHSA of all active mental health and substance use facilities in the U.S. Surveys prior to 2021 were collected using a different survey questionnaire and cannot be compared to later years.

2. **Total number of Medicaid psychotropic prescriptions** from Medicaid State Drug Utilization Data. This contains detailed information on outpatient prescription drug utilization for Medicaid beneficiaries at the state-quarter-level. We calculate the total number of psychotropic prescriptions: antidepressants, anti-anxiety medications, antipsychotics, mood stabilizers, and stimulants.

The other two outcomes are measures of population well-being:

3. **Number of days individuals are experiencing poor mental health** in the 30 days prior from the Behavioral Risk Factor Surveillance System (BRFSS). We aggregate the BRFSS data from the individual-month to the state-month level by computing the survey-weighted mean of the mental health measure for each state. The BRFSS surveys roughly 400,000 adults annually.

4. **Index of Overall Mood and Well-Being** from the Household Pulse Survey (HPS).[27] We construct an index for poor mental health by first computing survey-weighted means for each of four mental health questions about whether the respondent has felt (i) anxious, (ii) worried, (iii) uninterested in doing things, or (iv) depressed in the past two weeks. We recode each response to the four surveys as a binary variable of poor mental health ("more than half the days" or "nearly every day"), aggregate to the state-quarter level and then construct an average index. The public use file dropped state-identifiers starting in Q4 of 2024. HPS surveys roughly 50,000 individuals per wave.

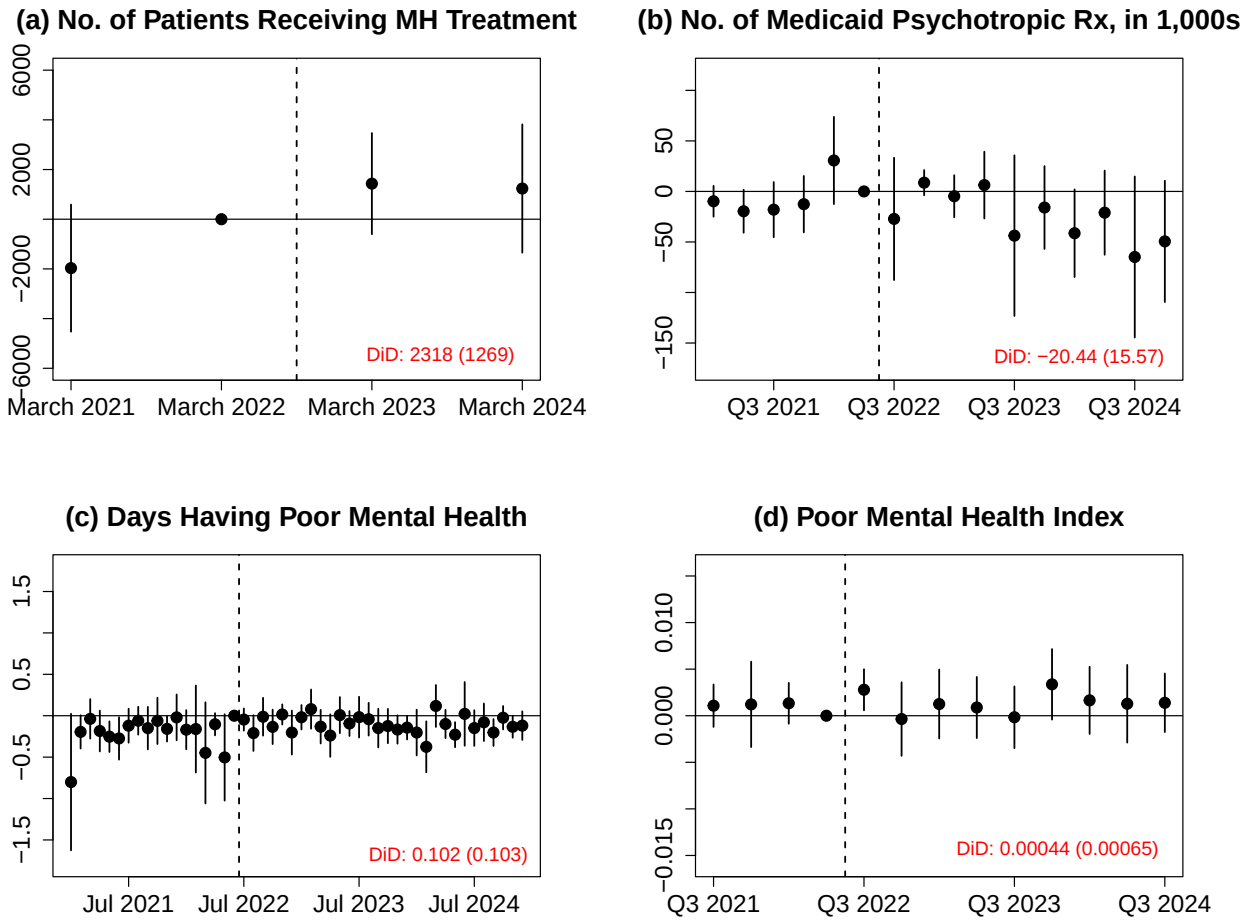
We then estimate Equation 1 for these four outcomes. The event study regressions are adapted to the quarterly- or yearly-level as necessary. Figure B.1 displays the event study plots. Panel (a) shows that the number of patients receiving any form of mental health treatment increases by 2,318 (11% over baseline)

[27] While the BRFSS primarily focuses on health risk behaviors, chronic health conditions, and use of preventative services, the HPS allows for rapid-response monitoring of social and economic disruptions.

in 2023 and 2024, relative to 2021 and 2022, among states with 0.3 greater calls in capacity gap per 1,000 residents. While significant at the 10%-level, these estimates coincide with a pre-existing increase in the number of patients receiving treatment between 2021 and 2022; they should therefore be interpreted with caution. The number of Medicaid psychotropic prescriptions decline by a statistically insignificant 20,441 (SE $= 15,574$) prescriptions in states with a one standard deviation greater baseline capacity gap; this is a relative effect size of -2.1%.

Panels (c) and (d) of Figure B.1 explore broader state-level trends in self-reported mental health using the BRFSS and HPS. Panel (c) shows that states with 0.3 greater calls in capacity gap per 1,000 residents go on to have a statistically insignificant 0.1 more days of poor mental health in the past 30 days (the pre-988 mean was 4.9 poor mental health days). Panel (d), using data from the Household Pulse Survey, shows virtually no change in an index for poor mental health after 988 implementation. With a two-sided test, we can rule out reductions in effect size in poor mental health of more than 2.0% in the BRFSS and more than 0.4% in the HPS, among states with a difference in baseline capacity gap of 0.3 calls per 1,000 residents (1.4% and 0.3% with a one-sided test).

Figure B.1: Non-Mortality Health Utilization and Outcomes



Notes: This figure presents the output of Equation 1 for four outcomes: (a) the number of patients receiving mental health treatment from the National Substance Use and Mental Health Services Survey (N-SUMHSS), (b) the number of psychotropic prescriptions from the Medicaid State Drug Utilization Data (SDUD), (c) the average number of days individuals in a state are experiencing poor mental health from the Behavioural Risk Factor Surveillance System (BRFSS), and (d) overall mood from the Household Pulse Survey (HPS). The equation is adapted as necessary to each dataset (for N-SUMHSS, state-year; for Medicaid and HPS, state-quarter). The dashed vertical line corresponds to national 988 rollout in July 2022. The two-period difference-in-difference (DiD) estimates are also displayed. All coefficients, including the two-period DiD estimates are scaled by 0.3, approximately the cross-state standard deviation in $BaselineCapacityGap_s$. Thus, these estimates represent the dynamic differences in outcomes across states with a capacity gap of 0.3 calls per 1,000 residents between January – April 2022. Regressions are weighted by the state's 2021 population count and robust standard errors are clustered at the state-level. The baseline means for each outcome are 20,381, 962,915, 4.9, and 0.21, respectively.

C Differential Geographic Variation in 988 Take-Up

This appendix implements a realized 988 take-up event study design analogous in structure to research designs that leverage geographic differences in differential exposure to a common shock. In our setting, the common shock is the nationwide launch of 988 in July 2022. Although all states were affected by the national implementation, the increase in 988 use varied substantially across states. Some states saw large increases in answered Lifeline calls after 988 went live, while others experienced much smaller changes. We use this cross-state variation in realized take-up to examine whether states where the number of (potentially) answered 988 calls increased more also experienced differential changes in suicide mortality.

This exercise is motivated by differential-exposure designs that interact a common aggregate shock with geographic variation in exposure to that shock. In those settings, the identifying variation typically comes from predetermined exposure such as pre-period industry composition (Bartik shift-share designs; Bartik, 1991) or differential realized exposure to a common shock (e.g., Yagan, 2019; Finkelstein et al., 2025). While the exercise here is similar in structure, the interpretation is somewhat different. Our exposure measure is the realized change in (potentially) answered Lifeline calls following the 988 launch, which captures several sources of variation: supply-side improvements in call center capacity (as used in our baseline empirical strategy), as well as, demand-side changes in awareness and willingness to call 988, and changes in latent demand for crisis services. The demand-side variation potentially suffers from greater endogeneity concerns. Therefore, we interpret the estimates in this appendix as descriptive evidence on whether larger increases in (potentially) answered 988 calls were accompanied by larger changes in mortality, rather than as a standalone causal estimate of the demand-side effect of 988.

Specifically, we estimate the following two-way fixed effects event study specification:

$$Y_{s,t} = \sum_{\tau \in \mathcal{T}, \tau \neq \text{Jun2022}} \beta_\tau \left(\Delta AnsweredOrBackUp_s \times D_t^\tau \right) + \alpha_s + \theta_t + \epsilon_{s,t}, \tag{2}$$

where $Y_{s,t}$ is age-adjusted suicide death rate per 100,000 individuals in state s and month t (same outcome variable as our main empirical strategy), α_s are state fixed effects, and θ_t are calendar-month fixed effects. The treatment variable $\Delta AnsweredOrBackUp_s$ is the change in number in-state answered or flowed to national backup Lifeline calls, in thousands of calls (e.g., a state with additional 1,000 calls would receive a value of 1) between the first year after (July 2022 to June 2023) and the first year before 988 implementation (July 2021 to June 2022).[28] The indicators D_t^τ denote calendar months, with June 2022 omitted as the reference month. Regressions are weighted by each state's 2021 population, and robust standard errors are

[28] This measure is an upper bound on overall answered calls because calls flowed to the national backup network may also be dropped. We do not observe the final disposition of calls after they are routed to national backup.

clustered at the state-level.

The advantage of this exercise is that it speaks directly to a broader margin than the main analysis. Our baseline empirical strategy isolates variation in call center capacity generated by pre-988 operational differences. By contrast, the realized take-up measure used here incorporates both capacity improvements and differential increases in call volume following national 988 implementation. Importantly, however, the measure is not simply total routed (placed) calls, which would more directly proxy total demand for the hotline. Instead, $\Delta AnsweredOrBackUp_s$ captures calls that were either answered in-state or flowed to the national backup network. It is therefore closer aligned to our main baseline empirical strategy and closer to a measure of potential crisis care contact than to a measure of all calls placed or routed. Thus, if the full implementation of 988 improved mortality through either supply-side or demand-side channels, one might expect states with larger realized increases in potentially answered calls to experience larger reductions in suicide mortality.[29]

Figure C.1 shows the cross-sectional variation behind this exercise. Each point represents a state. The x-axis plots the change in average monthly in-state answered or flowed to backup calls per 1,000 residents between the first post-988 year and the prior year. The y-axis plots the corresponding change in average monthly age-adjusted suicide death rate per 100,000.

Next, Figure C.2 presents the event study estimates from Equation 2. The estimates do not show statistically significant reductions in the age-adjusted suicide death rate per 100,000 in states with larger realized increases in 988 take-up. The coefficients are also relatively flat in the months leading up to 988 implementation, suggesting that states with larger subsequent increases in answered calls were not already experiencing clear differential changes in suicide mortality prior to the launch.

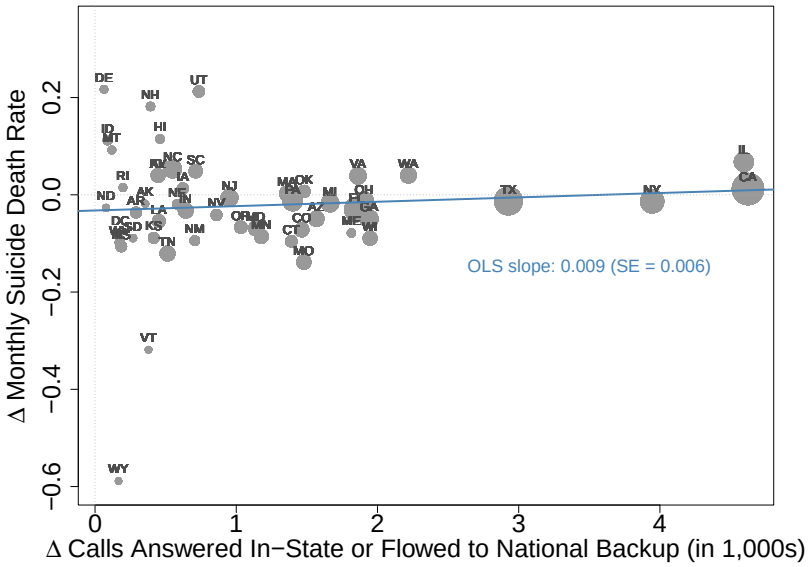
The magnitudes are small. The average state experienced an increase of 2,070 in-state or backup calls (or 2.07 more calls per 1,000 residents) after 988 implementation. Our estimates imply a 95% confidence interval of the number of monthly age-adjusted suicide deaths per 100,000 of -0.0024 to 0.0422, for the average increase in in-state or backup calls. Relative to the baseline mean suicide rate of 1.23, we are able to rule out reductions in the age-adjusted suicide rate of more than 0.2%. Moreover, the two-period difference-in-differences estimate from this realized 988 exposure exercise is remarkably similar to the 2SLS esimate in Table 2 (column 4) where answered in-state or flowed to national backup calls (also in 1,000s of calls) is instrumented with $BaselineCapacityGap \times Post988$ (0.0096 vs 0.0111).

Taken together, these results are consistent with the main findings. Even when we use realized

[29] This exercise formalizes the realized uptake argument in Patel et al. (2026). They compare suicide mortality trends in the ten states with the largest versus smallest post-launch increases in answered 988 calls and find larger observed-to-expected mortality changes in the high-uptake states. We extend this comparison by using the full cross-state variation in realized 988 uptake and estimating an event study specification with state and calendar month fixed effects.

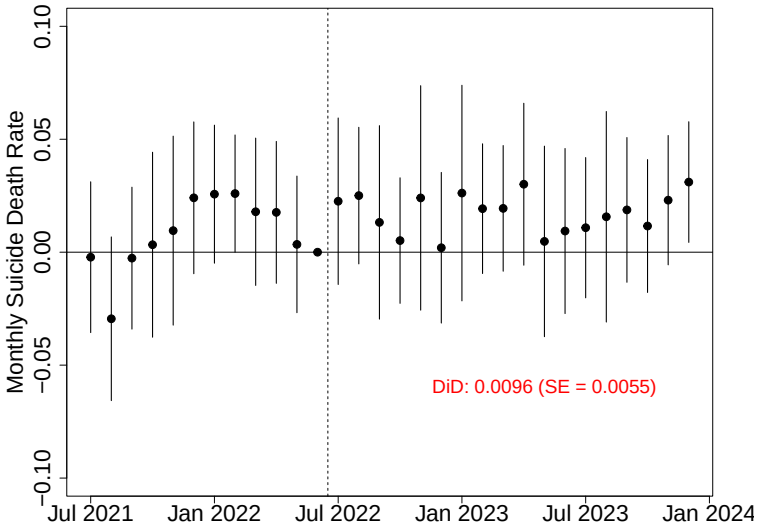
increases in 988 take-up, which incorporate both capacity improvements and demand-side responses to the national launch, we do not find evidence that states with larger increases in answered calls experienced larger short-run reductions in suicide mortality. Because the exposure measure is realized after implementation, these estimates should be viewed as descriptive, but they provide a useful check that the main null mortality findings are not unique to the supply-side variation used in the baseline design.

Figure C.1: Change in Monthly Suicide Death Rate and Total In-State Answered or Flowed to National Backup Calls, by State



Notes: This figure plots the change in average age-adjusted monthly suicide deaths per 100,000 individuals versus our treatment variable, $\Delta AnsweredOrBackUp_s$ change in monthly answered in-state and flowed to national backup, in thousands of calls, for each state. Note that this is an upper bound on overall answered calls because not all calls flowed to national backup are answered. The size of each point is proportional to the state's 2021 population. The ordinary least squares slope is weighted by each state's 2021 population. The average change in answered in-state and flowed to national backup calls (in thousands) and age-adjusted suicide rate per 100,000 are 2.07 and −0.028, respectively.

Figure C.2: Event Study: 988 Exposure and Age-Adjusted Suicide Death Rate, per 100,000



Notes: This figure plots the event study coefficients β_τ from Equation 2, the dynamic event study version of the cross-sectional Figure C.1. The 988 exposure variable is $\Delta AnsweredOrBackUp_s$ change in total monthly answered in-state and flowed to national backup calls, in thousands of calls, for each state. Note that this is an upper bound on overall answered calls because not all calls flowed to national backup are answered. We compute age-adjusted mortality by first calculating the mortality rate for each five-year age bin in a given state-month, then averaging using national population-by-age counts from the 2021 American Community Survey (ACS) as our weights. The baseline weighted-means are 2.07 for monthly in-state answered or flowed to national backup calls (in thousands, so 2,070 calls) and 1.23 age-adjusted monthly suicide deaths per 100,000. Regressions are weighted by each state's 2021 population, and robust standard errors are clustered at the state-level.

D 988 Job Postings

We scraped the career pages of crisis call centers of the Lifeline network in November and December 2024. Using the Wayback Machine, we were able to locate 65 postings on state crisis line careers pages in 2022. Out of these 65 postings, 10 were managerial positions which were all paid. Out of the 55 non-managerial positions, 18 were looking for volunteers. We do not know the number of hirings each posting was hoping to make. All volunteer positions had minimal requirements, with only a few requiring prior experience. The remaining only required the volunteer to be 18. Mobile response postings required the volunteer to have a valid drivers license. All provided on-the-job training.

Below are some examples of two volunteer postings and a salaried posting.

Figure D.1: Crisis Center (Birmington, Alabama), Volunteer

CRISIS & SUICIDE LINE

REQUIREMENTS AND RESPONSIBILITIES FOR VOLUNTEERS

What do volunteers for the Crisis and Suicide Line do?

Crisis and Suicide Line volunteers provide supportive crisis counseling on the telephone. Volunteers are trained to be active, non-judgmental listeners who allow the caller to express and sort through his or her thoughts and feelings in confidence. Although the volunteer may offer options and provide information during the problem solving stage of this process, the goal in most cases is to assist the caller in developing his or her own solutions. Examples of presenting problems include depression, feeling of loneliness, family conflicts and assistance with basic needs referrals.

Must I have any special training or experience in order to apply?

No. Although professional counselors and therapists do sometimes volunteer their time at the Crisis Center, most volunteers are not professional helpers. In fact, a strong distinction exists between the type of work done by volunteer counselors and that of professionals.

What are the requirements that I must meet before making an application?

You must be a high school graduate at least 18 years old with a genuine interest in helping others. You must not be currently receiving services provided by any Crisis Center program. Mental health consumers must be emotionally ready to assist others and be no less than a year past their own crisis experience.

What's involved in the screening process?

You will be asked to complete an oral and/or written exercise and be interviewed by professional staff member(s). The entire process takes about an hour. Some of the qualities screened for include emotional maturity, dependability, stability, absence of harsh or judgmental attitudes, and personal insight. Information on your application will be verified by a background check. All of the information you give us is held confidential.

What happens if I am selected to volunteer?

3600 8th Avenue South, Suite 501 Birmingham, AL 35222 (205) 323-7782

Figure D.2: Crisis Support Services of Alameda County (Alameda, California), Volunteer

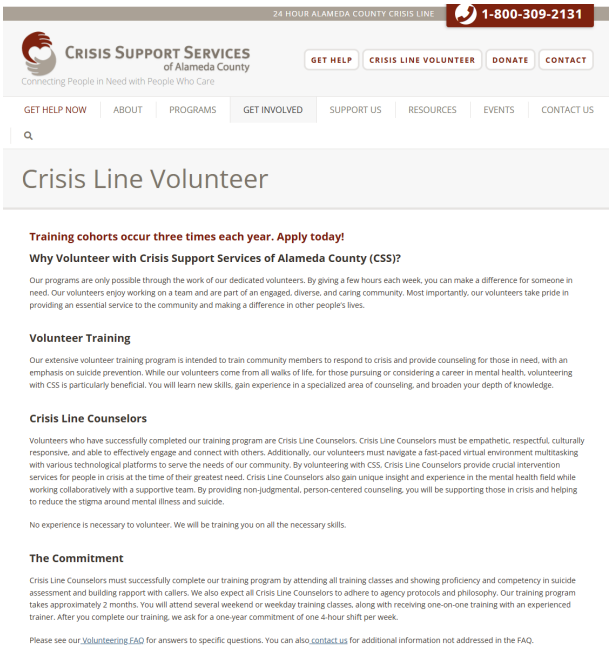
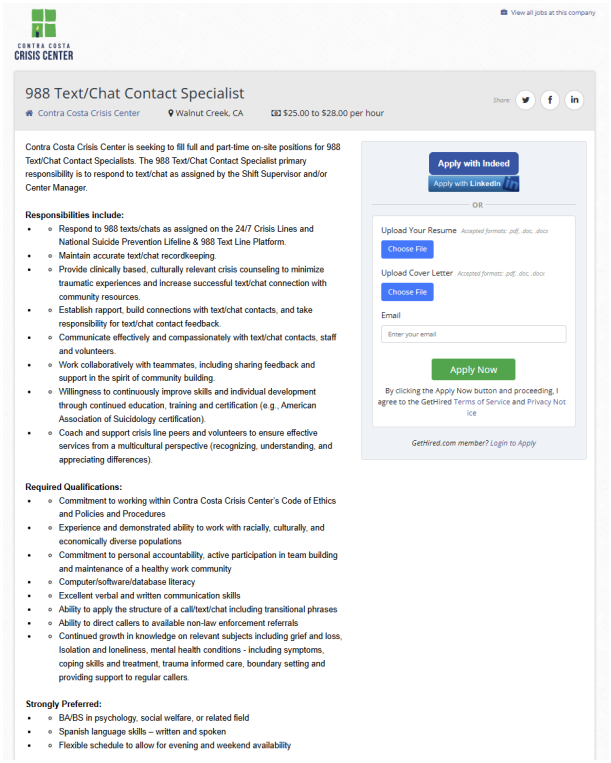



Figure D.3: Contra Costa Crisis Center (Contra Costa, California), Paid