

The Effect of “Failed” Community Mental Health Centers on Non-White Mortality*

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Abstract

The Community Mental Health Act of 1963 established Community Mental Health Centers (CMHCs) across the country with the goal of providing continuous, comprehensive, community-oriented care to people suffering from mental illness. Despite this program being considered a failure by most contemporary accounts, the World Health Organization advocates for a transition from the institutionalization of the mentally ill to a system of community-centered care. In this paper, we construct a novel dataset documenting the rollout of CMHCs from 1971 to 1981 to identify the effect of establishing a CMHC on county level mortality rates, focusing on causes of death related to mental illness. Though we find little evidence that access to a CMHC impacted mortality rates in the white population, we find large and robust effects for the non-white population, with CMHCs reducing suicide and homicide rates by 8% and 14%, respectively. CMHCs also reduced deaths from alcohol in the female non-white population by 18%. These results suggest the historical narrative surrounding the failure of this program does not represent the non-white experience and that community care can be effective at reducing mental health related mortality in populations with the least access to alternative treatment options.

JEL Codes: H75, I14, I18, I31, I32, I38, J15

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1 Introduction

Mental illness is a worldwide concern, with negative impacts at both the individual and societal levels. As of 2016, 1 in 5 adults lives with a mental illness in the United States, and 1 in 25 lives with a mental illness serious enough to make them unable to actively participate in one or more parts of their lives (NIMH 2017). In 2001, the World Health Organization estimated that serious mental illness cost the United States \$193.2 billion each year in lost earnings alone and identified depression as the leading global cause of disability (2001). Certain forms of treatment have been shown to be effective at ameliorating some of the negative effects of mental illness (Mintz et al. 1992, Zhang et al. 1999 a and b, Lang 2013), but it is often difficult for people to access effective treatment. The private market for mental healthcare suffers from inefficiencies and inequities that makes it unable to cope with growing mental health care needs. Insurance providers have resisted providing adequate coverage for mental health needs due to concerns about overuse and treatment efficacy (McGuire 1981, Keeler et al. 1988, Mechanic 2014) and insufficient mental health resources, such as psychiatric beds and medical providers, prevent patients who are seeking help from being able to get it (Mechanic 2003, Sipe et al. 2015).¹ Furthermore, inequalities in access to care arise along income and insurance coverage gradients, both of which are negatively associated with the severity of mental illness (Schlesinger and Dorwart 1984, Mechanic 2003, Rowan et al. 2013, Mechanic 2014). Between these inefficiencies and the positive externalities associated with treatment, mental health care is a prime candidate for government intervention.

Publicly provided community care offers an potential solution to these concerns with private market provision of mental health treatment, and the World Health Organization recommends community care as the gold standard worldwide (2001). Community care, as opposed to institutionalization, allows patients to live and work within the community while

¹Additionally, decreased earning ability, negative stigmas, and the decreased ability to make decisions associated with (serious) mental illness may prevent those who need mental healthcare from accepting it (McGuire 1981, Mechanic 2003, Rowan et al. 2013, Mechanic 2014).

receiving outpatient treatment services. There is currently limited evidence about the efficacy of community care.² The United States had its first experiment with community care from the 1950s through 1980s with the passage of the Community Mental Health Act (CMHA) and the establishment of Community Mental Health Centers (CMHCs).³ The goal of this program was to shut down the mental institutions that were providing mental health care to the seriously mentally ill, and to replace them with a system of comprehensive, continuous, community-oriented care at low-to-no cost to those who were unable to pay. Unfortunately, this program has gone down in history as an abject failure, which does not bode well for the WHO recommendation. However, this history is primarily built on contemporary and retrospective qualitative analyses, without providing quantitative evidence to support those assertions.

In this paper, we utilize the United States' experiment with CMHCs to analyze the efficacy of publicly provided community care in terms of mental illness related mortality. We use the rollout of CMHCs over the course of 10 years - 1971 to 1981 - to identify the effect of implementing a CMHC in a county on mortality rates. To do this we constructed a novel data set of the county-level location of CMHCs every two years within this time-frame to establish which counties ever received a CMHC and when. Also, we constructed a novel data set of state priority rankings in which states created catchment areas and ranked them in terms of need for mental health resources. While the construction of CMHCs was intended to follow these priority rankings, we show that these rankings do not predict which communities ever received CMHCs, nor do they predict which communities received CMHCs earlier rather than later. The lack of correlation between state rankings and treatment, along with parallel trends in our outcomes of interest in the pretreatment period, alleviate concerns

²Community care is associated with less stigmatization of the mentally ill (Link and Cullen 1986, Boyd et al. 2010) and better post-hospitalization outcomes for the mentally ill compared to no follow-up treatment (Stein and Test 1980). This form of care has been found to be more cost effective than institutionalization (Weisbrod et al. 1980, Test and Stein 1980, Weisbrod 1983) based on cost of care and the usage decisions of patients.

³See Morrissey and Goldman (1986) for an account of the history of mental health treatment in the United States.

about selection into treatment. Due to the structure of our data and the randomness in receiving a CMHC, we causally identify the effect of receiving a CMHC using a two-way fixed effect framework.

We consider suicide, homicide, and deaths caused by alcoholism as our outcome variables.⁴ Suicide is an clear candidate for considering causes of death that could be mitigated by mental health care, but deaths from homicide and alcoholism may be less obvious. However, alcoholism was, and still is, considered a type of mental illness as well as a co-morbidity of other mental illnesses and was thus treated by CMHCs. Homicide rates are a mental illness related cause of death for two reasons: violent and criminal behavior is associated with untreated mental illness, particularly among those with substance use disorders like alcoholism (Link et al. 1992, Torrey 1994, Steadman et al. 1998); and mental illness, particularly severe mental illness, makes people more vulnerable to being victims of all types of crimes (Torrey 1997, Hiday et al. 1999, Teplin et al. 2003, Maniglio 2009), including a 6-fold increase in the risk of dying from homicide for those with mental illness compared to the general population (Hiroeh et al. 2001).

While this paper is the first to quantitatively analyze the effect of community care on mental illness-related mortality, the CMHA has received plenty of qualitative scholarly attention and the conclusions of this work have been overwhelmingly negative. This program has long been regarded as a failure, charged with the “general abandonment” of the formerly institutionalized mentally ill and disabled population (Rose 1979) and “the creation of large populations of ‘homeless, deranged people’ ” (Grob 1992). This literature highlights two main reasons why the CMHA was considered unsuccessful: the program was never fully funded and far fewer CMHCs were built than were projected to be needed (Rose 1979, Grob 1992); and CMHCs were neither designed nor incentivized to treat the seriously mentally ill that were being forcibly released from mental institutions (Gronfein 1985, Grob 1994).⁵ Be-

⁴We do not include deaths identified as being caused by drug dependence because, as seen in Figure A3 in the Appendix, there were very few deaths caused by drug dependence during our sample period.

⁵This is due to the fact that the treatment of serious mental illness is much more costly and requires more resources and specialized training compared to the treatment of non-serious mental illness, and extra

cause the creation of CMHCs was wrapped up with the deinstitutionalization of the mentally ill and seen as an alternative to mental institutions, their inability to treat everyone who was deinstitutionalized led to the conclusion that they were ineffective and a failed policy experiment.⁶ However, CMHCs ultimately served a different population, those that were not mentally ill enough to warrant institutionalization but who could not otherwise access treatment in their communities due to a lack of insurance, an inability to pay, or a dearth of mental healthcare treatment options. Additionally, it is possible that the historical narrative focused more on majority populations, such as whites, who already had alternatives for mental health treatment and were more likely to have medical insurance, as compared to non-white individuals who were less likely to access mental healthcare prior to the establishment of CMHCs and were less likely to have medical insurance (Hoffmann, 1964; Franks et al., 1993; Sorlie et al., 1994; Carlisle et al., 1997, Kirby and Kaneda, 2010).

While focusing on the modal experience is informative, it could mask important heterogeneity across different segments of the population. The goal of this paper is to consider the efficacy of community care as provided by CMHCs, rather than the success or failure of the Community Mental Health Act as a whole. Our paper is the first to isolate the effect of community care from the overarching failure of the CMHA outside of the political context of the United States' first attempt at publicly provided community care. Additionally, our paper aims to understand how majority vs. minority status could affect the evaluation of the success or failure of the CMHCs and to ensure that the experience of all Americans, not just the majority or the most visible, is taken into account when determining the impact of

funding was not offered for providing treatment to the seriously mentally ill. In effect, the government policy treated every mental illness as equally costly, which then incentivized CMHCs to focus on non-serious, less expensive mental illnesses. Additionally, the community care setting could not provide day-to-day services, such as housing, basic care, and medication management that patients in mental hospitals received and that this patient body needed assistance with in order to function in daily life (US General Accounting Office 1977, US Interagency Council on the Homeless 1990).

⁶By the beginning of our sample period, over half of the deinstitutionalization that would occur in this period had already happened (Gronfein 1985). Additionally, because most mental health patients were at state mental health hospitals, deinstitutionalization can be seen as a state-wide effect - patients from all around a state would be sent to the state's mental health hospital, and upon release would be sent to another institution, such as a nursing home, or back to their home communities.

this type of mental health care.

Despite the negative conclusions from the previous literature on the CMHA, this paper shows that CMHCs were effective in reducing mental health related mortality, specifically in the non-white population. We find evidence that CMHCs reduced suicide and homicide rates among non-whites by 8% and 14% respectively. CMHCs also reduced deaths from alcohol in the female non-white population by 18%. These results are robust to the using different control groups, as well as the inclusion of controls for other publicly provided health care programs. We find little impact of access to a CMHC on white mortality rates. These results suggest CMHCs were effective in reducing mental illness related mortality, especially in populations with the least access to alternative forms of treatment. These results only measure improvements in mortality; we would also expect improvements in other areas correlated with these improvements in mortality, such as improved quality of life, increased employment, increased earnings, decreased homelessness, and decreased incarceration. Furthermore, these results highlight how the historical narrative surrounding this program may have been primarily documenting the white experience, without giving any weight to the benefits experienced by non-whites. As the United States and other countries address the growing need for mental health care, publicly provided community care is a potential solution that should be considered, particularly for populations that otherwise may not have access to mental health care or health insurance.

2 Background Information

2.1 Effect of Mental Health and Mental Health Treatment

Mental illness is associated with a host of costly problems for the individual and society. Mental illness has been found to cause increased unemployment and impoverishment (Hamilton et al. 1997), decreased labor market participation (Mullahy and Sindelar 1993), decreased work hours and income conditional on employment (Benham and Benham 1982, Bartel and

Taubman 1986, Ettner et al. 1997, Marcotte and Wolcox-Gok 2003), higher absenteeism (French and Zarkin), more transitions into and out of the labor market (Roan Gresenz and Strum 2004), performance deficits (Lerner and Henke 2008), and even decreased coworker performance (Ettner et al. 2011). The total economic burden of serious mental illness in 2002 was estimated to be \$317.6 billion, with \$193.2 billion due to lost earnings (Insel 2008). Mental illness is also associated with decreased educational attainment (Curie and Stabile 2006, Fletcher 2008, Eisenberg et al. 2009), decreased social connectedness and problems with social relationships (Kirk 1974, Bartel and Taubman 1986, Kelleher et al. 1994, Kessler et al. 1998, Teitler and Reichman 2008), violent and criminal behavior (Link et al. 1992, Torrey 1994, Steadman et al. 1998), incarceration and homelessness (Jemelka et al. 1989, Harcourt 2011, Raphael and Stoll 2013), decreased quality of life (Saarni et al. 2007), and excess mortality (Brown et al. 2000, Saha et al. 2007, McGrath et al. 2008, Druss et al. 2011, Thornicroft 2011), especially for the seriously mentally ill. While this list provides a plethora of outcomes that CMHCs could have affected, we focus on mortality due to this being the most extreme and substantial concern related to mental illness.

There is limited evidence evaluating the impact that mental health treatment has on economic outcomes. The treatment of depression using medication and psychotherapy has been found to decrease depressive symptoms and return depressed people to work (Mintz et al., 1992), making treatment either cost-neutral or beneficial based on the increased earnings and the cost of treatment (Zhang et al., 1999 a, b). The effect of changing access to treatment is even less well understood. Lang (2013) finds that laws requiring that health insurance include mental health benefits at parity with physical health benefits lead to a decrease in the suicide rate by 5%. However, these benefits are restricted to the subset of the population with health insurance, which is likely not universal in the population of the mentally ill due to the negative employment and earnings effects of mental illness. This will attenuate the potential effect that increased access could have on mental health related mortality. Because CMHCs were available to everyone regardless of income or insurance coverage, we will be

able to get a better grasp of how increases in access would affect mortality for the entire population.

2.2 History of Mental Health Treatment in the United States

In the early nineteenth century, people with mental illnesses were treated in asylums with the belief that medical treatment in a kind, familial atmosphere could cure the afflicted (Morrissey and Goldman, 1986).⁷ These facilities were often privately run, meaning that individuals who couldn't afford treatment often ended up in almshouses or jails. This type of "moral treatment" was advocated for use in public asylums that would focus on the treatment of lower-income populations; however, such treatment standards were only a feasible in a public setting under a specific set of conditions, including that patients and staff shared common familial values, that caseloads were relatively small to facilitate intimate staff-patient relationships, and that adequate governmental funds were available (Morrissey and Goldman, 1986). Furthermore, treatment in these types of asylums was limited to mild and acute cases as opposed to long-term or chronic cases. Over time, cost considerations caused public mental hospitals to be transformed from small asylums into large, custodial institutions.

Such public institutions grew to disproportionately treat the poorest individuals and those with the most advanced cases of mental illness. The law required that patients remain institutionalized until the original cause of commitment ceased to exist (Morrissey and Goldman, 1986). Consequently, state-supported asylums were occupied by individuals with chronic cases that undermined therapeutic practices like those used in private asylums. Such a concentration of chronically ill individuals caused the public to increasingly associate mental illness with incurability, and by the 1870s, public asylums focused on custodial care and community protection with treatment of the mentally ill being of secondary importance. Meanwhile, families who could afford to do so continued to use private facilities for the care

⁷Early asylums claimed success rates of 90 percent or higher with non-chronic, relatively short-term patients.

of their mentally ill family members.⁸

The New York State Care Act of 1890 was designed to solve the quality-of-care deficiencies associated with asylums operated by municipalities and counties. This legislation established the precedent for states to assume full financial responsibility for the care and treatment of the mentally ill (Morrissey and Goldman, 1986). The official designation for these institutions was changed from state asylums to state mental hospitals. As a response to the change in funding sources, the concept of mental illness was expanded to include aged and senile individuals who were previously sent to county or local almshouses. As a result, state mental hospitals gradually assumed responsibility for senile patients in addition to individuals suffering from conditions that required life-long custodial care, and as such the number of almshouses declined.

Between 1903 and 1950, the number of patients in state mental hospitals grew from 150,000 to 512,000 (Morrissey and Goldman, 1986). During this time period state mental hospitals continued to be viewed as chronic-care facilities that provided long-term custody of the poor and disabled. However, new psychotropic medications coupled with military successes with brief interventions in the treatment of so-called war neurosis stimulated renewed interest in prevention and new optimism for the treatment of mentally ill leading into the 1960s.

Outpatient treatment, or a system that requires an individual to go to a clinic every time they get talk therapy or to get prescriptions, was a small and fairly insignificant part of mental health treatment for most of the time frame discussed here. By the 1940s outpatient clinics did exist, dispensing psychoanalysis, early psychotropic medications, and other “treatments” such as lobotomy, electroshock therapy, and insulin therapy (Grob, 1991). Due to discoveries of new treatment modalities and changes in cost structures, there was a major

⁸Reformers began to publicize some of the shortcomings surround public mental health asylums. Simultaneously, new scientific psychiatry restored hope that the mentally ill could be effectively treated. A small number of psychopathic hospitals were created to offer acute treatment; however, these new facilities were unable to eliminate chronic illness and ultimately were unable to reform American mental health care in any fundamental way (Morrissey and Goldman, 1986).

shift from inpatient to outpatient treatment: in 1955, 22.6% of patient care episodes occurred in outpatient settings; this amount increased to 52.7% in 1968. However, a 1946 report from the Task Force on Patterns of Patient Care found the outpatient system “inadequate”, both in terms of the number and quality of clinics. Additionally, this shift to outpatient treatment was not necessarily equitable - during this time, greater onus of payment for mental health-care shifted to the individual, whose ability to pay was possibly impacted by their mental health and other demographic factors, and his or her insurance company, which may be dependent on the individual’s ability to hold a job; furthermore, health insurance providers were decreasing coverage for mental health care during this time.

2.3 Historical Context of Community Mental Health Act

During the early 1960s, community-based care was considered a promising new method for the treatment of the mentally ill. To stimulate the usage of community care techniques, President Kennedy signed the Community Mental Health Centers Construction Act of 1963. This act provided a three-year authorization for grants totaling \$150 million to fund the development and construction of Community Mental Health Centers (CMHCs) across the country.

This act mandated community-focused treatment centers be regionally planned and oriented toward prevention. To be eligible for federal funds, states had to first submit a comprehensive plan to the Department of Health, Education, and Welfare (HEW). This state plan was required to designate an agency to administer the plan, as well as an advisory council with broad representation. State mental health planning reports outlined the condition of mental health services available at the time of compilation, the mid-1960s, and contained recommendations for improvements.

The state plan was also required to develop a proposal for the construction of community mental health centers. The construction plan defined and prioritized catchment areas serving a population of 75,000 to 200,000 people. When determining the priority of each catchment

area, states were required to target especially needy populations and, as such, priority was largely determined by demographics correlated with the need for mental health services including median family income, the infant mortality rate, and alcoholism rates. Priority of catchment areas was also impacted by the current availability of mental health resources in each community, such as construction projects approved in previous years and the number of psychiatrists in an area.

For a project to be approved, it was required to have priority over other projects within the state. Funds were to be allocated to applicants in areas of greatest unfilled need and in the order of area priority, meaning the neediest catchment areas would be the first to get CMHCs and other areas could only receive CMHCs after those neediest areas were served. However, a 1971 report issued to Congress by the Comptroller General of the United States reviewed this process and found evidence of considerable discrepancy between funding guidelines and actual spending. For example, they cite that, although centers were supposed to be funded by need as specified in state plans, California and Florida had been funding centers with little regard to prioritization (Kenig, pg. 82).

Under President Johnson in 1965, amendments expanded the original legislation to include funding for staff. This funding took the form of staffing grants that lasted for 51 months but declined over the life of the grant using a sliding scale.⁹ The construction and staffing grant were a “seed money” mechanism to encourage the development of community focused centers that would eventually be funded by third parties, such as patient fees, local and state funds, and fundraising. After 51 months, centers were expected to have generated adequate alternative funds. To qualify for staffing grants, centers were required to offer the following five services: inpatient services, outpatient services, partial hospitalization, emergency services, and consultation/education programs (Naierman et al, 1978).

In 1967, the CMHC construction grants were extended for three more years and staffing

⁹This bill authorized \$73.5 million dollars for three years (although funding could be spread over fifty-one months to ensure that new centers receiving grants in the second and third year of the program would have full funding). The sliding scale begin with 75 percent cost coverage and decreased to 30 percent. (Grob pg 249)

grants for an additional two years (Kenig pg 72). In the years that followed, it became apparent that centers would not be able to acquire adequate funds to replace federal funding by the end of 51 months and eligibility for staffing grants was extended to eight years. A more generous sliding scale was introduced in high poverty catchment areas that left as much as 70 percent of the initial grant in the last year, compared to 30 percent for non-poverty centers. By 1975, in an attempt to force centers to obtain higher levels of alternative funding earlier in their development, a new sliding scale was introduced that maintained high initial levels for both poverty and non-poverty centers, but funds declined at a faster rate.¹⁰ Lastly, recognizing that the preventative functions of centers might be the first to be eliminated as funding diminished, the law provided the only permanent grant mechanism for consultation and education services.

The policies that mostly interacted with the CMHA and the efficacy of CMHCs were implemented at the national level. The Social Security Disability Insurance (SSDI) program implemented in 1956 and Supplemental Security Income for the Aged, the Disabled, and the Blind (SSI) program implemented in 1972, which provided income support to those whose age or disability made them unable to hold a job, gave credence to the idea that the formerly institutionalized mentally ill could survive in their communities, even without a job, hastening states' deinstitutionalization efforts (Grob 1994). Additionally, the implementation of Medicaid and the increasing direction of towards the Medicaid program made state hospitalization economically infeasible; therefore, there was a shift towards nursing homes for the aged and those otherwise unable to care for themselves, and community care for others (Gronfein 1985; Grob 1994). Both of these policies, though cited as motivating deinstitutionalization, are not varying at the county level and the impacts can be interpreted as state-wide effects.

Under the Carter administration, a new President's Commission on Mental Health was

¹⁰Funds decreased to a 30 percent federal contribution in the eighth year for poverty centers and a 25 percent federal contribution in non-poverty centers. Another provision of this amendment provided "distress" grants to some of the older centers that failed in finding adequate alternative funding. These grants were limited to a total of three years and mandated that 7 additional services be provided by the center.

appointed to revisit the nation’s mental health needs and services. The outcome of the commission’s work was a short-lived piece of legislation, the Mental Health Systems Act, which was passed in 1981, replacing the earlier Community Mental Health Centers Construction Act with a newly developed approach to providing mental health services.¹¹ However, the 1981 Omnibus Budget Reconciliation Act repealed most of the previous mental health legislation, including the CMHC Act and the Mental Health Systems Act, in favor of Alcohol, Drug Abuse, and Mental Health Block Grants to states. These block grants consolidated funding for services related to mental health, alcoholism, and drug abuse into a block grant starting in fiscal year 1982. Most CMHCs initially funded prior to 1982 received some portion of each state’s allotment for as many years as they would have been eligible for basic staffing or operations support when first funded. However, the amount of the award to each center was not guaranteed.

By the end of the program in 1981, every state had participated in the program and a total of \$2.66 billion was spent on CMHCs.¹² Despite the goal of having mental health care coverage nationwide through the establishment of over 2000 centers, only 781 CMHCs ever existed.

2.4 Evidence on Publicly-Provided Health Care

While the public provision of mental health care has a history mostly limited to the CMHCs, there have been more attempts to provide (physical) health care through public provision. A recent federally funded program to provide free breast and cervical cancer screenings, analyzed in Bitler and Carpenter (2019), increased the probability of being screened by about 3 to 6 percentage points for eligible women. In a more historical context, Bailey and Goodman-Bacon (2015) analyze another community health program: Community Health

¹¹Rather than providing twelve services in one center, the Systems act funded a phased-in system of services, and rather than providing direct federal funding, the system called for providing money to states for distribution through individual state departments of mental health.

¹²\$1.55 billion was spent on staffing and construction grants combined and the rest on other various grants including distress grants for centers that could not obtain alternative funding and consultation and education grants which were the only “permanent” grants that did not decline on a sliding scale.

Centers (CHCs). Compared to CMHCs, CHCs provided care in a similar way and to a similar population, but the care they provided was for physical, rather than mental, health. They find a 2% decrease in mortality for people ages 50 and over, with effects concentrated in cerebrovascular diseases. Similar to our conclusions regarding the establishment of CMHCs, they find that the timing of the roll out of CHCs had little to do with underlying need or planned development, citing the “great administrative confusion” that led to CHCs being approved and developed almost at random.

2.5 What Did CMHCs Do, Whom Did They Serve, and Whom Do We Expect to Be the Most Affected?

While CMHCs were originally viewed as an alternative to mental hospitals, most centers devoted their attention to the less severely mentally ill by offering preventative services, counseling, and crisis interventions; ultimately, the centers served a drastically different purpose than originally intended, that is treating the seriously and recently deinstitutionalized mentally ill. (Grob, pg 249). Figure 1 shows the number of patient care episodes reported annually from 1971 to 1975. By 1971, just under 300 centers existed that treated a total of 797,000 patient care episodes. By 1975, over 500 centers existed that treated over 1,961,000 patient care episodes. In general, most episodes were treated with outpatient services, although inpatient and partial services were also provided. These services were provided at low-to-no cost, based on the patient’s income, insurance status, and ability to pay. While we don’t have individual level information about patients, statistical notes compiled by the National Institute of Mental Health indicate that, in 1975, about 42% of patients were under the age of 25 and 39% were between the ages of 25 and 45.¹³ We also know that, while whites made up a majority of patients in CMHCs, the ratio of non-white to white patients is larger than the ratio of non-whites to whites within the population, suggesting greater

¹³Furthermore, females made up about 53% of the patient pool, although males made up 53% of the patients under the age of 25.

relative use among the non-white population.

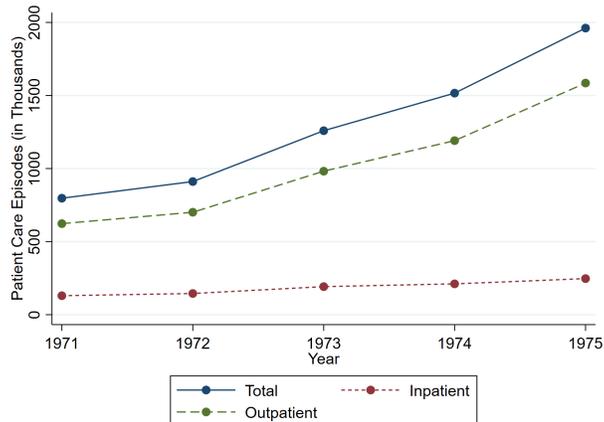


Figure 1: Patient Care Episodes

Notes: Annual patient care episode data was obtained from statistical notes compiled by the National Institute of Mental Health. The total number of patient care episodes for community mental health centers are reported annually from 1971-1975. Total number of episodes, as well as a breakdown of inpatient verse outpatient episodes, are reported.

We would expect that the effects of CMHCs on mortality rates depend both on the effectiveness/availability of CMHCs' care relative to alternatives and the prevalence of causes of death that CMHCs might prevent. We would expect to see different outcomes based on the alternative forms of mental healthcare available to the potential patients. In the statistical notes compiled by the National Institute of Mental Health, we can also see that non-whites were less likely to have been referred to the CMHC from a psychiatric medical professional and were less likely to be referred from the CMHC to further psychiatric medical treatment, suggesting that non-whites were less likely than whites to interact with psychiatric services outside of CMHCs. Additionally, non-whites were less likely to have health insurance at this time (Hoffmann, 1964; Franks et al., 1993; Sorlie et al., 1994; Carlisle et al., 1997, Kirby and Kaneda, 2010), suggesting that they would be more limited in their alternatives than whites.

Figure A1 shows how the mortality rates of interest vary across age groups, suggesting that we may expect the effects of access to a CMHC to differ along these dimensions. We also know that a disproportionate number of patients of CMHCs were between the ages of 15 and 24. Furthermore, education and prevention outreach programs, consisting mostly of

outreach to schools, were the only permanent funding provided to centers. Thus, we may expect to see a greater impact on the younger segment of the population.

3 Data

The data used in this project was compiled from various sources. The locations of CMHCs were identified by digitizing the Mental Health Directories and the Directories of Federally Funded Community Mental Health Centers. These directories document the addresses of CMHCs and were published every other year from 1971-1981. The variation in centers across subsequent editions of these publications allows us to document the roll-out of community mental health centers nationwide over the 1970s.¹⁴ The locations and roll-out of CMHCs can be seen geographically in Figure 2, which shows the first year a CMHC was established in a county, with the earlier centers shown with a lighter color.

We supplement these directories with data obtained from State Mental Health Planning reports, which were required before a county could be granted funding for community mental health centers. These planning reports defined catchment areas serving 75,000 to 200,000 people and, in a subsample of states, aggregated multiple counties into one planning area. Each planning area was ranked according to relative need.¹⁵ We collect and digitize planning area and relative rankings for each state that defined planning areas using county boundaries.

Our primary outcome variables are age-adjusted mortality rates. Mortality data was obtained from the Multiple Cause of Death Vital Statistics published by the National Center for Health Statistics. This data contains the universe of civilian deaths reported by cause, age, and the decedent's county residence. We compute age-adjusted mortality counts from

¹⁴Between 1966 and 1971 there is data that includes community mental health centers, though it is unclear from the documentation whether these centers were a part of the CMHA and were expected to follow the guidelines as such. In 1971 and later there are mental health locations called community mental health centers that were not included under the official category of federally funded community mental health centers, casting doubt on whether those CMHCs in pre-1971 documents actually are CMHCs as defined and funded by the federal government.

¹⁵These reports were maintained by the National Institute of Mental Health and are available at the National Archives in Maryland.

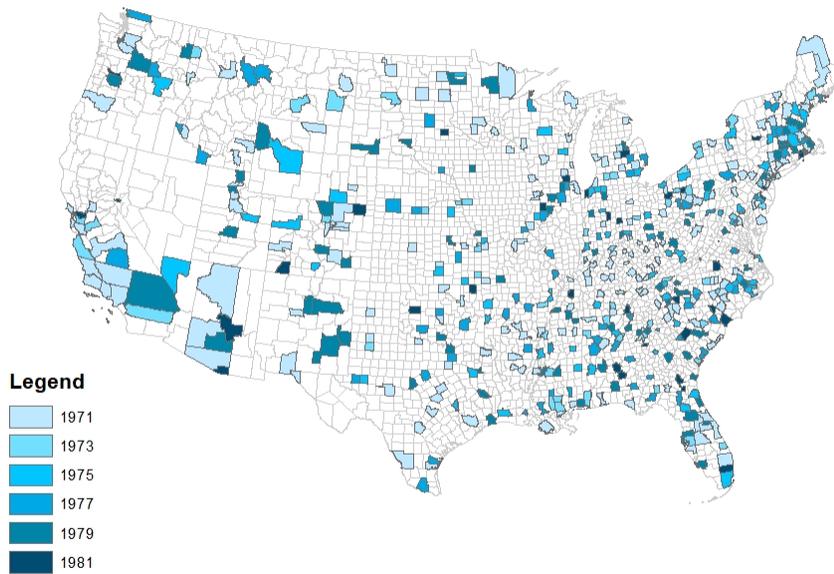


Figure 2: Rollout of CMHCs

Notes: Dates are the earliest period that a given county received a community mental health center. Counties colored with the lightest blue shades received a center by 1971 while the darkest shaded counties didn't receive a center until the 1980s. Counties shaded in white never received a center. The locations of CMHCs were identified by digitizing the Mental Health Directories and the Directories of Federally Funded Community Mental Health Centers. These directories document the addresses of CMHCs and were published every other year from 1971-1981.

1969 to 1988 using annual county population estimates from the Surveillance, Epidemiology, and End Results Program.¹⁶

We consider the following causes of death due to their relationship in the literature to mental illness: suicide, homicide, and deaths caused by alcoholism.¹⁷ We expect mental

¹⁶While mortality data dating back to 1959 is available, the chief of the NCHS mortality branch has said that while the files are generally acceptable, they have not been rigorously verified and their accuracy cannot be certain at this time. As such, we do not use this data. Furthermore, annual population estimates are only available from SEER starting in 1969. See <https://www.nber.org/research/data/mortality-data-vital-statistics-nchs-multiple-cause-death-data> for more details. For privacy reasons, death public-use micro-data files contain geographic identifiers only for counties and cities with a population of 100,000 or greater starting in 1989.

¹⁷We do not include deaths caused by drug dependence because, as seen in Figure A2 in the Appendix, there were very few deaths caused by drug dependence during our sample period.

health treatment to affect homicide rates for two reasons: violent and criminal behavior is associated with untreated mental illness (Link et al. 1992, Torrey 1994, Steadman et al. 1998), so greater access to treatment would likely decrease these behaviors and thus homicide; and mental illness, particularly severe mental illness, make people more vulnerable to being victims of all types of crimes, including homicide (Torrey 1997, Hiday et al. 1999, Hiroeh et al. 2001, Teplin et al. 2003, Maniglio 2009). We use an alternative measure of suicide which combines suicide deaths with accidental gun deaths; in the time-frame considered here, mental illness and suicide were still stigmatized in much of the country, and coroners would often mislabel suicides as accidental deaths to protect the family from the knowledge of the real cause of death or from the scrutiny of the community.

The age-adjusted mortality measures for our outcome variable of interest are shown graphically in Figure A3. The suicide rate remains at about 16 deaths per every 100,000 people over our time period of interest, with our alternative suicide definition trending similarly around 18 deaths per every 100,000 people. The homicide rate remains at about 8 deaths per every 100,000 people although it drops to about 6 deaths per every 100,000 around 1984. Deaths caused by alcoholism remain stable at about 2 deaths per every 100,000 over our sample period.

Lastly, we use county level controls such as educational attainment, labor force participation, the size of the medical workforce, and income measures from the decennial censuses. We use 1970 data and linear interpolate values for non-census years. Panel A of Table 1 shows averages of our variables of interest in 1970 in counties that would eventually receive a CMHC and those that would not. We see that counties receiving a center had larger populations and tended to be more urban. These counties had slightly higher educational attainment and a slightly higher labor force participation rate. We also see that community mental health centers were disproportionately placed into counties with more medical workers (and a higher share of medical workers per person). Due to differences along these dimensions, we include linear trends of percent of the population with less than high school

education, percent of the population with high school education, unemployment rate, labor force participation rate, and the number of medical workers as controls in each of our main specifications. We also add year by urban category fixed effects where urban category is a categorical variable dividing each county into one of five quintiles based on its share of urban residents.

Table 1: Pre-treatment Differences in Demographics across Counties

	(1)	(2)	(3)
	No CMHC	Gets CMHC	Difference
Panel A: County Characteristics			
Population	21172 (972)	170757 (18601)	-149585*** (8818)
Percent Urban	0.286 (0.005)	0.654 (0.010)	-0.368*** (0.012)
Percent Less than HS	0.379 (0.002)	0.301 (0.004)	0.078*** (0.006)
Percent HS	0.554 (0.002)	0.596 (0.003)	-0.041*** (0.005)
Percent College	0.066 (0.001)	0.103 (0.002)	-0.037*** (0.002)
Labor Force Participation	0.532 (0.001)	0.563 (0.002)	-0.031*** (0.003)
Unemployment Rate	0.046 (0.0004)	0.045 (0.001)	0.001 (0.001)
Medical Workers	385.2 (21.0)	3606.3 (389.5)	-3221.1*** (185.0)
Panel B: Mortality Rates			
Suicide Rate	18.62 (0.40)	18.03 (0.37)	0.596 (0.877)
Homicide Rate	7.53 (0.26)	10.25 (0.42)	-2.72*** (0.60)
Alcohol Related Death Rate	2.69 (0.15)	3.14 (0.16)	-0.533 (0.34)
Number of Counties	2503	531	

Notes: 1970 county characteristics are reported for both counties that would eventually receive a CMHC and counties that would not. Standard errors are in parentheses. Differences between these two subsamples are reported, along with the significance level associated with a two-sided t-test. *p < .10, **p < .05, ***p < .01. Information on CMHCs described in Figure 2 notes.

4 Identification Strategy

To identify the causal effect of community mental health centers on mental health mortality rates, we use state planning reports which determined preexisting need for mental health services, along with an empirical evaluation of pretreatment mortality trends across treated and untreated counties. We use state preliminary planning reports that ranked catchment areas by relative need to test if centers were being placed in areas based on predetermined need. We collected these reports for the 29 states that designated catchment areas using county borders.¹⁸ Priority rankings were established by mental health professionals familiar with the need of mental health services across the state. While each state had its own ranking algorithm, states were required to target especially needy populations and, as such, priority rankings were largely determined by demographics correlated with the need for mental health services including median family income, the infant mortality rate, and alcoholism rates. We calculate z-scores for priority ranking for each state to determine if higher rankings correspond with an increased likelihood of receiving a CMHC or with the timing of CMHC rollout. Table 2 presents the results of this analysis and shows that having a higher priority ranking does not increase the probability that an area would receive a center or, conditional on receiving a center, that higher priority areas would receive centers sooner.

We also explore the extent to which our specific outcomes of interest vary across treated and untreated counties in the pretreatment period. Panel B of Table 1 shows preexisting mortality rates in counties that would eventually receive a center and counties that would not. We see no statistical difference in the suicide or alcohol related death rate. However, we do see a statistical difference in the homicide rates across these two sets of counties, with treated counties having approximately 3 more annual homicides per 100,000 people.

¹⁸We have these planning reports for the following states: Alabama, Arkansas, Delaware, Florida, Idaho, Indiana, Kansas, Louisiana, Maryland, Mississippi, Missouri, Montana, Nebraska, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, and Wisconsin. In some instances, particularly in rural areas, centers were designed to treat multiple counties. Due to the large geographic catchment areas, we find it likely that CMHCs were not accessible to everyone they were meant to target. Thus, our preferred specification uses counties to characterize treatment status.

Table 2: Priority Ranking and CMHC Rollout

	(1)	(2)
	Ever Gets CMHC	Rollout
Priority Rank	-0.064 (0.064)	0.060 (0.194)
Observations	365	235
R^2	0.0021	0.0004

Notes: Priority rankings were digitized from state preliminary planning reports. We have planning reports for the 29 states listed in footnote 18 and the unit of observation is a catchment area. Priority rankings were normalized such that a higher ranking corresponds with an increased need of a CMHC. Standard errors are in parentheses. *p < .10, **p < .05, ***p < .01.

This difference can partially be explained by state variation and differences in county level urbanity. While we do see small differences in homicide levels, we explore the extent to which these two sets of counties were trending differently along these dimensions in the years preceding treatment and find support for the parallel trends assumption.

The apparent incoherent development of CMHCs is consistent with a 1971 report issued to Congress by the Comptroller General of the United States that found evidence of considerable discrepancy between funding guidelines and actual spending (Kenig, pg. 82). This haphazard roll-out is not unique to this program. Community health centers have also been shown to rollout with little regard to underlying need or planned development (Bailey and Goodman-Bacon, 2015).

4.1 Two-Way Fixed Effects Framework

Given that centers appear to be constructed with little regard to pre-existing mental health mortality trends or relative need as determined by mental health professionals within each state, we identify the effect of receiving a CMHC on county level measures of age-adjusted mortality using a two-way fixed effect framework. Our outcomes of interest include age-adjusted mental health related mortality, including suicides, homicides, and deaths caused by alcohol dependence. Given the volatile nature of our outcome of interest, along with

the large number of counties that have no mental health related deaths in a given year, our preferred specification estimates the following Poisson model:

$$E[y_{cst}|CMHC_{ct}, \theta_c, \gamma_t, \lambda_s * t, X_{ct}] = \exp(\alpha + \beta CMHC_{ct} + \ln(\text{population}) + \theta_c + \gamma_t + \lambda_s * t + \xi X_{ct} + \epsilon_{cst}) \quad (1)$$

where y_{cst} is an age-adjusted death count for county c in state s for year t , $CMHC_{ct}$ is a binary variable indicating if county c received a CMHC by year t , θ_c are county fixed effects, γ_t are year fixed effects, and X_{ct} is a vector of controls.¹⁹ Given the role of each state in planning the rollout of centers, along with variation in mortality trends across states, each specification includes a state specific linear time trend, represented by $\lambda_s * t$. The natural log of population with the regression coefficient restricted to one is included to analyze mortality rates as opposed to counts (Osgood, 2000). We also use subgroup analysis to explore if CMHCs were effective in mitigating mental health related mortality within certain demographics of the population, including age, race, and gender. All regressions are weighted by the relevant county population.

Mortality may be serially correlated within a county across years so we cluster our standard errors at the county level.²⁰ However, there is evidence that clustering standard errors (and even robust standard errors) will result in too-conservative standard error estimates in this environment.²¹ We present clustered standard errors and highlight that we are likely being over conservative in our estimation strategy. To address concerns about potential bias in two-way fixed effects models, we follow the recommendation of Goodman-Bacon (2021) and supplement the static analysis with an event-study framework. Furthermore, we highlight that over 80% of counties in our sample were never treated, meaning problematic compar-

¹⁹Controls include linear trends of percent less than high school education, percent with high school education, unemployment rate, labor force participation rate, and number of medical workers, as well as year by urban category fixed effects.

²⁰See Bertrand et al. (2004) for more information about serial correlation and see Abadie et al. (2017) for more information about clustering standard errors.

²¹See Abadie et al. (2017) for more details about why clustering may be too-conservative.

isons that use already treated counties as a control group for not yet treated counties receive a relatively small weight in our static estimator.²²

4.2 Event Study Framework

In an event study framework, we estimate the impact of receiving a CMHC by leveraging the randomness in the timing of the roll-out of CMHCs across space. In this framework, the identification of effects is entirely from the sample of counties that would ever receive a CMHC, though the impacts of controls are estimated using never-treated counties. Additionally, the event study framework allows us to visualize whether there differing pre-trends by treatment.

We estimate the following regression equation:

$$E[y_{cst}|CMHC_{ct}, \theta_c, \gamma_t, \lambda_s * t, X_{ct}] = \exp(\alpha + \ln(\text{population}) + \theta_c + \gamma_t + \lambda_s * t + \xi X_{ct}) + \sum_{b=-3}^{-1} \pi_b CMHC_c \mathbf{1}(t - T_c^* \in b) + \sum_{b=1}^7 \tau_b CMHC_c \mathbf{1}(t - T_c^* \in b) + \epsilon_{cst} \quad (2)$$

where y_{cst} is an outcome for county c in state s for year t , $CMHC_c$ is a binary variable indicating if county c ever received a CMHC, θ_c are county fixed effects, γ_t are year fixed effects, $\lambda_s * t$ is a state specific linear time trend, and X_{ct} is a vector of controls. Due to the relatively low incidence rate and the volatile nature of our outcomes of interest, we aggregate data into two year bins. The indicator function $\mathbf{1}(t - T_c^* \in b)$ indicate years away from T_c^* , the year the CMHC was implemented in that county. The bin containing the 2 years before a center is constructed is labeled bin $[-2, -1]$ and is omitted. The coefficients π_b and τ_b provide estimates of the effect of getting a CMHC in the years prior to and after the CMHC was built in that community, respectively. In this environment, null values on the estimates of π_b would indicate no differential pre-trends and negative values on the estimates of τ_b would represent the treatment effects $2 * b$ years after treatment.

²²The Bacon-Decomposition (which uses a simplified linear regression as opposed to our preferred specification) suggests that problematic comparisons receive a weight of less than .1 in our static estimator.

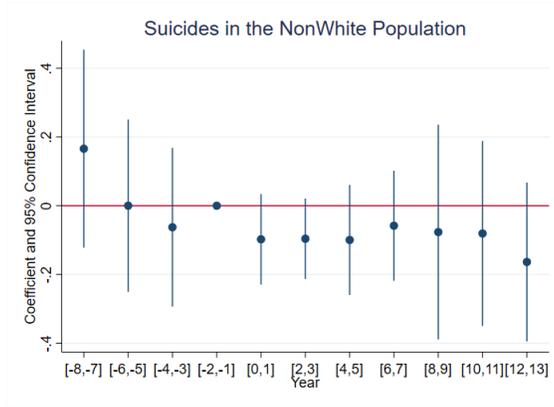
Figure 3 provides the event study graphs for our three main results: the decrease in suicides and homicides for non-whites and the decrease in deaths related to alcohol for non-white women. While we will discuss the pattern of post treatment effects in the results section, we first illustrate the similarity of trends in the pretreatment period across all three graphs. Prior to the implementation of the CMHCs, conditions were trending similarly compared to places that did not get CMHCs, allaying concerns that differences in mortality trends across treated and untreated counties are driving our results.

5 Results

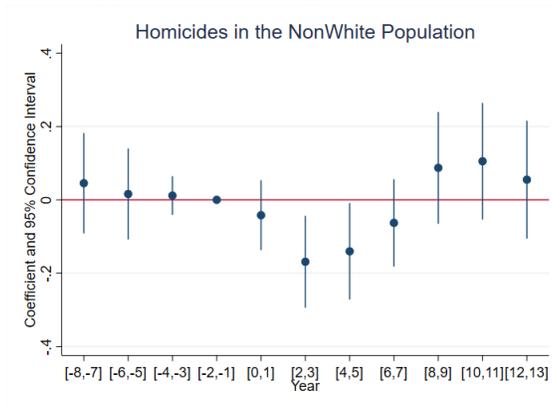
Our first set of results are shown in Table 3. Each entry presents the results for a different regression, with the outcome variables corresponding to suicide rates, homicide rates, and deaths caused by alcoholism. These results indicate that, on average, CMHCs did not mitigate suicide rates or deaths caused by alcoholism. We do find suggestive evidence that CMHCs caused a decrease in the homicide rate by approximately 9%.²³ Due to the differing baseline mortality rates across demographic groups for our causes of death, we analyze subsamples of the population and find that CMHCs were particularly effective on certain demographic groups. Panels B and C explore mortality rates for the white and non-white population respectively. We see that the decrease in homicide rates are solely driven by a 14% decrease in the homicide rate in the non-white population.

We explore if these results differ by gender in Table 4. Panel A limits our sample to only deaths among non-white males, Panel B to non-white females, Panel C to white males, and Panel D to white females. Panels A and B shows CMHCs were also effective in reducing the murders of the non-white population, with non-white males and females experiencing over

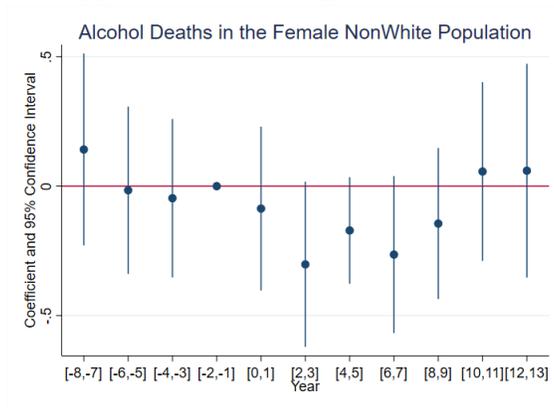
²³Another policy that could interact with the outcomes of the CMHA and CMHCs is community policing. Community policing is a policing method that focuses on having the police present and interconnected with their community, with increased focus on maintaining order in the community, rather than just solving crimes. While there were some trials with community policing during our sample period, community policing did not become wide-spread until the 1990s and has not been found to be effective in reducing crime (Cordner 1994).



(a) Suicide among Non-Whites



(b) Homicide among Non-Whites



(c) Alcohol Deaths among Non-White Women

Figure 3: Event Study Coefficients

Notes: The dependent variables are age-adjusted mortality rates per 100,000 residents among the respective population. The coefficients and 95% confidence intervals from the Poisson estimates of π and τ in equation (3) are presented. Standard errors clustered at the county level. Years included: 1969-1988. Regressions include year fixed effects, urban-category-by-year linear time trends, and controls for percent less than high school education, percent high school education, unemployment rate, and labor force participation rate. Regressions are weighted by the relevant county population.

Table 3: Effects of CMHC on Mortality

	(1)	(2)	(3)
	Suicide	Homicide	Alcohol
Panel A: Total Population			
CMHC	-0.013 (0.016)	-0.092 (0.070)	-0.021 (0.074)
Panel B: White Population			
CMHC	-0.003 (0.015)	-0.004 (0.048)	0.007 (0.094)
Panel C: Non-white Population			
CMHC	-0.085* (0.051)	-0.153** (0.072)	-0.018 (0.058)
County Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
State Linear Time Trend	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Observations	60316	60316	60316

Notes: Dependent variable is age-adjusted mortality counts. Poisson regressions include controls for the natural log of the respective population with the regression coefficient restricted to one and linear time trends for percent less than high school education, percent high school education, unemployment rate, and labor force participation rate. Regressions are weighted by the respective county population. Standard errors clustered at the county level are in parenthesis *p < .10, **p < .05, ***p < .01. Years included: 1969-1988.

Table 4: Demographic Sub-group Analysis

	(1)	(2)	(3)
	Suicide	Homicide	Alcohol
Panel A: Non-White Men			
CMHC	-0.076	-0.160**	0.030
	(0.051)	(0.074)	(0.083)
Panel B: Non-White Women			
CMHC	-0.128	-0.135*	-0.195*
	(0.099)	(0.070)	(0.117)
Panel C: White Men			
CMHC	-0.009	-0.019	0.017
	(0.013)	(0.052)	(0.088)
Panel D: White Women			
CMHC	0.005	0.040	-0.017
	(0.030)	(0.050)	(0.121)
County Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
State-Specific Linear Time Trend	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Notes: Dependent variable is age-adjusted mortality counts. Poisson regressions include controls for the natural log of the respective population with the regression coefficient restricted to one and linear time trends for percent less than high school education, percent high school education, unemployment rate, and labor force participation rate. Regressions are weighted by the respective county population. Standard errors clustered at the county level are in parenthesis *p < .10, **p < .05, ***p < .01. Years included: 1969-1988.

10% declines in homicides. Furthermore, we see that non-white women experienced an 18% decline in deaths related to alcoholism. Again, we see no effects of CMHCs on the white population, regardless of gender.

Additionally, we consider whether the effects of CMHCs on the non-white population differ across different age groups in Table 5. Each panel of this table shows the regression results for different segments of the population. Panel A limits our sample to only deaths among 15-24 year olds, Panel B to 25-44 year olds, Panel C to 45-64 years and Panel D to those who died at an age of 65 or older. CMHCs are associated with a 12% decrease in the suicide rates in the young non-white population. We also see negative, although marginally insignificant coefficients, on the suicide rates of non-white young adults and those over the

Table 5: Sub-group Analysis by Age - Non-White Population Only

	(1) Suicide	(2) Homicide	(3) Alcohol
Panel A: Young			
CMHC	-0.124** (0.061)	-0.163* (0.097)	0.311 (0.318)
Panel B: Young Adult			
CMHC	-0.106 (0.069)	-0.193*** (0.074)	-0.034 (0.064)
Panel C: Adult			
CMHC	0.038 (0.106)	-0.070 (0.052)	-0.057 (0.086)
Panel D: Elderly			
CMHC	-0.102 (0.075)	-0.188** (0.077)	0.195 (0.149)
County Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
State Linear Time Trend	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Notes: Dependent variable is age-adjusted mortality counts. Poisson regressions include controls for the natural log of the respective population with the regression coefficient restricted to one and linear time trends for percent less than high school education, percent high school education, unemployment rate, and labor force participation rate. Regressions are weighted by the respective county population. Standard errors clustered at the county level are in parenthesis *p < .10, **p < .05, ***p < .01. Years included: 1969-1988. Age groups are defined as follows: 15-24 years old (young), 25-44 (young adult), 45-64 (adult), and 65 and older (elderly).

age of 65. Furthermore, we see a decline in homicide rates across all age groups in the non-white population, with effects ranging from a 7% decline for the non-white adult population to an 18% decline for the young adult population.

The analogous analysis for the white population is presented in Table A1 in the appendix. No coefficient is statistically significant at standard levels. Panel A provides some evidence that CMHCs decreased suicide rates of the young white population by approximately 5%. This age group made up the highest patient share among CMHCs and was likely to benefit from low or no-cost treatment, providing further evidence that CMHCs were effective at decreasing the morality rates of people visiting centers. We find no effects of CMHCs on

homicide rate or deaths caused by alcohol across for any age group in the white population. The general picture painted by these results suggests that CMHCs had, at most, a small effect on the mental health mortality rates in the white population.

Returning to our event study graphs in Figure 3, we consider how the impact of CMHCs evolved over time. These results indicate that the impact of CMHCs was fairly immediate. Results for suicides suggest a fairly constant effect over the subsequent decade, neither ramping-up to full capacity nor deteriorating substantially from the initial improvement, while results for homicides are strongest in the first five years after treatment. Results for deaths related to alcoholism for non-white women appear to exist for 10 years after the implementation of a CMHC. Effects were likely mitigated as centers struggled with finances after the initial seed money ran out, causing some centers to close altogether before the official end of the program in 1981.

6 Robustness Checks

In this section, we will consider multiple robustness checks to better understand the relationship between community care and mental health related mortality rates. These robustness checks include a pseudo-boundary analysis, winsorizing the data, and adding controls for other publicly provided health care centers.

6.1 Boundary Analysis

In this section, we explore the robustness of our results to changes in the set of control counties by limiting the sample of control counties to only those counties directly adjacent to a county that received a CMHC. Hence, we drop counties that were both never treated and physically distant from any treated county from our analysis. By doing this, we are potentially focusing on counties that are more similar to each other on unobservables, dealing with potential selection effects that may have been occurring at a regional level. This brings

our sample to 527 counties that ever received a CMHC and 1,537 adjacent counties that never got a CMHC. We then re-estimate Equation 1 with this smaller sample.

This exercise does not directly compare the treated counties' outcomes to their neighboring un-treated counties' outcomes. Instead, we are comparing the treated counties' outcomes to the outcomes of any county not yet treated that is adjacent to an ever-treated county. This is important for two reasons. The first is that, within a treated-county-and-its-adjacent-untreated-counties group, there is possibly selection on which county is chosen to be treated, most likely due to urbanity. However, since in this analysis we still control for the set of covariates listed in Equation 1, we are comparing the outcomes of treated counties to the counties adjacent to other treated counties that have similar observable characteristics.

Table 6 presents the results on this subsample for the total population, the white population, and the non-white population. Results are presented in rows labeled "Boundary Sample". We see that changing our control group to drop areas of the country that did not participate in the program has little impact on our conclusions. We still see a 14% drop in the homicide rates and an 8% decline in suicide rates for the non-white population. This sample also provides no evidence that CMHCs decreased mortality rates in the white population. Tables A2 and A3 replicate Tables 4 and 5, respectively, using the boundary analysis sample and also find similar results.

6.2 Winsorized Data

To further test the robustness of our results, we replicate our main analysis on a winsorized subsample of our data. To create this sample, we estimate the predicted probability of receiving a CMHC using pretreatment observable characteristics. Using the predicted probability of treatment distribution, we identify treatment and control counties that fall within the common support across both samples. This helps ensure treatment and control counties have similar observable characteristics and results in dropping counties that were essentially guaranteed to receive a center and those guaranteed not to receive a center. Using this

Table 6: Robustness Checks - Effects of CMHC on Mortality

	(1)	(2)	(3)
	Suicide	Homicide	Alcohol
Panel A: Total Population			
Boundary Sample	-0.017 (0.016)	-0.096 (0.070)	-0.018 (0.076)
Winsorized Sample	-0.012 (0.017)	-0.093 (0.071)	-0.023 (0.075)
CHC Control	-0.014 (0.017)	-0.101 (0.070)	-0.023 (0.076)
Panel B: White Population			
Boundary Sample	-0.007 (0.015)	-0.007 (0.049)	0.011 (0.096)
Winsorized Sample	-0.002 (0.015)	-0.001 (0.024)	0.006 (0.095)
CHC Control	-0.003 (0.015)	-0.010 (0.048)	0.007 (0.094)
Panel C: Non-white Population			
Boundary Sample	-0.087* (0.052)	-0.154** (0.072)	-0.013 (0.058)
Winsorized Sample	-0.089* (0.052)	-0.157** (0.074)	-0.030 (0.056)
CHC Control	-0.089 (0.068)	-0.156** (0.072)	-0.039 (0.055)
County Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
State Linear Time Trend	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Notes: Dependent variable is age-adjusted mortality counts. Poisson regressions include controls for the natural log of the respective population with the regression coefficient restricted to one and linear time trends for percent less than high school education, percent high school education, unemployment rate, and labor force participation rate. Regressions are weighted by the respective county population. Standard errors clustered at the county level are in parenthesis *p < .10, **p < .05, ***p < .01. Years included: 1969-1988.

subsample helps ensure we are only comparing marginally treated and untreated counties. Our baseline results described in Table 3 are replicated using this subsample of the data in Table 6. Results are presented in rows labeled “Winsorized Sample”. Results remain the same sign, magnitude, and statistical significance as our baseline results, suggesting that our main findings are not driven by a comparison of counties that were essentially guaranteed to receive a center and those guaranteed not to receive a center. Tables A2 and A3 replicate Tables 4 and 5, respectively, using the winsorized sample and also find similar results.

6.3 Community Health Centers

We know that other publicly provided health programs were also being established during this time period. In 1965, the Office of Economic Opportunity initiated a Community Health Center (CHC) program to deliver affordable health care to disadvantaged populations. It is theoretically possible that CMHCs had no impact on mental health related mortality, but were correlated with the locations of CHC which have been shown to reduce mortality rates in the elderly population. If the locations of these centers are correlated with the locations of CMHCs, and these centers offered mental health services, it is possible that our previous results suffer from omitted variable bias. To address this concern, we add an additional control variable to our main specification to indicate if a county received a grant to establish a community health center by year t . Results are presented in Table 6. Our previous conclusions remain unchanged; the establishment of a community mental health center corresponds with a decrease in mental health related mortality in the non-white population. Tables A2 and A3 replicate Tables 4 and 5, respectively, controlling for the presence of CHCs and also find similar results. Taken together, these robustness exercises support our conclusion that CMHCs caused a reduction in the non-white suicide rate by 8%, the non-white homicide rate by 14%, and the female non-white alcohol related death rate by 18%.²⁴

²⁴As further robustness to address concerns about potential bias in two-way fixed effects estimators, we also report the results of six difference-in-difference estimators for each of our three main results. These

7 Conclusion

Mental illness is a pervasive and growing problem in the United States and around the world (WHO 2001, NIMH 2017). The World Health Organization’s suggested solution is for community care, despite a lack of evidence supporting its efficacy in managing mental health. The United States’ experiment with community care in the 1950s through 1980s provides a context within which to test whether community care could be an effective means of handling the mental health problem in the United States and the rest of the world.

Since CMHCs were not equipped to treat the seriously mentally ill who were being deinstitutionalized during this time and less than half of the planned centers were ever built, Community Mental Health Centers have gone down in history as being completely ineffectual for treating the mentally ill. However, our results suggest a more nuanced story.

We use the roll-out of CMHCs from 1971 to 1981 to identify the effect of implementing a CMHC in a community on mortality rates. While priority rankings were created by states to establish which areas had the greatest need for a CMHC, we show that these rankings do not predict which communities ever got CMHCs, nor do they predict the rollout of CMHCs. This apparent lack of correlation between state priority rankings and treatment allows us to directly compare treated and untreated counties in identifying the effect of a CMHC on county level mortality rates. We further show that our pre-treatment outcome variables of interest had similar levels and were experiencing similar trends before treatment.

With the exception of some suggestive evidence that CMHCs reduced suicide rates among whites between the ages of 15 and 24 by 5%, we find little evidence that CMHCs reduced mental health related mortality rates in the white population. However, we do find that CMHCs were effective in reducing suicides and homicides in the non-white population, with

results are displayed graphically in Figure A3. Each of these estimators compare one of the six treatment timing cohorts to the set of never treated counties. Results suggest that our main effects are driven by these difference-in-difference style comparison as opposed to the problematic comparisons that use already treated units as a control group for not yet treated counties. While the estimators become a bit noisy due to smaller sample sizes, this analysis highlights the effectiveness of centers that were established as part of the 1975 timing cohort.

non-whites experiencing an 8% decline in suicide rates and a 14% decline in homicide rates. We also find that non-white women experienced an 18% decline in deaths caused by alcohol. These results suggest CMHCs were effective in reducing mental illness related mortality, especially in populations with the least access to alternative forms of treatment.

Death is the most extreme outcome of unmanaged mental illness; other outcomes, such as unemployment, labor force participation rates, poverty, and divorce rates, all contribute to the decreased quality of life for those suffering from mental illness. We see our results as a lower bound on the overall impact of CMHCs on the mentally ill and their communities, and find that, just considering this lower bound, we see substantial improvements in outcomes due to the implementation of CMHCs.

These results challenge the currently-held narrative that the CMHA and CMHCs were completely ineffective in improving the mental healthcare landscape for the United States. We find that the non-white population did benefit from CMHCs in terms of reduced mortality, with possibly other benefits based on measures to which we do not have access. It is possible that the qualitative narrative not reflecting our quantitatively measured benefits to non-whites comes entirely from the conflation of the CMHCs with deinstitutionalization, wherein the measure of success or failure for CMHCs was whether they could cope with the many seriously mentally ill people being released from mental institutions. Because our data does not include information about the severity of the mental illness associated with the mortality we see, we cannot say whether this is the case or not. However, our results indicate another possibility as to why the historical narrative does not align with our conclusions - the decreases in mortality we see are entirely within the non-white population, whose experiences may not have featured highly in the minds or observations of the writers of that narrative. While we cannot know for sure, our results lay out a new story of the impact of CMHCs, one that finds gains for a population with great need, if potentially a lack of visibility.

While CMHCs were implemented in a particular context, being in the United States and

the results of a federal policy with numerous deployment issues, the effects that they had can be informative to our more general understanding of community care. In particular, it seems that community care is most likely to be effective in environments that are low in alternative mental health services, as was the case for those with lower rates of health insurance and less interaction with other forms of psychiatric medical care, and for people who have the highest rates of mental illness-related issues. Additionally, they may be effective at helping not only the mentally ill, but also their communities, as the results on homicide rates suggest. While it is outside the scope of this paper to compare community care with other forms of care, the results suggest that community care does provide some benefits for the most extreme outcomes, and cautiously indicate that community care is worth considering as a viable option for public mental health.

References

- Bachrach, Leona L (1974) *Patients at federally funded rural community mental health centers in 1971*, vol. 102 (Department of Health, Education, and Welfare, Public Health Service, Alcohol, Drug Abuse, and Mental Health Administration)
- Bailey, Martha J., and Andrew Goodman-Bacon (2015) ‘The war on poverty’s experiment in public medicine: Community health centers and the mortality of older americans.’ *American Economic Review* 105(3), 1067–1104
- Bartel, Ann, and Paul Taubman (1986) ‘Some economic and demographic consequences of mental illness.’ *Journal of Labor Economics* 4(2), 243–256
- Benham, Lee, and Alexandra Benham (1982) ‘Employment, earnings, and psychiatric diagnosis.’ In ‘Economic aspects of health’ (University of Chicago Press) pp. 203–220
- Bitler, Marianne, and Christopher Carpenter (2019) ‘Effects of direct care provision to the uninsured: Evidence from federal breast and cervical cancer programs.’ Technical Report, National Bureau of Economic Research
- Blank, Michael B, Jeanne C Fox, David S Hargrove, and Jean T Turner (1995) ‘Critical issues in reforming rural mental health service delivery.’ *Community Mental Health Journal* 31(6), 511–524
- Boyd, Jennifer E, Emerald P Katz, Bruce G Link, and Jo C Phelan (2010) ‘The relationship of multiple aspects of stigma and personal contact with someone hospitalized for mental illness, in a nationally representative sample.’ *Social psychiatry and psychiatric epidemiology* 45(11), 1063–1070
- Brown, Steve, Hazel Inskip, and Brian Barraclough (2000) ‘Causes of the excess mortality of schizophrenia.’ *The British Journal of Psychiatry* 177(3), 212–217
- Carlisle, David M, Barbara D Leake, and Martin F Shapiro (1997) ‘Racial and ethnic disparities in the use of cardiovascular procedures: associations with type of health insurance.’ *American Journal of Public Health* 87(2), 263–267
- Chandra, Anita, and Cynthia S Minkovitz (2006) ‘Stigma starts early: Gender differences in teen willingness to use mental health services.’ *Journal of adolescent health* 38(6), 754–e1
- Conner, Kyaien O, Valire Carr Copeland, Nancy K Grote, Gary Koeske, Daniel Rosen, Charles F Reynolds III, and Charlotte Brown (2010) ‘Mental health treatment seeking among older adults with depression: the impact of stigma and race.’ *The American Journal of Geriatric Psychiatry* 18(6), 531–543
- Cordner, Gary (2014) ‘Community policing.’ *The Oxford handbook of police and policing* pp. 148–171
- Currie, Janet, and Mark Stabile (2006) ‘Child mental health and human capital accumulation: the case of adhd.’ *Journal of health economics* 25(6), 1094–1118

- Druss, Benjamin G, Liping Zhao, Silke Von Esenwein, Elaine H Morrato, and Steven C Marcus (2011) ‘Understanding excess mortality in persons with mental illness: 17-year follow up of a nationally representative us survey.’ *Medical care* pp. 599–604
- Eisenberg, Daniel, Ezra Golberstein, and Justin B Hunt (2009) ‘Mental health and academic success in college.’ *The BE Journal of Economic Analysis & Policy*
- Ettner, Susan L, Johanna Catherine Maclean, and Michael T French (2011) ‘Does having a dysfunctional personality hurt your career? axis ii personality disorders and labor market outcomes.’ *Industrial Relations: A Journal of Economy and Society* 50(1), 149–173
- Ettner, Susan L, Richard G Frank, and Ronald C Kessler (1997) ‘The impact of psychiatric disorders on labor market outcomes.’ *ILR Review* 51(1), 64–81
- Fletcher, Jason M (2008) ‘Adolescent depression: diagnosis, treatment, and educational attainment.’ *Health economics* 17(11), 1215–1235
- for Health Statistics, National Center *Data File Documentations, Multiple Cause of Death (machine readable data file and documentation, CD-ROM Series)* (Hyattsville, Maryland)
- Frank, Richard G, and Thomas G McGuire (2000) ‘Economics and mental health.’ *Handbook of health economics* 1, 893–954
- Franks, Peter, Carolyn M Clancy, and Marthe R Gold (1993) ‘Health insurance and mortality: evidence from a national cohort.’ *Jama* 270(6), 737–741
- French, Michael T, and Gary A Zarkin (1998) ‘Mental health, absenteeism and earnings at a large manufacturing worksite.’ *The Journal of Mental Health Policy and Economics* 1(4), 161–172
- Gibb, Sheree J, David M Fergusson, and L John Horwood (2010) ‘Burden of psychiatric disorder in young adulthood and life outcomes at age 30.’ *The British Journal of Psychiatry* 197(2), 122–127
- Gonzalez, Jodi M, Margarita Alegria, and Thomas J Prihoda (2005) ‘How do attitudes toward mental health treatment vary by age, gender, and ethnicity/race in young adults?’ *Journal of community psychology* 33(5), 611–629
- Goodman-Bacon, Andrew (2021) ‘Difference-in-difference with variation in treatment timing.’ *Journal of Econometrics*
- Goodman-Bacon, Andrew, Thomas Goldring, and Austin Nichols (2019) ‘Bacondecomp: Stata module to perform a bacon decomposition of difference-in-differences estimation.’ *Statistical Software Components*
- Grob, Gerald N (1991) *From asylum to community: Mental health policy in modern America* (Princeton University Press)
- (1994) ‘Government and mental health policy: A structural analysis.’ *The Milbank Quarterly* pp. 471–500

- Gronfein, William (1985) 'Incentives and intentions in mental health policy: A comparison of the medicaid and community mental health programs.' *Journal of Health and Social Behavior* pp. 192–206
- Gujral, Kritee, and Anirban Basu (2019) 'Impact of rural and urban hospital closures on inpatient mortality.' Technical Report, National Bureau of Economic Research
- Harcourt, Bernard E. (2011) 'An institutionalization effect: The impact of mental hospitalization and imprisonment on homicide in the united states, 1934-2001.' *The Journal of Legal Studies* 40(1), 39–83
- Hiday, Virginia Aldigé, Marvin S Swartz, Jeffrey W Swanson, Randy Borum, and H Ryan Wagner (1999) 'Criminal victimization of persons with severe mental illness.' *Psychiatric services* 50(1), 62–68
- Hiroeh, Urara, Louis Appleby, Preben Bo Mortensen, and Graham Dunn (2001) 'Death by homicide, suicide, and other unnatural causes in people with mental illness: a population-based study.' *The Lancet* 358(9299), 2110–2112
- Hoffmann, Carolanne H. (1964) *Health Insurance Coverage; United States. July 1962- June 1963*, vol. 10.11 (Department of Health, Education, and Welfare)
- Horwitz, Allan (1977) 'The pathways into psychiatric treatment: Some differences between men and women.' *Journal of Health and Social Behavior* pp. 169–178
- Insel, Thomas R (2008) 'Assessing the economic costs of serious mental illness'
- Jemelka, R., E. Trupin, and J.A. Chiles (1989) 'The mentally ill in prisons: A review.' *Hospital and Community Psychiatry* 40, 481–485
- Keeler, Emmett B, Willard G Manning, and Kenneth B Wells (1988) 'The demand for episodes of mental health services.' *Journal of Health Economics* 7(4), 369–392
- Kelleher, Kelly, Mark Chaffin, Janice Hollenberg, and Ellen Fischer (1994) 'Alcohol and drug disorders among physically abusive and neglectful parents in a community-based sample.' *American Journal of Public Health* 84(10), 1586–1590
- Keller, Emmett B., Willard G. Manning, and Kenneth B. Wells (1981) 'The demand for episodes of mental health services.' *Journal of Health Economics* 7(4), 369–392
- Kenig, Sylvia (1992) *Who plays? Who pays? Who cares?: A case study in applied sociology, political economy, and the community mental health centers movement* (Baywood Publishing Company)
- Kessler, Ronald C, Ellen E Walters, and Melinda S Forthofer (1998) 'The social consequences of psychiatric disorders, iii: probability of marital stability.' *American Journal of Psychiatry* 155(8), 1092–1096

- Kessler, Ronald C, Roger L Brown, and Clifford L Broman (1981) ‘Sex differences in psychiatric help-seeking: Evidence from four large-scale surveys.’ *Journal of health and social behavior* pp. 49–64
- Kirby, James B, and Toshiko Kaneda (2010) ‘Unhealthy and uninsured: exploring racial differences in health and health insurance coverage using a life table approach.’ *Demography* 47(4), 1035–1051
- Kirk, Stuart A (1974) ‘The impact of labeling on rejection of the mentally ill: An experimental study.’ *Journal of Health and Social Behavior* pp. 108–117
- Lang, Matthew (2013) ‘The impact of mental health insurance laws on state suicide rates.’ *Health economics* 22(1), 73–88
- Lerner, Debra, and Rachel Mosher Henke (2008) ‘What does research tell us about depression, job performance, and work productivity?’ *Journal of Occupational and Environmental Medicine* 50(4), 401–410
- Link, Bruce G, and Francis T Cullen (1986) ‘Contact with the mentally ill and perceptions of how dangerous they are.’ *Journal of Health and Social Behavior* pp. 289–302
- Link, Bruce G, Howard Andrews, and Francis T Cullen (1992) ‘The violent and illegal behavior of mental patients reconsidered.’ *American Sociological Review* pp. 275–292
- Mackenzie, CS, WL Gekoski, and VJ Knox (2006) ‘Age, gender, and the underutilization of mental health services: the influence of help-seeking attitudes.’ *Aging and Mental Health* 10(6), 574–582
- Maniglio, R (2009) ‘Severe mental illness and criminal victimization: a systematic review.’ *Acta Psychiatrica Scandinavica* 119(3), 180–191
- Marcotte, Dave E, and Virginia Wilcox-Gok (2003) ‘Estimating earning losses due to mental illness: a quantile regression approach.’ *Journal of Mental Health Policy and Economics* 6(3), 123–134
- McGrath, John, Sukanta Saha, David Chant, and Joy Welham (2008) ‘Schizophrenia: a concise overview of incidence, prevalence, and mortality.’ *Epidemiologic reviews* 30(1), 67–76
- McGuire, Thomas G. (1981) ‘Financing and demand for mental health services.’ *The Journal of Human Resources* 16(4), 501–522
- Mechanic, David (2002) ‘Removing barriers to care among persons with psychiatric symptoms.’ *Health Affairs* 21(3), 137–147
- (2014) ‘More people than ever before are receiving behavioral health care in the united states, but gaps and challenges remain.’ *Health Affairs* 33(8), 1416–1424

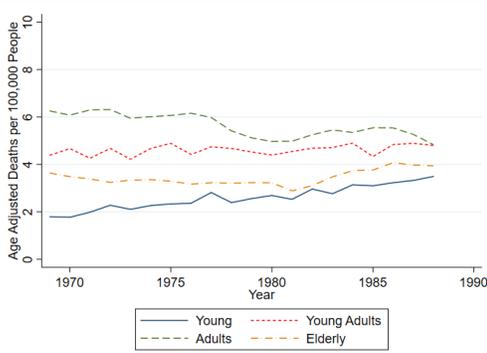
- Mintz, Jim, Lois Imber Mintz, Mary Jane Arruda, and Sun Sook Hwang (1992) 'Treatments of depression and the functional capacity to work.' *Archives of General Psychiatry* 49(10), 761–768
- Mojtabai, Ramin (2007) 'Americans' attitudes toward mental health treatment seeking: 1990–2003.' *Psychiatric Services* 58(5), 642–651
- Morrissey, Joseph P, and Howard H Goldman (1986) 'Care and treatment of the mentally ill in the united states: Historical developments and reforms.' *The Annals of the American Academy of Political and Social Science* 484(1), 12–27
- Mullahy, John, and Jody L Sindelar (1993) 'Alcoholism, work, and income.' *Journal of Labor Economics* 11(3), 494–520
- Naierman, Naomi, Brenda Haskins, and Gail Robinson (1978) *Community Mental Health Centers - A decade later* (Abt Books)
- of Mental Health (U.S.). Division of Biometry. Survey, National Institute, and Reports Branch. *Statistical Note* (Rockville, Md.)
- Office, United States General Accounting (1977) *Summary of a report: returning the mentally disabled to the community: government needs to do more* (United States General Accounting Office)
- on the Homeless, United States Interagency Council (1990) *The 1990 annual report of the Interagency Council on the Homeless*. (Washington D.C.: The Council)
- Organization, World Health (2001) *The World Health Report 2001: Mental Health New Understanding, New Hope* (Geneva: World Health Organization Office of Publication)
- Osgood, D. Wayne (2000) 'Poisson-based regression analysis of aggregate crime rates.' *Journal of Quantitative Criminology* 16(1), 21–43
- Raphael, Steven, and Michael A. Stoll (2013) 'Assessing the contribution of the deinstitutionalization of the mentally ill to growth in the us incarceration rate.' *The Journal of Legal Studies* 42(1), 187–222
- Roan Gresenz, Carole, and Roland Sturm (2004) 'Mental health and employment transitions.' In 'The economics of gender and mental illness' (Emerald Group Publishing Limited) pp. 95–108
- Rose, Stephen M (1979) 'Deciphering deinstitutionalization: Complexities in policy and program analysis.' *The Milbank Memorial Fund Quarterly. Health and Society* pp. 429–460
- Rowan, Kathleen, Donna D McAlpine, and Lynn A Blewett (2013) 'Access and cost barriers to mental health care, by insurance status, 1999–2010.' *Health affairs* 32(10), 1723–1730

- Saarni, Samuli I, Jaana Suvisaari, Harri Sintonen, Sami Pirkola, Seppo Koskinen, Arpo Aromaa, and Jouko Lönnqvist (2007) 'Impact of psychiatric disorders on health-related quality of life: general population survey.' *The British journal of psychiatry* 190(4), 326–332
- Saha, Sukanta, David Chant, and John McGrath (2007) 'A systematic review of mortality in schizophrenia: is the differential mortality gap worsening over time?' *Archives of general psychiatry* 64(10), 1123–1131
- Schlesinger, Mark, and Robert Dorwart (1984) 'Ownership and mental-health services: A reappraisal of the shift toward privately owned facilities.' *New England Journal of Medicine* 311(15), 959–965
- Sipe, Theresa Ann, Ramona KC Finnie, John A Knopf, Shuli Qu, Jeffrey A Reynolds, Anilkrishna B Thota, Robert A Hahn, Ron Z Goetzl, Kevin D Hennessy, Lela R McKnight-Eily et al. (2015) 'Effects of mental health benefits legislation: A community guide systematic review.' *American journal of preventive medicine* 48(6), 755–766
- Sorlie, Paul D, Norman J Johnson, Eric Backlund, and Douglas D Bradham (1994) 'Mortality in the uninsured compared with that in persons with public and private health insurance.' *Archives of Internal Medicine* 154(21), 2409–2416
- Steadman, Henry J, Edward P Mulvey, John Monahan, Pamela Clark Robbins, Paul S Appelbaum, Thomas Grisso, Loren H Roth, and Eric Silver (1998) 'Violence by people discharged from acute psychiatric inpatient facilities and by others in the same neighborhoods.' *Archives of general psychiatry* 55(5), 393–401
- Stein, Leonard I, and Mary Ann Test (1980) 'Alternative to mental hospital treatment: I. conceptual model, treatment program, and clinical evaluation.' *Archives of general psychiatry* 37(4), 392–397
- Teitler, Julien O, and Nancy E Reichman (2008) 'Mental illness as a barrier to marriage among unmarried mothers.' *Journal of Marriage and Family* 70(3), 772–782
- Teplin, Linda A, Gary M McClelland, Karen M Abram, and Dana A Weiner (2005) 'Crime victimization in adults with severe mental illness: comparison with the national crime victimization survey.' *Archives of general psychiatry* 62(8), 911–921
- Test, Mary Ann, and Leonard I Stein (1980) 'Alternative to mental hospital treatment: Iii. social cost.' *Archives of General Psychiatry* 37(4), 409–412
- Thornicroft, Graham (2011) 'Physical health disparities and mental illness: the scandal of premature mortality.' *The British Journal of Psychiatry* 199(6), 441–442
- Torrey, E Fuller (1994) 'Violent behavior by individuals with serious mental illness.' *Psychiatric services* 45(7), 653–662
- (1997) *Out of the Shadows: Confronting America's Mental Illness Crisis* (John Wiley and Sons, Inc.)

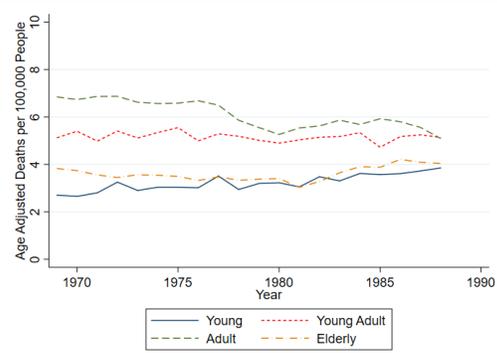
- Weisbrod, Burton A (1983) 'A guide to benefit-cost analysis, as seen through a controlled experiment in treating the mentally ill.' *Journal of Health Politics, Policy and Law* 7(4), 808–845
- Weisbrod, Burton A, Mary Ann Test, and Leonard I Stein (1980) 'Alternative to mental hospital treatment: Ii. economic benefit-cost analysis.' *Archives of General Psychiatry* 37(4), 400–405
- Zhang, Mingliang, Kathryn M Rost, and John C Fortney (1999a) 'Earnings changes for depressed individuals treated by mental health specialists.' *American Journal of Psychiatry* 156(1), 108–114
- Zhang, Mingliang, Kathryn M Rost, John C Fortney, and G Richard Smith (1999b) 'A community study of depression treatment and employment earnings.' *Psychiatric Services* 50(9), 1209–1213

Appendix

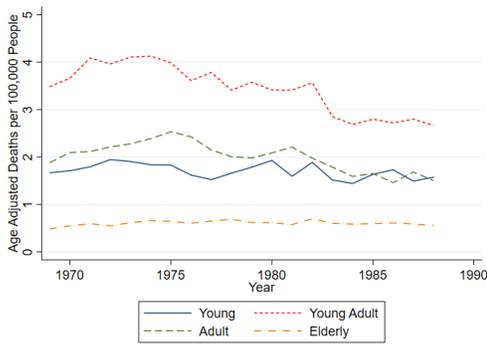
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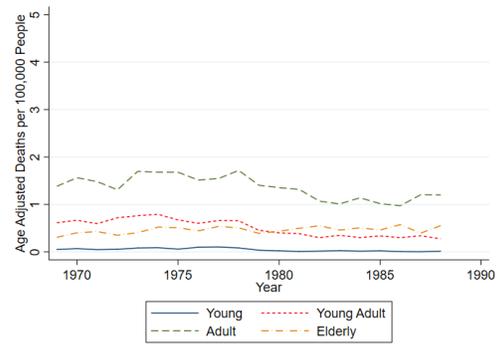
(a) Suicides



(b) Alternative Suicide Measure



(c) Homicide



(d) Alcohol

Figure A1: Age-Adjusted Mortality Rates by Age

Notes: Age-adjusted mortality data was created from Vital Statistics Multiple-Cause of Death Files and the 1969-1988 population statistics (SEER). Suicide alt. combines suicide deaths with accidental gun deaths due to the tendency during this period to misclassify suicides on death certificates. Age groups are defined as follows: 15-24 years old (young), 25-44 (young adult), 45-64 (adult), and 65 and older (elderly).

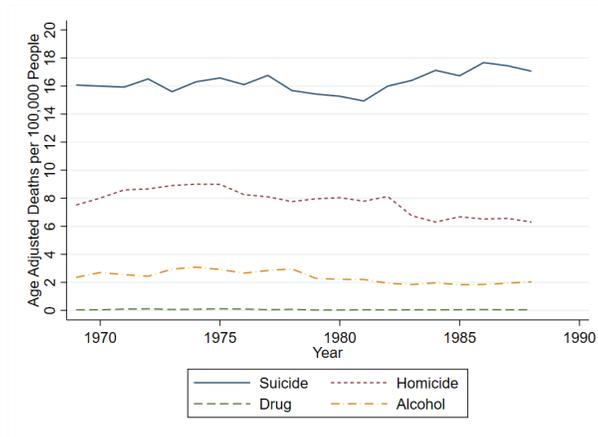


Figure A2: Age-Adjusted Mortality Summary Statistics

Notes: Age-adjusted mortality data was created from Vital Statistics Multiple-Cause of Death Files and 1969-1988 population statistics (SEER).

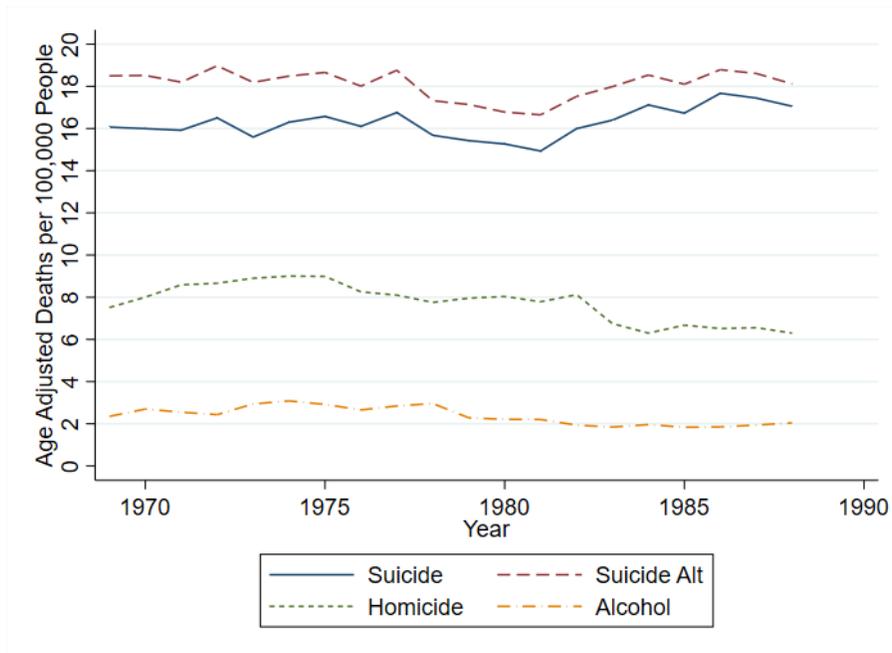
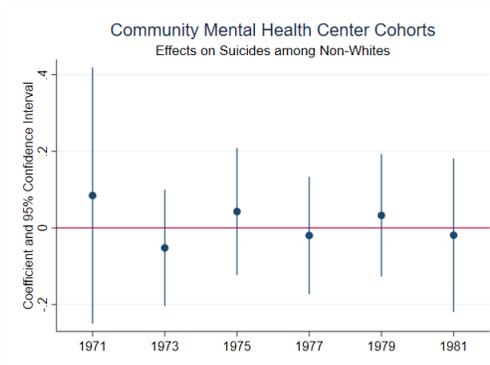
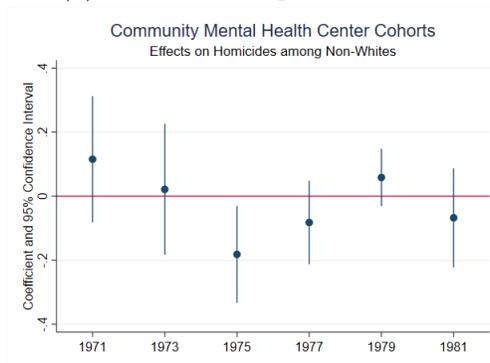


Figure A3: Age-Adjusted Mortality Summary Statistics

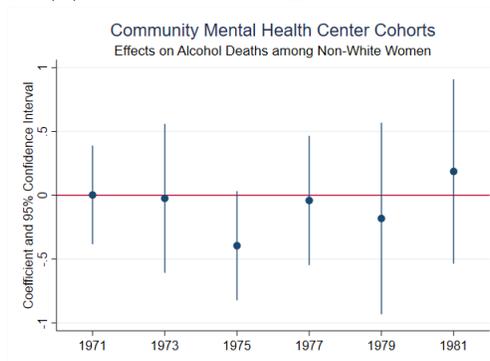
Notes: Age-adjusted mortality data was created from Vital Statistics Multiple-Cause of Death Files and the 1969-1988 population statistics (SEER). Suicide alt. combines suicide deaths with accidental gun deaths due to the tendency during this period to misclassify suicides on death certificates.



(a) Suicide among Non-Whites



(b) Homicide among Non-Whites



(c) Alcohol Deaths among Non-White Women

Figure A4: Effect Size by Timing Cohort

Notes: Dependent variable is age-adjusted mortality counts. Poisson regressions include controls for the natural log of the respective population with the regression coefficient restricted to one and linear time trends for percent less than high school education, percent high school education, unemployment rate, and labor force participation rate. Each coefficient and the associated 95% confidence interval is estimated from independent Poisson regression were only treated counties from the respective timing cohort and never treated counties are used in the model. Standard errors clustered at the county level. Years included: 1969-1988. Regressions are weighted by the relevant county population.

Tables

Table A1: Sub-group Analysis by Age - White Population Only

	(1)	(2)	(3)
	Suicide	Homicide	Alcohol
Panel A: Young			
CMHC	-0.056	0.018	0.263
	(0.040)	(0.057)	(0.290)
Panel B: Young Adult			
CMHC	0.024	-0.017	0.024
	(0.015)	(0.049)	(0.097)
Panel C: Adult			
CMHC	-0.006	-0.026	0.022
	(0.018)	(0.056)	(0.095)
Panel D: Elderly			
CMHC	0.004	-0.034	-0.080
	(0.041)	(0.105)	(0.130)
County Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
State Linear Time Trend	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Notes: Dependent variable is age-adjusted mortality counts. Poisson regressions include controls for the natural log of the respective population with the regression coefficient restricted to one and linear time trends for percent less than high school education, percent high school education, unemployment rate, and labor force participation rate. Regressions are weighted by the respective county population. Standard errors clustered at the county level are in parenthesis *p < .10, **p < .05, ***p < .01. Years included: 1969-1988. Age groups are defined as follows: 15-24 years old (young), 25-44 (young adult), 45-64 (adult), and 65 and older (elderly).

Table A2: Robustness Checks: Demographic Sub-group Analysis

	(1)	(2)	(3)
	Suicide	Homicide	Alcohol
Panel A: Non-White Men			
Boundary Sample	-0.078 (0.052)	-0.161** (0.074)	0.036 (0.083)
Winsorized Sample	-0.078 (0.052)	-0.162** (0.076)	0.018 (0.081)
CHC Control	-0.085 (0.061)	-0.161** (0.073)	0.007 (0.073)
Panel B: Non-White Women			
Boundary Sample	-0.132 (0.100)	-0.134* (0.070)	-0.194* (0.119)
Winsorized Sample	-0.138 (0.100)	-0.145** (0.073)	-0.205* (0.119)
CHC Control	-0.118 (0.114)	-0.139* (0.072)	-0.213* (0.118)
Panel C: White Men			
Boundary Sample	-0.012 (0.013)	-0.022 (0.053)	0.021 (0.090)
Winsorized Sample	-0.007 (0.013)	-0.017 (0.052)	0.018 (0.089)
CHC Control	-0.009 (0.013)	-0.026 (0.051)	0.019 (0.088)
Panel D: White Women			
Boundary Sample	0.000 (0.031)	0.035 (0.051)	-0.014 (0.123)
Winsorized Sample	0.006 (0.030)	0.040 (0.051)	-0.023 (0.122)
CHC Control	0.005 (0.030)	0.035 (0.050)	-0.024 (0.123)
County Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
State-Specific Linear Time Trend	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Notes: Dependent variable is age-adjusted mortality counts. Poisson regressions include controls for the natural log of the respective population with the regression coefficient restricted to one and linear time trends for percent less than high school education, percent high school education, unemployment rate, and labor force participation rate. Regressions are weighted by the respective county population. Standard errors clustered at the county level are in parenthesis *p < .10, **p < .05, ***p < .01.

Table A3: Robustness Checks: Sub-group Analysis by Age - Non-White Population Only

	(1)	(2)	(3)
	Suicide	Homicide	Alcohol
Panel A: Young			
Boundary Sample	-0.128** (0.063)	-0.164* (0.097)	0.324 (0.323)
Winsorized Sample	-0.119* (0.063)	-0.170* (0.099)	0.300 (0.316)
CHC Control	-0.105 (0.076)	-0.158* (0.093)	0.201 (0.299)
Panel B: Young Adult			
Boundary Sample	-0.107 (0.070)	-0.194*** (0.073)	-0.030 (0.064)
Winsorized Sample	-0.091 (0.066)	-0.181** (0.074)	-0.028 (0.062)
CHC Control	-0.128 (0.096)	-0.202*** (0.076)	-0.069 (0.067)
Panel C: Adult			
Boundary Sample	0.039 (0.108)	-0.069 (0.052)	-0.052 (0.086)
Winsorized Sample	0.015 (0.103)	-0.063 (0.052)	-0.076 (0.083)
CHC Control	0.031 (0.113)	-0.070 (0.050)	-0.069 (0.079)
Panel D: Elderly			
Boundary Sample	-0.090 (0.074)	-0.183** (0.077)	0.210 (0.151)
Winsorized Sample	-0.101 (0.077)	-0.185*** (0.079)	0.168 (0.146)
CHC Control	-0.076 (0.073)	-0.185*** (0.076)	0.253* (0.154)
County Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
State-Specific Linear Time Trend	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Notes: Dependent variable is age-adjusted mortality counts. Poisson regressions include controls for the natural log of the respective population with the regression coefficient restricted to one and linear time trends for percent less than high school education, percent high school education, unemployment rate, and labor force participation rate. Regressions are weighted by the respective county population. Standard errors clustered at the county level are in parenthesis *p < .10, **p < .05, ***p < .01. Each panel limits the sample to specific age groups. Age groups are defined in the notes of Table 5.

Table A4: Robustness Checks: Sub-group Analysis by Age - White Population Only

	(1)	(2)	(3)
	Suicide	Homicide	Alcohol
Panel A: Young			
Boundary Sample	-0.060 (0.041)	0.019 (0.059)	0.245 (0.325)
Winsorized Sample	-0.056 (0.041)	0.019 (0.057)	0.266 (0.308)
CHC Control	-0.051 (0.037)	0.012 (0.057)	0.258 (0.314)
Panel B: Young Adult			
Boundary Sample	0.023 (0.015)	-0.013 (0.049)	0.033 (0.099)
Winsorized Sample	0.024 (0.015)	-0.017 (0.049)	0.024 (0.097)
CHC Control	0.022 (0.016)	-0.023 (0.048)	0.023 (0.098)
Panel C: Adult			
Boundary Sample	-0.010 (0.018)	-0.027 (0.057)	0.029 (0.098)
Winsorized Sample	-0.005 (0.018)	-0.026 (0.057)	0.022 (0.095)
CHC Control	-0.005 (0.018)	-0.028 (0.056)	0.020 (0.096)
Panel D: Elderly			
Boundary Sample	0.001 (0.042)	-0.053 (0.109)	-0.091 (0.133)
Winsorized Sample	0.004 (0.041)	-0.034 (0.105)	-0.080 (0.131)
CHC Control	0.004 (0.040)	-0.043 (0.104)	-0.064 (0.127)
County Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
State-Specific Linear Time Trend	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Notes: Dependent variable is age-adjusted mortality counts. Poisson regressions include controls for the natural log of the respective population with the regression coefficient restricted to one and linear time trends for percent less than high school education, percent high school education, unemployment rate, and labor force participation rate. Regressions are weighted by the respective county population. Standard errors clustered at the county level are in parenthesis *p < .10, **p < .05, ***p < .01. Each panel limits the sample to specific age groups. Age groups are defined in the notes of Table 5.