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A State-Level Analysis of Deinstitutionalization and the Impact of Chlorpromazine

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A STATE-LEVEL ANALYSIS OF DEINSTITUTIONALIZATION AND THE IMPACT OF CHLORPROMAZINE

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Abstract

US state mental hospitals were rapidly depopulated in the decades following 1955. This was a demographic phenomenon of major proportion. The introduction of antipsychotics in 1954 has often been considered instrumental in this population movement. To date, studies of the role of antipsychotics in deinstitutionalization have been state specific, methodologically weak, inconsistent in their findings and fail to consider inter-state differences which could reveal previously unknown causal variables. This study used US Census data and pooled cross sectional time-series analysis to estimate the impact of chlorpromazine and policy changes on mental hospital population movement. To that end, the population movement of US state mental hospitals from 1925 to 1966 by state was analyzed. Furthermore, this study analyzes the overall resident count, discharges, first admissions and readmissions as well the resident count and first admissions of nine diagnostic categories and seven age groups. Population movement was assessed in relation to drug use using data on drug expenditure from a California State Senate survey conducted in 1956 within thirty states. This study found that the US mental hospital resident count significantly declined between 1954 and 1966 but the decline between 1954 and 1961 was accounted for by demographic changes in several diagnoses. However, schizophrenia was not among these diagnoses. The US resident count of patients with schizophrenia did not significantly decline between 1954 and 1961, a seven year period during which antipsychotics were in widespread use, but did significantly decline between 1961 and 1966. Moreover, drug expenditure as reported by the survey, did not appear to influence the movement of the population of patients with schizophrenia in those states studied. Lastly, the depopulation of US mental hospitals that occurred between 1954 and 1961 occurred among patients below age 55 whereas the depopulation between 1961 and 1966 occurred among patients aged 55 and over.

This depopulation of the elderly occurred across diagnostic categories before the advent of Medicare and Medicaid and coincided with important policy changes in 1961. The central conclusion of this study is that policy change, not the advent of antipsychotics was responsible for deinstitutionalization.

Introduction

The first public hospitals for mental patients in the United States were established in the early 19th century. By mid-century the construction of public hospitals had escalated to an average of more than one state asylum built each year (Torrey & Miller, 2001). The size of the hospitals also grew. In 1870, there were just 2 hospitals with over 1000 patients. By 1910, there were 75 (Torrey & Miller, 2001). This expansion in the number and population of mental hospitals continued into the 20th century. In 1955 there were 3.38 persons per 1000 population in US mental hospitals compared to the 0.20 persons in 1850 (Torrey & Miller, 2001). This seventeen-fold increase in hospitalization occurred in approximately 100 years. The US mental hospital population of 1955 exceeded half a million (Torrey & Miller, 2001). Hospital population then declined from this peak of 559,000 in 1955 to 107,000 in 1988 (Shorter, 1997), decreasing to approximately a fifth of its maximum size in 33 years. This drastic reduction in state mental hospital population is often referred to as deinstitutionalization.

Deinstitutionalization is an important phenomenon in the history of psychiatry. Firstly, it involved a shift in the delivery of services to the mentally ill. In 1955, outpatient care accounted for 23% of all mental patient care (Barton, 1987). By 1977, outpatient care accounted for 70% (Barton, 1987). Secondly, deinstitutionalization had a considerable impact on patients, their families and communities across America. The number of patients released was substantial. For example, in the 11 year period after 1954 the number of patients discharged more than tripled. These ex-patients faced many challenges in returning to the community and deinstitutionalization has been linked with difficulties in maintaining medication, poor functioning, homelessness, incarceration in prisons, and re-institutionalization in alternative settings such as adult homes and shelters (Johnson, 1990). Lastly, deinstitutionalization is an

important topic because its cause is still unknown. It is commonly associated with the introduction of chlorpromazine in 1954. Indeed, the pharmacological efficacy of antipsychotics is generally perceived to have played a causal role in the depopulation of state mental hospitals (Shorter, 1997). However, there are rival explanations and the cause of deinstitutionalization continues to be debated (Gronfein, 1985).

Defining deinstitutionalization

As previously stated, deinstitutionalization is often understood as the depopulation of mental hospitals that occurred in the decades following 1954. However, this understanding is overly simplistic. Deinstitutionalization as a concept requires consideration of the goals of deinstitutionalization and its processes (Lee Pow, Baumeister, Hawkins, Cohen & Garand, in press). Its goal was to depopulate state mental hospitals primarily by reducing the large numbers of long-term chronically ill patients. It aimed to achieve this goal through processes that were both proximal and distal to hospital administration. Proximal factors included actual population movement such as discharge and admission rates. Obviously, depopulation requires that the former exceed the latter. Distal factors included a social movement aimed explicitly at closing large state hospitals; this included initiatives designed to help discharged patients live successfully in the community, such as the construction of community-based mental health centers, provisions for shelter (such as group homes) and employment for the functionally able (Lee Pow et al., in press). Both proximal and distal factors arose from various sources. Some were local, such as decisions by hospital administrators to reduce admissions. Others came from state and federal government initiatives, such as placing caps on the size of mental hospitals, and laws, which allocated funds to care for discharged patients in the community. There were also private legal initiatives involving patient rights that emerged later. Deinstitutionalization is

therefore a complex and multifaceted phenomenon that risks being misunderstood if too narrowly defined. For the purposes of this paper, deinstitutionalization will be defined as the movement to depopulate that includes consideration of factors both proximal, such as changes in population movement and distal, such as the social context of such movement.

History of deinstitutionalization

Deliberate attempts to reduce hospital population by means of discharging patients have been occurring since the early 19th century (Pollock, 1934; 1945). One early strategy was family care: the placement of "chronic" and "quiet" patients in private homes with an unrelated "foster family". Foster families received an allowance from the state for the care of the patient. This was first practiced in Massachusetts on a small scale and in 1914 the state had 341 patients in family care (Pollock, 1934). Family care was appealing because it helped to reduce overcrowding (Grob, 1983) and was estimated to cost half as much as institutional care (Pollock, 1934; 1945). The practice soon spread to other states which established family care programs in the 1930's and 40's, including New York, Pennsylvania, Utah, Illinois, Maryland, Rhode Island, California and Michigan (Pollock, 1945). For example, by 1945, there were 1700 patients in family care in New York, 420 patients in Illinois and 228 in Rhode Island (Pollock, 1946). However, the growth of the family care movement came to an end with World War II. Fewer families were willing to house patients and the costs of placement in foster families doubled (Pollock, 1947). As such, the practice declined and never recovered (Pollock, 1948).

The term deinstitutionalization was first used in 1934 by Dr. John Maurice Grimes. In 1930, he was appointed by the American Medical Association (AMA) to conduct a two-year-long investigation of US mental hospital care (Grimes, 1934). The result of his investigation

portrayed hospital care for the mentally ill in an unfavorable manner. Grimes alluded to controversy over whether the investigation was the responsibility of the American Psychiatric Association or the AMA. This controversy, coupled with his unfavorable findings led to suppression of the report. However, Grimes published the report in book form independently. After observing overcrowding at hospitals, he concluded that the solution to the problem "must begin with de-institutionalization" (p.113). Unlike family care which was a small-scale attempt to relieve overcrowding, Grimes' offered the first serious proposal that mental hospitals begin large-scale discharge for the purpose of dramatically reducing the mental hospital population.

An important development in the history of deinstitutionalization was the growth of community care for mental patients through outpatient clinics. The first outpatient clinics of the 1940's primarily treated children (Barhash, Bentley, Kirkpatrick & Sanders, 1952). By the 1950's they began to treat more adult patients. It is in these early clinics that the practice of using a team of psychiatrists, psychologists and psychiatric social workers in patient care evolved. World War II greatly advanced outpatient clinics. Almost 2 million of the 15 million men examined for military service between 1942 and 1945 were rejected because of psychiatric disabilities (Mechanic, 1989). This suggested a much greater level of psychopathology in the general public than previously assumed and increased overall awareness of mental illness (Johnson, 1990; Barhash et al., 1952). The outpatient clinic model was adopted by the Veterans Administration to provide psychiatric services for mentally ill war veterans (Pollock, 1947). This treatment of veterans helped steer outpatient psychiatry further away from child services and more toward the development of services for adults (Barhash et al., 1952).

In 1945, Robert Felix who would become the first director of the National Institute of Mental Health in 1946 was appointed by the Surgeon General to design a national mental health

program (Torrey, 2014). His plan, proposed in 1945, was the first of its kind, in that it advocated federal fiscal involvement in mental health care. He proposed that the federal government create a mental illness research center to be called the National Neuropsychiatric Institute, and use federal funds to detect and treat mental illness through programs such as community mental health clinics (Torrey, 2014). Felix accurately predicted that through federal assistance and community based clinics "public mental hospitals as we know them today can disappear in 25 years" (Torrey, 2014, p. 26). Congressional hearings for Felix's plan began in September 1945. These hearings led to the National Neuropsychiatric Institute being renamed the National Institute of Mental Health and to passage of the National Mental Health Act in 1946.

The 1946 National Mental Health Act allowed for the provision of funds to develop community care. The financial assistance given to states allowed for the establishment of new clinics, planning of new mental health programs and extension of existing programs (Grob, 1991; Barhash et al., 1952). Two million dollars was allotted in 1948, and the following year grant-in-aid-funding was increased to 3.5 million (Grob, 1991). As a result the number of outpatient clinics grew. Before 1948, more than half of all states had no such clinics and by 1949 all but five states had one or more (Grob, 1991). The number of outpatient clinics grew from approximately 800 to 1200 during the 1940's (Felix, 1967).

A national Governor's Conference in 1949 ensured that this movement towards increasing use of outpatient clinics was nationally endorsed (The Council of State Governments, 1950). This conference presented data from 94% of all state hospitals on the organization, administration, and operation of state programs for the mentally ill. The conference concluded that "many persons in state hospitals who are not now in need of continuing psychiatric hospital

care" (p.5) and recommended that “Outpatient clinics should be extended and other community resources developed to care for persons in need of help, but not of hospitalization” (p.5).

By 1954, the movement to depopulate was well under way. The existing conditions included efforts to reduce overcrowding by increasing discharges, mounting criticisms of the custodial institution and increasing expansion of community care. Indeed, the National Institute of Mental Health counted 1234 psychiatric outpatient clinics in operation in 1954 (NIMH, 1959). It defined the psychiatric outpatient clinic as an outpatient service for ambulatory patients, where a psychiatrist is in attendance and takes medical responsibility for all patients in the clinic (NIMH, 1954). Several policies aimed at establishing and expanding community care such as the National Mental Health Act of 1946 were also enacted. Individual states also passed their own laws promoting community care. For example, in California a policy to extend extramural care, passed in 1939 greatly increased the number of patients in extramural care (Rosanoff, 1942). A separate act passed in 1953 allowed for the provision of California state subsidies to local outpatient services (Aviram & Segal, 1977). In New York, a commission was established in 1949 to administer federal grants for planning community mental health service (Foley & Sharfstein, 1983). Based on the commission’s work, the Community Mental Health Services Act was passed in 1954 and established a permanent system of state aid for locally operated community mental health services (Hunt & Forstenzer, 1957).

Chlorpromazine (CPZ) was introduced into American psychiatry in 1954. Smith, Kline and French, the company licensed to sell CPZ in America, began an aggressive marketing campaign aimed at two target groups; private practitioners and state hospitals (Grob, 1991). As private practitioners were less willing to try the new drugs and state hospitals were limited by their institutional budgets, SK&F appealed to state legislatures to provide more funding. Indeed,

a special task force was specifically created by SK&F to assist legislators and state administrators in planning hospital budgets (Johnson, 1990; Swazey, 1974). As states were eager to reduce the problems associated with mental illness identified in the Governors Conference of 1949, these appeals for increased budgets were well received (Grob, 1991). Both state hospitals and SK&F had strong financial incentives to make reintegration into the community a success. For state hospitals, the cost of maintaining patients outside the institution on chlorpromazine was estimated to be $46 per-annum as compared to the $912 it cost to keep them in hospital (Valenstein, 1998). And for SK&F: they reported a 284% increase in earnings between 1953 and 1956 (Smith, Kline and French, 1956). They did not state how much of their profit was due to CPZ but they mentioned how Thorazine was well received, "showed a rise in sales" and "remains the outstanding drug for the treatment of severe mental illness" (p.3).

Another major tranquilizer was introduced into American psychiatry during this time. Reserpine, known for its sedative effects, was also considered useful for agitated states of psychosis. By 1954, both drugs were known to many psychiatrists (Swazey, 1974) but "CPZ soon surpassed it as the most widely used major tranquilizer because of its more pronounced symptomatic effects and greater speed of action" (Swazey, 1974, p.192). Other reasons for the growing preference for CPZ over reserpine are that 1) the former drug had more specific pharmacological and clinical effects and 2) clinicians became reluctant to use reserpine when reports began appearing in the late 1950's that it causes depression (Baumeister, Hawkins & Uzelac, 2003).

The earliest clinical trials of chlorpromazine observed remarkable effects on patients. Three influential trials in particular demonstrated the drug's effectiveness and affected SK& F's decision to market CPZ as a psychiatric medication (Swazey, 1974). Lehmann and Hanrahan

(1954) conducted their study in Canada and observed a reduction in psychomotor symptoms for over half the patients with schizophrenia. Another study by Winkelman (1954), which was also the first US publication on CPZ, considered the drug a "true therapeutic agent with definite indications" that could "reverse or modify a paranoid psychosis" and "change the hostile, agitated, senile patient into a quiet, easily managed patient" (p.338). Lastly, Kinross-Wright (1954) observed that in treating a range of mental disorders, CPZ's effects on patients with schizophrenia were "highly provocative" (p.288). He stated that the drug "modifies abnormal behavior in a novel fashion" and may "represent the start of a new era in the treatment of serious mental disorders" (p.299).

Chlorpromazine was reported to reduce the chaotic atmosphere of hospital wards and have quantitative effects on hospital populations. Hospital psychiatrists observed highly favorable outcomes on many symptoms including reductions in psychomotor output, delusions and hallucinations and an overall improvement in patient behavior (Goldman, 1955; Freyhan, 1955; Overholser, 1956; Forrer, 1956). Also observed was the drug's ability to make patients significantly more amendable to other forms of therapy (Overholser, 1956; Winkelman, 1954). With more cooperative patients, hospital wards were quieter and more manageable (Freyhan, 1955). As one psychiatrist puts it, "the atmosphere of disturbed wards has been completely revolutionized" (Overholser, 1956, p.214). In 1956, the California State Senate conducted a national survey to assess the use of chlorpromazine (California State Senate, 1956). The feedback from this survey indicated that this drastic transformation of hospital wards was taking place in public mental hospitals across the United States. Other studies such as those conducted by Brill and Patton (1957; 1959; 1962) attribute significant changes in hospital population, specifically reductions in overcrowding, to the drug's effect.

From its introduction, chlorpromazine was recognized and acclaimed for its ability to treat schizophrenia. In 1954, several studies demonstrated favorable effects on patients with schizophrenia (Lehmann & Hanrahan, 1954; Kinross-Wright, 1954; Winkelman, 1954). One author stated that for the "acute, agitated, unapproachable schizophrenic the use of the drug is primary" (Winkelman, 1954, p.340). CPZ therapy demonstrated efficacy in a high percentage of patients with schizophrenia. A 1956 study of 285 patients found 67% had obvious improvements of behavior (Pollack, 1956). In 1955, Goldman remarked "The group of chronic, severe, schizophrenic illness resistant to all other treatments, particularly after long periods of hospitalization, has represented until now a therapeutic 'no man's land'" (p. 26). He goes on to state, "The application of CPZ in such situations has, however, accomplished results never heretofore achieved. It is in this group of patients that the incontrovertible proof of effectiveness of the treatment is produced". By 1955, it was not yet sufficiently demonstrated whether acute or chronic individuals with schizophrenia would benefit the most from drug therapy. It was generally accepted, however, that the drug represented a breakthrough in the treatment of schizophrenia.

The possibility of treating severe mental illness with a simple chemical agent, administered readily and relatively inexpensively to large numbers of patients, was undeniably appealing to overcrowded state mental hospitals (Swazey, 1974). One psychiatrist stated "We are justified in concluding that chlorpromazine therapy constitutes a major break-through on the therapeutic battle-front. The mental hospital now appears to have the tools with which to remove most of the traditional obstacles that blocked its social emancipation" (Freyhan,1955, p.84). Given such glowing testimonials it is not surprising that CPZ was widely used. Although likely

to be an overestimation[1], one psychiatrist estimated in 1955, "that probably as many as four million patients [in the US] have had it [chlorpromazine] prescribed for them" (Overholser, 1956 p.212).

Cause of deinstitutionalization

There are aspects about the role of antipsychotics in deinstitutionalization which are known. The new drugs were not perfect. They had serious side effects such as tardive dyskinesia and they did not necessarily improve patient functioning to the extent that they could easily rejoin society. Many patients had difficulty gaining employment and maintaining independent life in the community (Hall, Smith & Shimkunas, 1966; Liberman, Falloon & Wallace, 1984; Schooler, Goldberg, Boothe & Cole, 1967; Walker & McCourt, 1965). In addition increased discharge of patients that coincided with the introduction of CPZ has been linked to increased readmissions, incarceration in prisons, homelessness and re-institutionalization in alternative settings such as nursing homes (Cunningham, Botwinik, Dolson & Weickert, 1969; Gelberg, Linn & Leake, 1988; Grunberg, Klinger & Grumet, 1977; Kahn et al., 1987; Lorei, 1967; Pollock &Taube, 1975; Steadman et al., 1984; Steadman, Cocozza & Melick, 1978; United States, 1989).

However, despite a limited number of studies and persuasive anecdotes, the role of chlorpromazine's pharmacological actions in population movement remains obscure to the present day. The question of whether the drug's ability to successfully treat severe mental illness caused the depopulation of state mental hospitals remains unanswered. In previous work, discharges from and admissions to state mental hospitals between 1935 and 1964 were examined

[1] Considering that CPZ was only introduced in 1954, and that the 1955 state mental hospital census was approximately half a million, this may be an exaggeration. Overholser also does not provide evidence to support this claim.

(Lee Pow et al., in press). Discharges were significantly increasing before the introduction of chlorpromazine but hospital populations did not decrease in this period because discharges, though high, were matched by increases in first admissions and readmissions. After the introduction of CPZ, discharges increased at an accelerating rate. However between 1954 and 1961 admissions were also increasing at accelerating rates and as such, hospital population only decreased by 1% during this period. It was only after 1961, that both first admissions and readmissions began to decline. The ongoing increase in discharges coupled with the decrease in admissions resulted in a 14% decline in hospital population between 1961 and 1964. This is seen in Figure 1 and Table 1. In Figure 1 the first vertical line represents the year 1954, and the second vertical line represents 1961. It seems unlikely that the pharmacological efficacy of CPZ led to the sudden and simultaneous decline of both first admissions and readmissions seven years after its introduction. These findings suggest that the depopulation of state mental hospitals was dependent on factors other than, or in addition to, the introduction of antipsychotics.

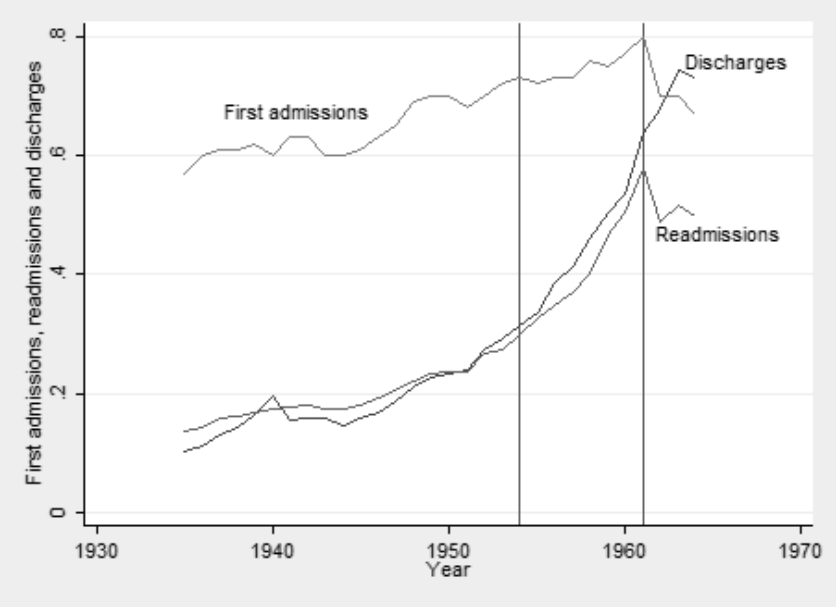

Figure 1. First admissions, readmissions and discharges.

Table 1. The percentage change in hospital population, discharges and admissions between 1954 and 1961 and between 1961 and 1964.

	1954-1961	1961-1964
Hospital population	1.05% decrease	14.04% decrease
Discharges	127.09% increase	19.76% increase
First admissions	23.42% increase	12.07% *decrease*
Readmissions	117.27% increase	9.91% *decrease*

Nevertheless, there are those who attribute depopulation to drug efficacy. Pollock and Taube (1975) observed changes in the US state mental hospital population between 1950 and 1972. They state that "There appears to be no question that the sudden decrease in the state mental hospital population in 1956…was due to the widespread introduction of the psychoactive drugs into the mental hospitals" and that it "undoubtedly played a large role in the subsequent rapid increase in movement of the mental hospital populations" (p.49). Interestingly, Pollock and Taube (1975) also observed that as a proportion of the total resident population, the population of patients with schizophrenia remained constant at 48% in 1955, 1966 and 1971. Perhaps the most widely known studies citing antipsychotics as the driving force behind depopulation are those by Brill and Paton (1957; 1959; 1962). Several studies of population changes in New York state mental hospitals led them to conclude "that the abrupt population fall was in material degree due to the introduction of the new drugs" (Brill & Patton, 1959, p.495). However in contrast to the report by Pollack and Taube (1975), they found that the greatest decline occurred in groups where drug therapy has the greatest presumed clinical advantage (Brill & Patton, 1962): the greatest decline occurred in the diagnostic group of schizophrenia compared to psychoses of senium, involutional psychoses, alcoholic psychoses, manic-depressive psychoses, character disorder and general paresis. However, the methodology of the later studies and findings has been criticized. Because the antipsychotics were introduced before depopulation began does not

necessarily mean the drugs were responsible. According to Gronfein (1985), Brill and Patton incorrectly inferred causation from correlation. In their first paper, when assessing the impact of drug treatment they failed to compare the release rates of treated and untreated patients (Gronfein, 1985; Scull, 1977). Moreover, this first paper is solely a comparison of the hospital population for two years: 1955 and 1956 and in one state. According to Scull (1977), it is "downright perverse to claim it provides 'definitive' evidence that drugs caused the fall in hospital populations" (p.84). Scull (1977) also suggested that Brill and Patton's data indicate declines in diagnostic categories where drug therapy was not expected to exert a strong influence. Indeed, the categories of general paresis, involutional psychoses, manic depressive psychoses and psychoses of the senium all showed declines during the period studied (Brill & Patton, 1959; 1962).

There are other studies that do not find antipsychotic drug effects on hospital population. A California based study using 1956 and 1957 data found that drug-treated patients were less likely to be released than untreated patients (Epstein, Morgan & Reynolds, 1962). In 1956, the Michigan Department of Health conducted a study of drug effects on state hospitals. They observed improvements in patient symptoms and ward operations but did not find such improvements to be reflected in hospital movement. "The data indicate that...the use of chlorpromazine and reserpine does not influence movement of patients out of hospital"(Michigan Department of Health, 1956, p.16). Another study compared two 5-year follow up evaluations of 100 patients, one study conducted in 1947 without psychotropic drugs and the other in 1967 with extensive use of psychotropic drugs (Bockoven & Solomon, 1975). They found that with or without the drugs, over 70% of the patients were successfully maintained in the community five years later.

Inferring drug efficacy from a quieter hospital ward is problematic. The maintenance of order was a problem continuously plaguing state hospitals, and the drugs appeared to offer a solution (Gronfein, 1985). However, manageable wards do not necessarily translate into improved patient functioning. As one psychiatrist stated "the extensive use of chlorpromazine causes changes not only in those to whom the drug is given, but also in those who give it" (Pollack, 1956, p.442). As such, many of the listed advantages of CPZ were to hospital staff and not actual patients (Johnson, 1990), and should not be taken as direct indication of pharmacological effects. Also, these drugs are noted for their sedative effects. Sedating patients to the point where they are no longer disruptive is not indicative of a specific antipsychotic effect.

In addition, international data do not provide support for the idea that psychotropic drugs were responsible for the decline in hospital population. In England, mental hospital populations declined before the introduction of drugs (Gronfein, 1985; Scull, 1977). In Germany, Austria and Norway the drugs did not increase discharges (Valenstein, 1998; Odengard, 1964). And in Italy, France and Spain, mental hospital populations continued to increase after the introduction of antipsychotic drugs (Sedgewick, 1982). Ironically, in the country where chlorpromazine was first synthesized in 1950 and actively marketed (France), the inpatient population did not decline until 1970 (Sedgewick, 1982).

Others who downplay the impact of antipsychotics on depopulation point to the role of policy change, in particular the development of federal health and welfare programs in the US (Aviram , Syme & Cohen, 1976; Lee Pow et al., in press; Lerman 1982; Mechanic, 1989; Morrissey 1982; Rose 1979; Sedgwick 1982; Segal and Aviram 1978; Scull 1977). Previously, population movement has been examined using aggregate data for all US state mental hospitals

(Lee Pow et al., in press). However, deinstitutionalization occurred with significant interstate variability. There were major state differences in overcrowding, drug use, state budgets and community care. Because of these differences, some states were more willing than others to implement the support of federal and welfare programs in mental health care. For example, in the 1960's, the federal government provided grant-in-aid funding for mental health care programs outside the hospital such as nursing home care. Such funding was never explicitly provided for the goal of depopulating mental hospitals, nevertheless using it could help to achieve that goal. Individual states had to realize this and choose to make use of this funding (Lerman, 1982). Consequently, there may have been state difference in the use of these funds.

During the 1960's, California chose to make use of federal assistance. In 1960 the US Congress passed the first major federal medical assistance program for the aged (Medical Assistance to the Aged) (Lerman, 1982). This legislation provided subsidies to private care facilities such as nursing homes but not to state institutions making it financially beneficial to move the elderly from state mental hospitals to nursing homes. California began to identify elderly patients who qualified for federal assistance in 1963 using a geriatric screening program (Epstein & Simon, 1968; Lerman, 1982). As a result of this, between 1963 and 1969, California reduced its aged population in mental hospitals by 73% (Aviram & Segal, 1977).

In a separate policy change in 1962, the Department of Health, Education, and Welfare revised its policy toward mental patients. This change allowed for increased availability of federal funds for persons on conditional release from mental hospitals (Aviram et al., 1976). Because community placement of patients depended on funds to support them, this policy change increased the chances that released patients could remain in community settings (Aviram et al., 1976). California took action and established Aid to the Totally Disabled and public

assistance programs for the mentally handicapped to distribute these federal funds (Segal & Aviram, 1978). Ten years later, the California State Department of Mental Hygiene cite such public assistance programs as primarily responsible for the depopulation of state hospitals that began in 1962 (Segal & Aviram, 1978).

There were other states where federal assistance did not play a significant role as it did for California. Although New York and California greatly reduced their mental hospital populations, because California chose to use the federal 'Medical Assistance to the Aged' and implemented the geriatric screening program in 1963, there were notable differences between the two states. Between 1955 and 1969, California's aged hospitalized population declined by 39% whereas in New York it increased by 36% (Aviram et al., 1976). Aviram et al. (1976) also observe variation in changes in resident counts across five states: between 1955 and 1968 the decline in California was 49%, Illinois 43%, New York 18%, Texas 13% and Virginia showed no decline. They state that this "wide variation among states, despite the fact that knowledge about treatment theories and techniques was available throughout the U.S., led us to think that different policies and administrative mechanisms might account for the variations observed" (p.574). Besides California however, there are limited examples of how the enactment of federal policy may have affected other state mental hospital populations in the early 1960's.

A major national event in the history of deinstitutionalization was the publication of the final report of the Joint Commission on Mental Illness and Health in 1961. As a result of the 1955 Mental Health Study Act, the Joint Commission was formed to assess the United States' mental health needs (Torrey, 1988). The final report titled *Action for Mental Health* (1961) states:

> No further State hospitals of more than 1000 beds should be built, but not one patient should be added to any existing mental hospital already housing 1000 patients or more. It is further recommended that all existing State hospitals of more than 1000 beds be gradually and progressively converted into centers for the long-term and combined care of chronic diseases, including mental illness (Joint Commission on Mental Illness and Health, 1961, p.16).

Mike Gorman, a contributor to the report, stated that it had a "hidden agenda … to break the back of the state mental hospital" (Torrey, 1988, p.92). Community mental health clinics were to replace state mental hospitals as the "main line of defense in reducing the need of many persons with major mental illness for prolonged or repeated hospitalization" (Joint Commission, 1961). With an ultimate goal of considerably downscaling state mental hospitals, this report was significant and had a major impact (Torrey, 1988).

The report also recommended that the Federal government assume greater fiscal responsibility for the mentally ill instead of individual states (Torrey, 1988; Joint Commission, 1961). The "Federal government should be prepared to assume a major part of the responsibility for the mentally ill insofar as the States are agreeable to surrendering it"(Joint Commission, 1961, p.xx). This recommendation represents the beginning of what would be a considerable shift toward increasing federal and welfare involvement in mental health care.

The Action for Mental Health report was well received by President Kennedy. In 1963, he delivered the first-ever message to Congress on mental illness and mental retardation (Barton, 1987; Foley & Sharfstein, 1983). In this message, he stated that most of the mentally ill "are confined and compressed within an antiquated, vastly overcrowded, chain of custodial State institutions" (p.164) and that "reliance on the cold mercy of custodial isolation will be supplanted by the open warmth of community concern and capability" (Foley & Sharfstein,

1983, p.165). He referred to the 1961 "comprehensive study by the Joint Commission" (p.165) and its findings in his speech. In particular, he echoed the Joint Commission's recommendations for increasing Federal fiscal responsibility for the mentally ill and expanding community mental health care. He stated "I am proposing a new approach to mental illness and mental retardation. This approach is designed, in large measure, to use Federal resources to stimulate State, local, and private action" (p.165) and "I recommend, therefore, that the Congress authorize grants to the States for the construction of comprehensive community mental health centers" (Foley & Sharfstein, 1983, p.166).

One month after the Presidential address on mental illness, congressional hearings on Community Mental Health Centers (CMHC) began (Torrey, 1988) and in 1963, the Community Mental Health Centers Act was established. This act provided grants to build community mental health centers and specified five essential services which these centers were to provide (Johnson, 1990). Among these five services were inpatient services, partial hospitalization (day hospital) and outpatient services to a geographically defined area of 75,000 to 200,000 people. In 1965, President Lyndon Johnson amended the previous Act to authorize more CMHC construction and funding (Foley & Sharfstein, 1983). Amendments increasing this funding occurred again in 1970 and 1975 and, as such, CMHC continued to expand during and after the 1970s.

Medicare and Medicaid were enacted in 1965 (Grob, 1991). Both programs provided coverage for nursing-home care for the elderly only, accelerating the movement of elderly patients out of state mental hospitals into private facilities (Rose, 1979). Between 1963 and 1969 in the US, the number of patients over 65 in state and county mental hospitals decreased by 25% and the number of patients over 65 in nursing homes increased by 95% (Lerman, 1982).

The 1960's witnessed a significant decline in the total mental hospital census. In the decade after 1965 state mental hospital population dropped by 59%. However, a mandatory working relationship between CMHC and state mental hospitals was never established (Torrey, 1988). In fact, the CMHC regulations included no mention of state hospitals. It appears that this omission was intentional as proponents of CMHC saw the hospitals as state programs of the past and CMHC as the federal program of the future (Torrey, 2014). Proponents for CMHC assumed that CMHC would be responsible for those released. However, much of the deinstitutionalized population had chronic mental illness and CMHC could not care for such ex-hospital patients as much as they did for persons with other problems in living (such as alcohol and drug abuse) (Barton, 1987).

Those who downplay the role of pharmacological drug efficacy often cite economic and political influences as the driving force behind deinstitutionalization (Rose, 1979). Some mental health professionals, policy makers and state hospital administrators treated depopulation as indicative of therapeutic innovation but in reality it was based on economic needs (Rose, 1979). Depopulation was indeed financially beneficial. Before the advent of CMHC and federal welfare, mental health services were paid for exclusively by state tax dollars (Rose, 1979). In the 1960's the states were in fiscal crisis (Rose, 1979), and the rising admission rates of the previous 30 years only contributed further to the burden of maintaining overcrowded facilities. Accepting federal support alleviated these financial burdens but accepting such support meant shifting funds from state hospital care to community-based care (Rose, 1979). This shift stimulated discharges (Rose, 1979) and has been associated with reduced admissions (Lee Pow et al., in press). In an evaluation of state and federal costs in mental health care, one Texas-based study found that the state was responsible for 98% of state hospital costs compared to 40% of

community mental health center costs (Sheehan and Atkinson, 1974). Clearly, using community mental health care was more beneficial to the state budget than using state hospitals. Sheehan and Atkinson (1974) concluded that this "system of providing community-based care with state hospital backup is a significant bargain for state funding authorities" (p.1). Rose (1979) estimates the entire cost savings to the states in the 10-year period after 1965 to be $5.4 billion.

> Each time the federal government became more involved in the deinstitutionalization process, states saved money in exchange for discharging patients, contracting with the private sector to use public funds, and indenturing themselves to federal control through participation in sharing funding programs… (Rose, 1979, p. 448).

Lastly, in support of the view that economic motives were relevant, it is notable that deinstitutionalization did not occur exclusively in mental health facilities. Large scale deinstitutionalization has been attempted in other areas of social policy: juvenile delinquency, adult criminal justice, and mental health (Scull, 1977). For example, the US prison population consistently increased between 1954 and 1961 and then decreased every year between 1961 and 1968. This decline has been linked to the increased use of non-institutional alternatives such as community corrections' programs. Moreover, in the criminal justice system, this movement toward non-institutional settings has been influenced by federal programs such as the Law Enforcement Assistance Administration (Scull, 1977). Here, the use of federal programs also led to states saving money.

Statement of problem and hypotheses

There is insufficient evidence demonstrating how the pharmacological efficacy of antipsychotics may have affected deinstitutionalization. Studies that examine the impact of antipsychotics on total hospital population have been carried out in individual states (Brill & Patton, 1957; 1959; 1962; Epstein et al., 1962; Michigan Department of Health, 1956). As there is a high level of interstate variability in hospital population changes, data from any single state were not representative of other states (Gronfein, 1974). Using data from a single state produces only limited inferences about the relationship of interest and cannot be generalized to the United States as a whole. Some of these studies have been criticized on other aspects of methodology (Scull, 1977; Gronfein, 1974). Studies on the population movement of specific diagnostic groups have been carried out (Brill & Patton, 1962; Pollock & Taube, 1975; Pollack, 1956). Researchers who conducted these studies merely assumed that the drugs, if effective, should produce improvements in those diagnostic groups most suited for treatment. These studies are also state-specific and inconclusive in their findings.

There are several reasons why deinstitutionalization should be examined looking at state data (Garand, Monroe & Vlosky, 2001). First, looking at state level data increases the number of observations (and degrees of freedom) considerably. This allows for more precise parameter estimates. Second, even a cursory examination of the evidence indicates there is considerable variation in dependent and independent variables at the state level that is obscured when combined into a single national-level statistic. On the other hand, state-level analysis may permit the isolation of statistical connections among key variables by accessing a lower level of data where this variance is manifest. Third, using state-level data allows for consideration of state-level determinants of the dependent variable. For example, there may be state laws that affect

values on the dependent variables which cannot be assessed using national-level data. Lastly, using state-level data allows for consideration of heterogeneity in the response to a major event (such as the introduction of CPZ). One could test hypotheses about why the effect may have been strong in some states and weak in others. To sum up, state-level research can provide insights that would not be possible using national data.

Previous work (Lee Pow et al., in press) that assessed the impact of the events in 1954 and 1961 on population movement examined discharges and admissions using time series analysis but did not examine resident count using time series analysis. This previous paper observed percentage changes in resident count which may have produced less accurate results than using time series analysis. This previous paper also did not examine interstate differences and contained no data on the speed and extent that the new therapeutic drugs were adopted into routine clinical use, whether and the extent to which discharged residents were maintained on medications in the community, or whether patients may have been treated with medications before hospitalization, and if so, whether this treatment prevented or reduced the length of hospitalization. Although anecdotal evidence suggests that the drugs were adopted on a large enough scale after their introduction to expect an effect on hospital population, this assumption has not been tested and there is no analysis of empirical evidence to support this claim. The California State Senate conducted a survey on the use of tranquilizing drugs (chlorpromazine and reserpine) in 1956. The best available data on hospital drug use at this time are from this survey. Twenty nine states responded, indicating their expenditure on these drugs. Although this expenditure was on chlorpromazine and reserpine, chlorpromazine was of greater importance. As one author states, by 1954 both drugs were known in psychiatry, but chlorpromazine surpassed reserpine " as the most widely used tranquilizer because of its more pronounced symptomatic

effects and greater speed of action" (Swazey, 1974, p.192). States also reported greater use of chlorpromazine in the California State Senate survey. Interstate differences in population movement have never been examined in a time series state-level analysis to assess the impact of chlorpromazine. A state-level analysis of the relationship between drug use and population movement - of both state mental hospitals and of different age groups and diagnostic groups within those hospitals - may help to clarify this ongoing discussion on the role of chlorpromazine in deinstitutionalization.

The population being studied is the state mental hospital population of the Unites States. Population movement was examined through resident count, discharges, admissions and readmissions. Resident count refers to the number of patients reported as being resident in hospitals. Resident count and first admissions were also examined by diagnostic group and by age group. Data on drug expenditure were obtained from the 1956 California survey. Based on previous work (Lee Pow et al., in press), there is reason to believe that 1961 is an important year in the history of deinstitutionalization. That year marked the publication of the Joint Report *Action for Mental Health* and the first significant decline in both admissions and readmissions in twenty five years. As such, depopulation was found to be associated with the post-1961 period (14% decline) and not the period of 1954-1961 (1% decrease).

For the present study, the time period examined was 1926 to 1966, with special consideration given to 1954 and 1961. The hypotheses tested are broken down into four broad categories. These hypotheses are stated in a manner consistent with the idea that policy change, and not pharmacology, was the driving force for deinstitutionalization. The first set of hypotheses is aimed at providing a comprehensive description of population movement across the United States and evaluating previous findings that used aggregate US census data. Because

previous findings were based on aggregate data, this analysis sought to reveal any interstate differences that may be of interest. These hypotheses include:

A.1. Resident count will significantly increase between 1926 and 1954, show no significant decrease between 1954 and 1961 and significantly decrease between 1961 and 1966.

A.2. Discharges will significantly increase between 1926 and 1966.

A.3. First admissions will significantly increase between 1926 and 1961 and significantly decrease between 1961 and 1966. Previous research (Lee Pow et al., in press) indicates that the 1961 decline in admissions was found to be associated with policy changes and not drugs.

A.4. Similar to the previous hypothesis, readmissions will significantly increase between 1926 and 1961 and significantly decrease between 1961 and 1966.

The second set of hypotheses examined the population movement of different diagnostic groups. Note that data on resident count and first admissions were available for certain diagnostic groups but data on readmissions and discharges by diagnostic group were not available. The diagnostic groups for which data were collected include schizophrenia, alcoholism, personality disorder, mental deficiency, manic depressive disorder, psychoneuroses, cerebral aterio-sclerosis, meningoencephalitic syphilis and senile brain disorder. These groups were analyzed because they are consistently reported in the US Census data between 1954 and 1966 and represent the nine largest diagnostic categories during that period. Before 1954, considerably fewer states reported this information creating a problem of missing data. Moreover, the names of diagnostic groups reported differ across time creating a possible source of error. The second set of hypotheses includes:

B.1. For each diagnostic group, the resident count will not significantly decrease between 1954 and 1961 and will significantly decrease between 1961 and 1966.

B.2. For each diagnostic group, first admissions will significantly increase between1954 and 1961 and significantly decrease between 1961 and 1966.

The third set of hypotheses examined the population movement of different age groups. Only data on resident count and first admissions were available by age group. The age groups for which data were collected are under 24, 25 to 34, 35 to 44, 45 to 54, 55 to 64, 65 to 74 and over 75. The third set of hypotheses includes:

C.1. For each age group, the resident count will not significantly decrease between 1954 and 1961 and will significantly decrease between 1961 and 1966.

C.2. For each age group, first admissions will significantly increase between 1954 and 1961 and significantly decrease between 1961 and 1966.

The fourth set of hypotheses is aimed at understanding the relationship between population movement and drug use. Of the 29 states that reported expenditure on drugs, states were sorted in three groups based on the median drug expenditure: high drug states which are those six states that report highest expenditure on drugs, low drug states which are those six states that report lowest expenditure and middle drug states which are those six states that report expenditures between high and low. The terms “high drug”, “middle drug” and “low drug” will hereafter be used to describe these three groups of states. This set of hypotheses includes:

D.1. Resident count will not significantly decrease between 1954 and 1961 and will significantly decrease between 1961 and 1966 in high drug, middle drug and low drug states.

D.2. Discharges will significantly increase between 1954 and 1966 in high drug, middle drug and low drug states.

D.3. First admissions will significantly increase between 1954 and 1961 and significantly decrease between 1961 and 1966 in high drug, middle drug and low drug states.

D.4. Readmissions will significantly increase between 1954 and 1961 and significantly decrease between 1961 and 1966 in high drug, middle drug and low drug states.

D.5. For each diagnostic group, the resident count will not significantly decrease between 1954 and 1961 and will significantly decrease between 1961 and 1966 in high drug, middle drug and low drug states.

D.6. For each age group, the resident count will not significantly decrease between 1954 and 1961 and will significantly decrease between 1961 and 1966 in high drug, middle drug and low drug states.

Method

Total United States population and state population figures were collected from the US Census Bureau. Data on state hospital populations were also collected from US Census data and adjusted for state population. The US Census Bureau began collecting information on mental disorders in 1840 (Redick et al., 1984). *The Statistical Manual for the Use of Institutions for the Insane* was published in 1918 (National Committee for Mental Hygiene, 1918) and, as a result, statistical reporting by US mental hospitals became more standardized. The US Census Bureau adopted this manual in 1923. In 1947, US Public Health Services was given responsibility for conducting mental hospital censuses and in 1949 the National Institute of Mental Health (NIMH) was created as a division of the US Public Health Service.

The following variables on state mental hospitals were collected from US Census data for the period 1926 to 1966 for each state: resident count, first admissions and readmissions. Discharge data were only available from 1935 so these were collected from US Census data from 1935 to 1966 for each state. Resident count and first admissions were also collected by diagnostic category from 1954 to 1966 for each state and for the following nine diagnostic groups: schizophrenia, alcoholism, personality disorder, mental deficiency, manic depressive disorder, psychoneuroses, cerebral aterio-sclerosis, meningoencephalitic syphilis and senile brain disorder. As previously stated, these nine diagnostic groups were chosen because they are consistently reported in the US Census data between 1954 and 1966 and represent the largest diagnostic categories during that period. Before 1954, there are considerable missing data and inconsistency in the names of diagnostic groups. From 1954 to 1966, resident count was collected for each state and first admissions for the United States total for the following seven age groups under 24, 25 to 34, 35 to 44, 45 to 54, 55 to 64, 65 to 74 and over 75. US Census data

reported all age data using these seven age groups. Once again, data on diagnostic groups were not consistent before 1954 so for each of the nine diagnostic groups, the United States resident count for the seven age groups was collected from 1954 to 1966. Data on readmissions and discharges were not available by diagnostic groups or age groups. Expenditure on drugs was collected from the report published by the California State Senate in 1956 for each state. Along with expenditure, each state also reported the existing resident count (the total number of patients resident in hospital at the time of the survey) of the state hospitals. The resident count reported by the California State Senate survey closely matched the resident count reported within US Census data. Expenditure on drugs was divided by the resident count reported in the survey to create the variable drug expenditure.

In short, trends in population movement were analyzed before and after two major years; 1954 and 1961. An interrupted time-series design similar to that used by Garand et al. (2001) and Lee Pow et al. (in press) allows for such an analysis. An interrupted time-series design (ITS) uses one regression model to compare the intercept and slope parameters for a pre-intervention time series with the intercept and slope in a post-intervention time series. The interventions in this case are the introduction of antipsychotics in 1954 and policy shifts in 1961. The impact of 1954 and 1961 on resident count, discharges, admissions and readmissions was assessed using an ITS design. The following example explains the ITS model used in previous work (Lee Pow et al., in press). An explanation of this ITS model based on aggregate data is important because the pooled cross-sectional ITS model that was used in the present study builds upon this first model. The variable resident count and the impact of 1954 will be used in this example.

The effect of an intervention (1954) on resident count can be estimated using the following model:

$$\text{Resident count}_t = a + b_1(\text{Time Counter}_t) + b_2(\text{Intervention}_t) + b_3(\text{Intervention Time Counter}_t)$$

Resident count_t is the resident count of the total US mental hospitals at time t. Time Counter_t is a year time counter, measured as 1 in the first year of the time series, 2 in the second year and so forth. Intervention_t is a binary variable coded 0 for all years up to 1954 and 1 for 1954 and all the years following. Intervention Time Counter_t is a post intervention time counter, coded 0 for the years before 1954, and 1 for 1954, 2 for 1955, 3 for 1956 and so forth.

In this model a represents the intercept, b_1 represents the slope for the pre-intervention time period, b_2 represents the shift in the intercept of the time series due to the intervention and b_3 represents the change in the slope of the time series that occurs following the intervention. A significant b_1 would indicate that the pre-intervention slope is significant and the resident count was changing before antipsychotics. A significant b_2 would indicate an immediate impact of the intervention on resident count where the intercept shift coincides with the introduction of antipsychotics. A significant b_3 would suggest an ongoing long term impact of the intervention on the slope where antipsychotics caused a significant increase or decrease in resident count over time.

The above analysis serves to analyze the population movement for all US state mental hospitals using aggregate US data. However, the main aim of this paper is to analyze the effect of an intervention both over time and across states. This can be achieved using a pooled cross-sectional ITS design. This allows for the estimation of the effect of interventions (in 1954 and 1961) within individual states as well as the overall effect on all states. Once again, resident count and the year 1954 will be used as an example.

$$\text{Resident count}_{i,t} = a + b_1(\text{Time Counter}_{i,t}) + b_2(\text{Intervention}_{i,t}) + b_3(\text{Intervention Time Counter}_{i,t})$$

In this case, resident count is modelled in state i at time t. Note that the pooled model is identical to the first time-series model except for i which denotes the ith state. Like the first model, b_2 indicates the immediate impact of the intervention on resident count and b_3 indicates the long term impact of the intervention on resident count (slope) over time. However, in this model the effect of the intervention on resident count can be observed for all states and for individual states.

Unless stated otherwise all analyses used the pooled cross sectional interrupted time series design. All trends in population movement within this paper were considered significant at the .05 level (two tailed test).

1. Hospital population movement (resident count, discharges, first admissions and readmissions) was tested to assess the impact of 1954 and 1961.

2. The population movement by diagnostic category (resident count and first admission of the nine diagnostic groups) was tested to assess the impact of 1954 to 1961.

3. The population movement by age (resident count of the seven age groups) was tested to assess the impact of 1954 and 1961. First admissions by age were collected for the US total and not by state. It was therefore tested in a simple ITS design and not the pooled cross sectional method.

4. The population movement by age and diagnostic category was tested to assess the impact of 1954 and 1961. The US resident count of the nine diagnostic groups was collected for the seven age groups. Although this resident count by age was not available by state, this

model is still a pooled cross sectional ITS design because it involves the analysis of diagnosis by age.

5. The population movement and impact of 1954 and 1961 in high drug states were examined by assessing the population movement (resident count, discharges, first admissions and readmissions), the population movement by diagnostic category (resident count and first admissions) and the resident count by age group. This was done for the high, low and middle drug states.

Results

Analysis 1

The first analysis examined the population movement (resident count, first admissions and readmissions) between 1926 and 1966 in a pooled cross sectional ITS design. Because discharges were only available from 1935, discharges were analyzed using the same design between 1935 and 1966. The analysis of resident count, discharges, admissions and readmissions was carried out for the 49 states for which data were available. Resident count, discharges, admissions and readmissions are reported per 1000 state population.

The results of the analysis of resident count are presented in Figure 2.The first red line on this figure indicates the year 1954 and the second red line 1961. The numbers in black indicate the slope of the time series regression, which in this case is the number of patients resident (per 1000 state population) per year for the period covered. The numbers in red indicate the effect of the intervention on the intercept of the slope. An asterisk is used to convey statistical significance in this figure and in all figures within this paper. The resident count was significantly increasing at a rate of 0.03 patients (per 1000 state population) per year between 1926 and 1954. The resident count was significantly decreasing at a rate of -0.07 patients per year between 1954 and 1961 and significantly decreasing at a rate of -0.09 patients per year between 1961 and 1966.

Hypothesis A.1 stated that the resident count would significantly increase between 1926 and 1954, show no significant decrease between 1954 and 1961 and significantly decrease between 1961 and 1966. The resident count did significantly increase between 1926 and 1954, but significantly declined between 1954 and 1961 (-0.07) and then showed a steeper decline between 1961 and 1966 (-0.09).

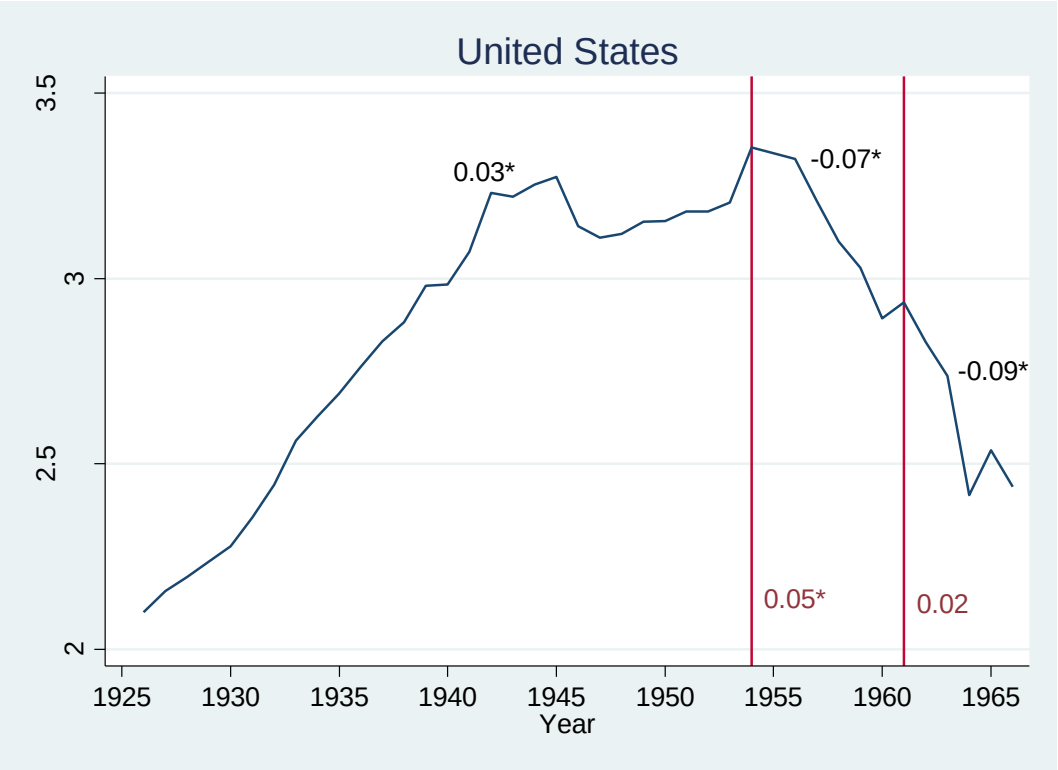

Figure 2. United States resident count between 1926 and 1966.

Hypothesis A.2 stated that discharges would significantly increase between 1926 and 1966. Because discharges were only available between 1935 and 1966 the time period for this analysis was shortened. The results of the analysis of discharges are presented in Figure 3. Discharges showed a significant increase throughout this period with a significant increase of 0.03 patients (per 1000 state population) per year between 1935 and 1954, 0.08 between 1954 and 1961 and 0.10 between 1961 and 1966.

Hypothesis A.3 stated that first admissions would significantly increase between 1926 and 1961 and significantly decrease between 1961 and 1966. The results of the analysis of first admissions are presented in Figure 4.

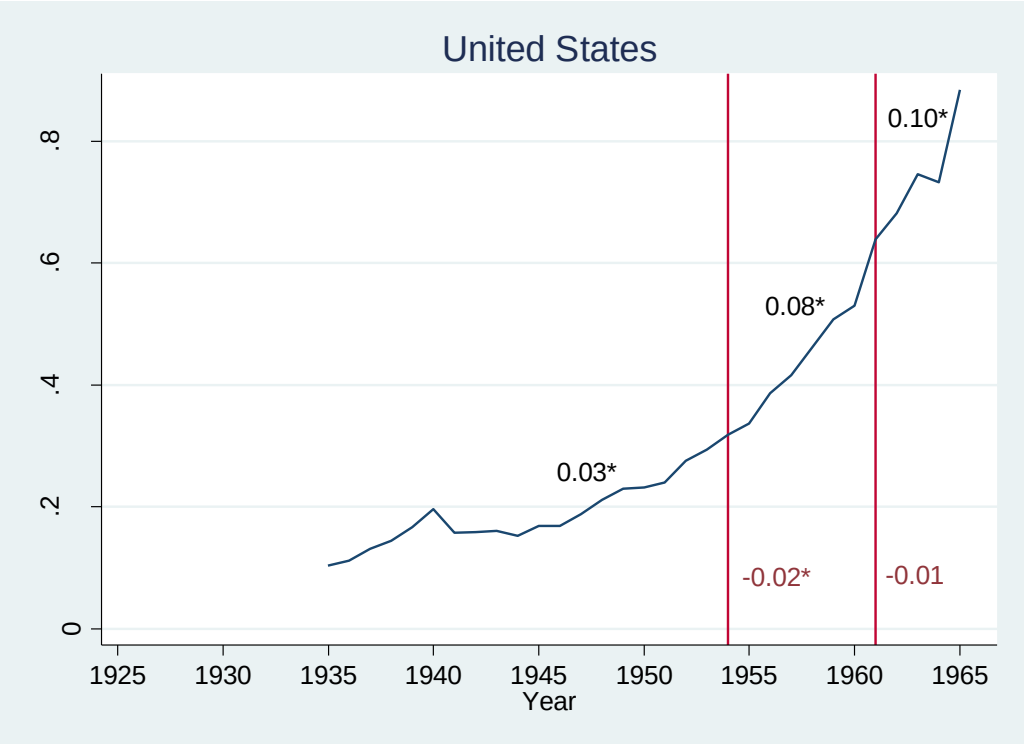

Figure 3. United States discharges between 1935 and 1966

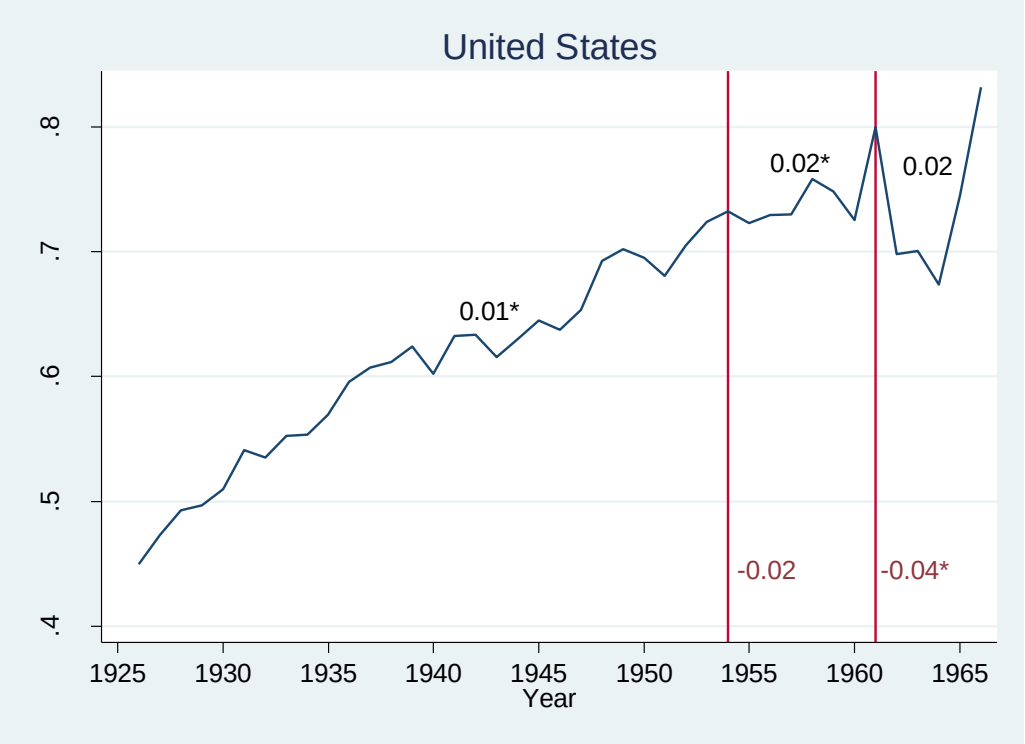

Figure 4. United States first admissions between 1926 and 1966

As hypothesized, first admissions showed a significant increase between 1926 and 1954 (0.01). However, first admissions continued to significantly increase between 1954 and 1961 (0.02) but showed no significant change in slope between 1961 and 1966. The effect of 1954 was not significant. However, the effect of 1961 on the intercept (intervention) was significant with a -0.04 decline in the intercept.

Hypothesis A.4 stated that readmissions would significantly increase between 1926 and 1961 and significantly decrease between 1961 and 1966. The results of the analysis of readmissions are shown in Figure 5.

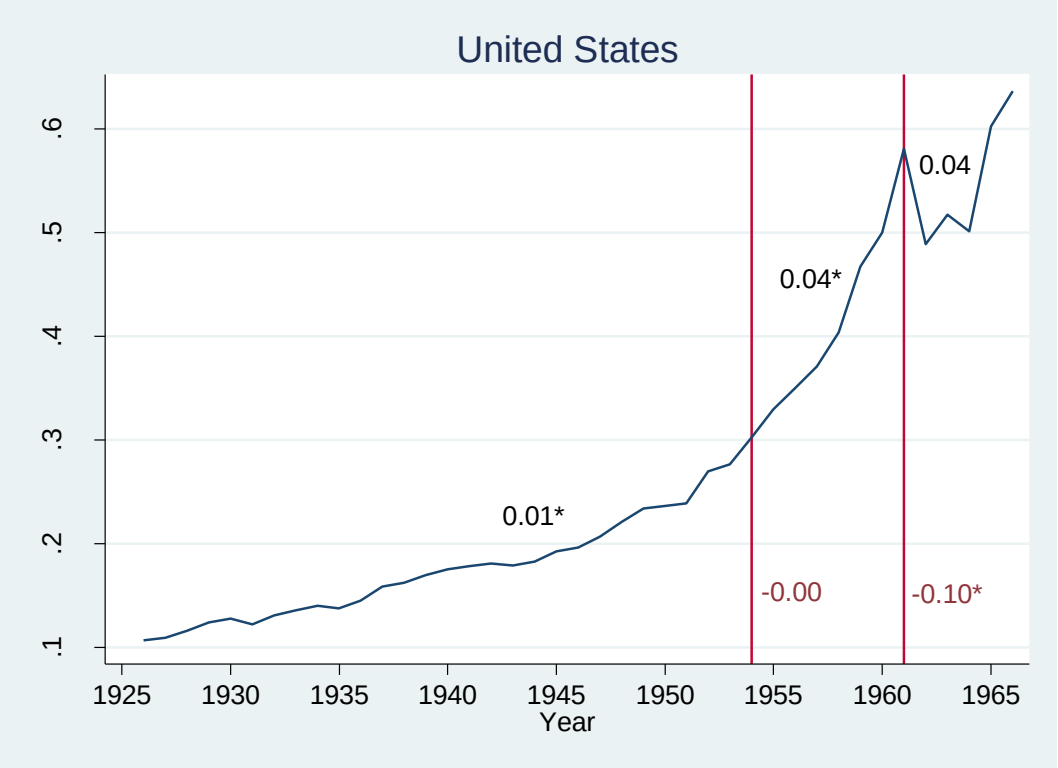

Figure 5. United States readmissions between 1926 and 1966

Readmissions showed a significant increase between 1926 and 1954 (0.01) and then again between 1954 and 1961 (0.04). Like first admissions, readmissions showed no significant

change in slope between 1961 and 1966 but again, like first admissions, readmissions were affected by the 1961 (-0.10) and not the 1954 intervention. Table A.1 reporting the regression estimates for the analysis of resident count, discharges, admissions and readmissions for the United States can be found in Appendix A. Please note that the regression estimates shown in the table are used to calculate the slopes shown in the graphs. This is because the regression estimates shown in the table report the slope and change in slope. The change in slope is used to calculate the actual slope shown within the graphs. Table A.2 reporting the regression estimates for the analysis of resident count by state is also included in Appendix A.

Analysis 2

The second analysis examined the population movement (resident count and first admissions) of the nine diagnostic groups between 1954 and 1966 in a pooled cross sectional ITS design. Data were not available for Georgia and Massachusetts so this analysis was carried out on 47 states. Whereas the previous data (hospital resident count, discharges, admissions and readmissions) were adjusted for state population the data on diagnostic categories and age groups were adjusted for state hospital population. This is because this paper is primarily focused on the movement of diagnostic categories and age groups within state mental hospitals and not within the states themselves. For this analysis by diagnostic category, resident count and first admissions are reported per 100 state hospital population. Note that in 1954, the US hospital resident count was made up of these diagnostic groups in descending order; schizophrenia 29.84%, mental deficiency 5.82%, cerebral aterio-sclerosis 4.65%, manic depressive disorder 4.18%, senile brain disorder 3.58%. meningoencephalitic syphilis 3.07% personality disorder 1.59%, alcoholism 1.04% and psychoneuroses 0.57%. That is, in 1954 patients with schizophrenia accounted for 29.84% of the hospital population and the remaining eight

diagnoses accounted for 24.51% of the hospital population. The remaining hospital population was accounted for by a large number of diagnoses each one accounting for a small (less than 0.50) percentage and many of them not consistently reported in the time period studied.

Hypothesis B.1 stated that for each diagnostic group, the resident count would not significantly decrease between 1954 and 1961 and would significantly decrease between 1961 and 1966. Note that for the following results, the number reported in parentheses is the number of patients increasing or decreasing (per 100 state hospital population) per year. Between 1954 and 1961 the following three diagnoses showed a significant decline in resident count in order of magnitude; manic depressive disorder (-0.28), syphilis (-0.17) and senile brain disorder (-0.16). The following five diagnoses showed a significant increase; personality disorder (0.19), cerebral aterio-sclerosis (0.16), psychoneuroses (0.10), mental deficiency (0.08) and alcoholism (0.06). There was no significant change for schizophrenia. During the period of 1961 to 1966, the following six diagnosis showed a significant decline; schizophrenia (-0.81), senile brain disorder (-0.24), manic depressive (-0.22), syphilis (-0.20), cerebral aterio-sclerosis (-0.07) and mental deficiency (-0.05). Only alcoholism (0.11) showed a significant increase and psychoneuroses and personality disorder showed no significant change. Hence, five diagnoses showed a decline that was greater post-1961 than pre-1961. Only one diagnostic category (manic depressive) showed a decline that was greater pre-1961 than post-1961. Table 2 shows the significance or non-significance of resident count by diagnostic category over the two time periods studied. An upward pointed arrow indicates that the resident count significantly increased and a downward pointed arrow indicates a significant decline. Diagnoses with no significant change are also reported. Hereafter, the use of upward or downward pointed arrows in all tables denote the significance of that movement in the direction indicated.

Table 2. Resident count by diagnoses

Resident count	
1954 – 1961	1961 – 1966
↑5 - personality disorder, cerebral a-s, psychoneuroses, mental deficiency, alcoholism	↑1 – alcoholism
↓3 – manic depressive, syphilis, senile brain disorder	↓6 – schizophrenia, senile brain disorder, manic depressive, syphilis, cerebral a-s, mental deficiency
No significant change schizophrenia	No significant change psychoneuroses , personality disorder

Hypothesis B.2 stated that for each diagnostic group, first admissions would significantly increase between 1954 and 1961 and significantly decrease between 1961 and 1966. Between 1954 and 1961, first admissions significantly increased for five diagnoses; personality disorder (0.47), psychoneuroses (0.25), schizophrenia (0.14), cerebral aterio-sclerosis (0.10) and mental deficiency (0.04), significantly decreased for three disorders; senile brain disorder (-0.08), manic depressive (-0.03) and syphilis (-0.02) and showed no significant change for alcoholism. Between 1961 and 1966, first admissions significantly declined for two diagnoses; cerebral aterio-sclerosis (-0.05) and syphilis (-0.01), significantly increased for five; schizophrenia (0.03), manic depressive (0.01), personality disorder (0.90), alcoholism (0.22) and psychoneuroses (0.40) and showed no significant change for two; mental deficiency and senile brain disorder. Table 3 shows the significance or non-significance of first admissions by diagnostic category over the two time periods studied.

Table 3. First admissions by diagnoses.

First admissions	
1954 – 1961	1961 – 1966
↑5 - personality disorder, psychoneuroses, schizophrenia, cerebral a-s, mental deficiency	↑5 – schizophrenia, manic depressive, personality disorder, alcoholism, psychoneuroses
↓3 – senile brain disorder, manic depressive, syphilis	↓2 – cerebral a-s. syphilis
No significant change - Alcoholism	No significant change – Mental deficiency, senile brain disorder

Figure 6 presents the resident count for the largest diagnostic group, i.e. schizophrenia, between 1954 and 1966.

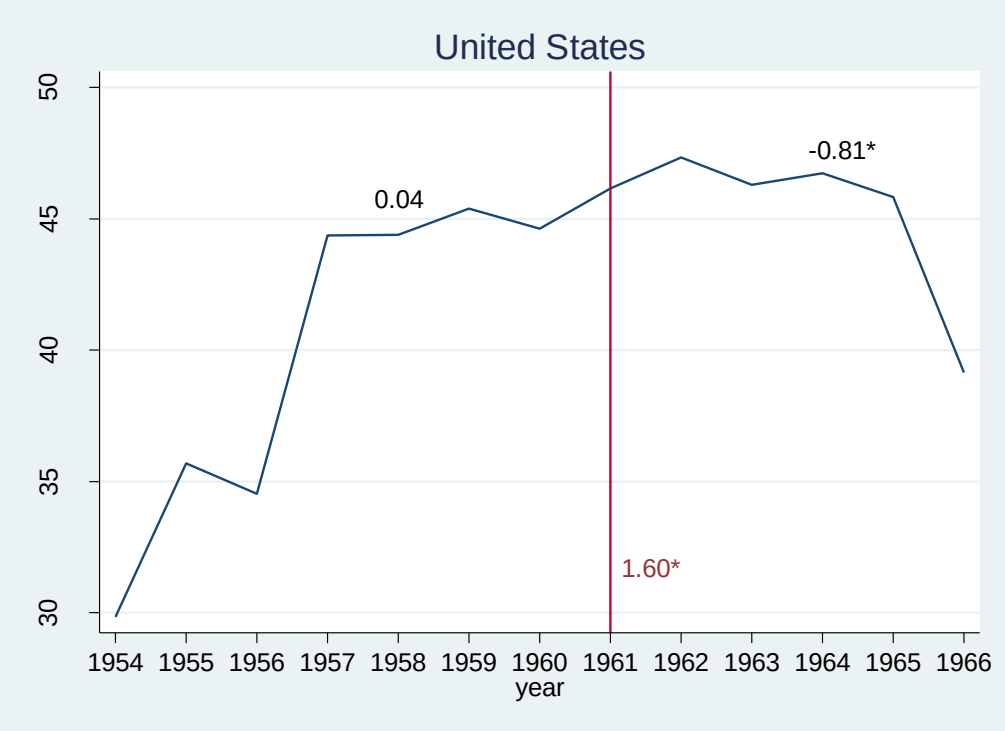

Figure 6. United States resident count for schizophrenia between 1954 and 1966.

Schizophrenia showed no significant change in resident count between 1954 and 1961 (0.04) and significantly declined between 1961 and 1966 (-0.81). First admissions for schizophrenia are shown in Figure 7.

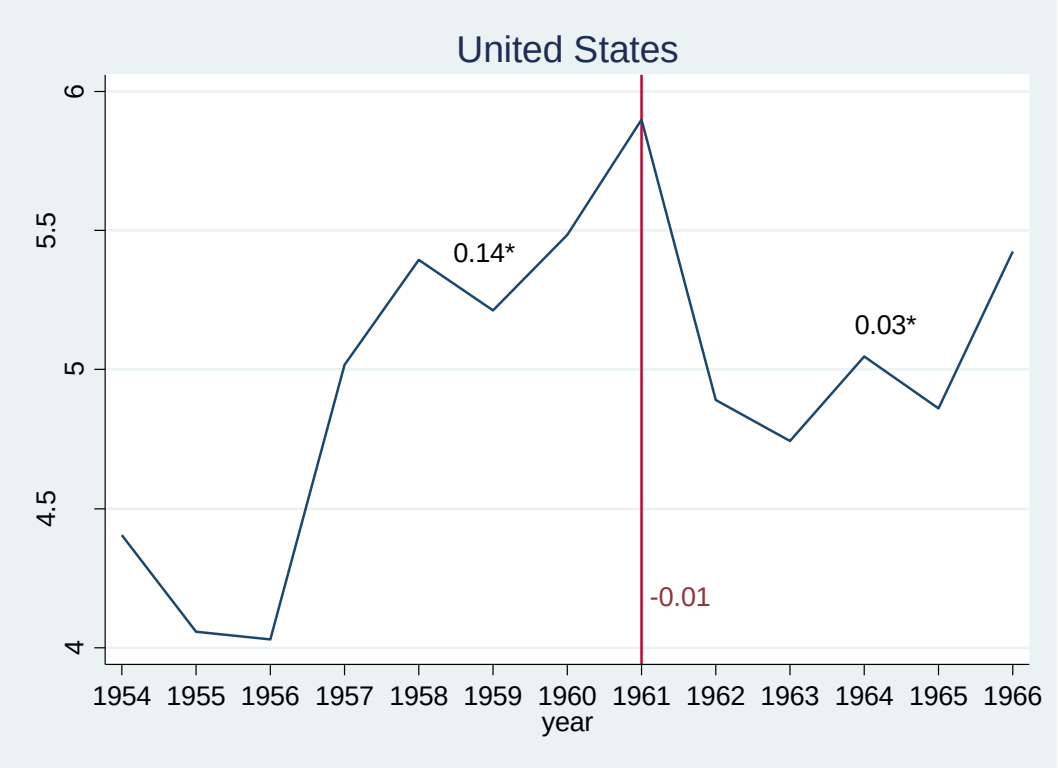

Figure 7. United States first admissions for schizophrenia between 1954 and 1966.

First admissions for schizophrenia were significantly increasing between 1954 and 1961 (0.14) and between 1961 and 1966 first admissions continued to significantly increase but at a slower rate (0.03 being less than 0.14). This suggests that the decline in resident count during the post-1961 period may be due to both an increase in discharges combined with a slowing in the rate of first admissions (note that first admissions were significantly increasing in the period after 1961but at a slower rate than the period before1961). As previously stated, data were not available on readmissions by diagnostic category. Figures B.1 to 18 showing the resident count

and first admissions for all nine diagnoses are in Appendix B. Appendix B also contains a Table B.1 showing the regression estimates for the analysis of resident count and first admissions by diagnostic category for the United States and Table B.2 showing the regression estimates for the analysis of resident count by diagnostic category for each state.

Out of the 49 states included in the analysis, 41 states showed a significant decline in resident count between 1954 and 1961. (The results showing the regression estimates for the analysis of resident count by state can be found in Table A.2) Of the 47 states included in the analysis of resident count by diagnostic category, 11 states showed a significant decline in schizophrenia residents during this period (1954 to 1961), 9 showed a significant decline in mental deficiency residents, 9 showed a significant decline in cerebral arteriosclerosis residents and 34 states showed a significant decline in manic depressive residents. This is shown in Table B.2.

Analysis 3

The third analysis examined the resident count of the seven age groups between 1955 and 1966 in a pooled cross sectional design. For all analyses by age group, the year 1954 was excluded due to a large amount of missing data. Data were not available for Georgia, Massachusetts and the District of Columbia, so this analysis was carried out on 46 states. First admissions by age group were also tested between 1955 and 1966 in a simple ITS design (first admissions were collected for the US and not by state). Resident count and first admissions are reported per 100 state hospital population.

Hypothesis C.1 stated that for each age group, the resident count would not significantly decrease between 1954 and 1961 and would significantly decrease between 1961 and 1966. Note

that in 1955, the resident count was made up of these age groups in descending order; 45 to 54(19.26%), 55 to 64 (17.97%), 35 to 44(15.78%), 65 to 74(15.16%), over 75 (10.78%), 25 to 34 (10.39%) and under 24 (6.52%). For the following results, the number reported in parentheses is the number of patients increasing or decreasing (per 100 state hospital population) per year. Between 1955 and 1961, the resident count significantly increased for three groups; under 24 (0.30), 55 to 64 (0.27) and over 75 (0.27) and significantly declined for three groups; 25 to 34 (-0.17), 35 to 44 (-0.45) and 45 to 54 (-0.09). The group 65 to 74 showed no significant change. Between 1961 and 1966, the resident count significantly increased for two groups; under 24 (0.52), 25 to 34 (0.04) and significantly declined for all other groups; 35 to 44 (-0.27), 45 to 54 (-0.54), 55 to 64(-0.04), 65 to 74 (-0.35) and over 75 (-0.12). Table 4 shows the significance or non-significance of resident count by age group over the two time periods studied.

Table 4. Resident count by age.

Resident count	
1955 – 1961	1961 – 1966
↑3 – under 24, 55 to 64, over 75	↑2 – under 24, 25 to 34
↓3 – 25 to 34, 35 to 44, 45 to 54	↓5 – 35 to 44, 45 to 54, 55 to 64, 65 to 74, over 75
No significant change – 65 to 74	

This means that the significant decline in resident count (refer to Figure 2) observed between 1954 and 1961 (-0.07) occurred among patients aged 25 to 54 whereas the significant decline between 1961 and 1966 (-0.09) occurred among patients 35 to over 75. The change between the pre-1961 slope and the post-1961 slope is associated with age. To further investigate this finding that there was a decline in the resident count of older age groups after 1961, the age

groups were placed into two age groups; those below 55 and those 55 and above. A separate analysis was carried out on these two age groups. Figure 8 shows the resident count for patients below age 55.

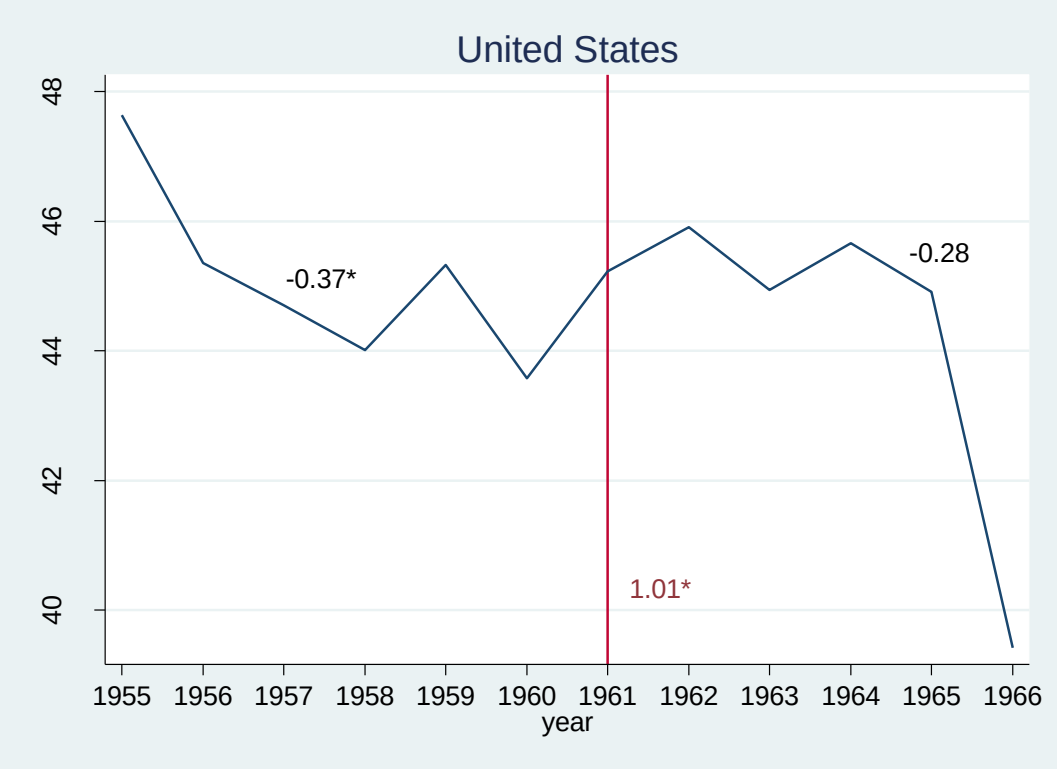

Figure 8. United States resident count for the age group below age 55 between 1955 and 1966.

Figure 9 shows the resident count for patients aged 55 and above. These figures show that during the period of 1954 to 1961, patients under the age of 55 significantly declined (-0.37) and patients 55 and above significantly increased (0.44). During the period of 1961 to 1966, patients under the age of 55 showed no significant change and patients 55 and above significantly declined (-0.47). Figures C.1 to 7 showing the resident count for each of the seven original age groups are in Appendix C.

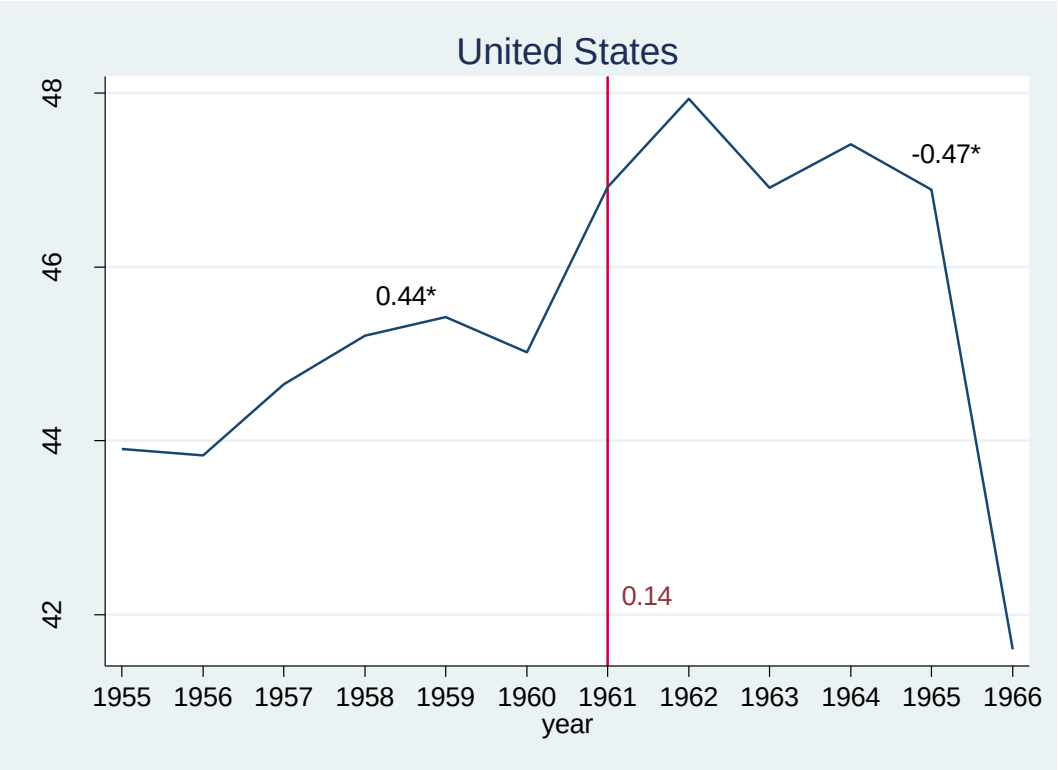

Figure 9. United States resident count for the age group aged 55 and above between 1955 and 1966.

Medicare and Medicaid were passed in 1965. The introduction of Medicare in particular meant that patients who were 65 years and older were then eligible for health insurance regardless of income or medical history. A post-hoc analysis on patients aged 65 and over was conducted excluding the year 1966 to examine whether changes to the 65 and over population occurred before Medicare. It was found that patients aged 65 and over significantly declined between 1955 and 1965. The results of this analysis are included in Table C.2 in Appendix C.

Hypothesis C.2 stated that for each age group, first admissions would significantly increase between 1954 and 1961 and significantly decrease between 1961 and 1966. Between 1955 and 1961, first admissions significantly increased for all age groups; under 24 (0.37), 25 to 34 (0.22), 35 to 44 (0.23), 45 to 54 (0.18), 55 to 64 (0.11), 65 to 74 (0.07) and over 75 (0.13).

This means that the significant declines in resident count observed for the age groups 25 to 34, 35 to 44 and 45 to 54 during this period were likely due to an increase in discharges. Between 1961 and 1966, first admissions significantly increased for under 24 (0.53) and showed no significant change in all other groups. However, all of the age groups except over 75 showed a significant effect of the year 1961 on the intercept. This effect is a decline in the intercept for first admissions. Appendix C also contains Table C.2 showing the regression estimates for the analysis of resident count by age and Table C.3 showing the regression estimates for the analysis of first admissions by age.

Analysis 4

The fourth analysis examined the resident count of the nine diagnostic groups by age group between 1955 and 1966 in a pooled cross sectional design. As previously stated, this resident count was available for the US overall and not by state. Because this model involves the analysis of diagnosis by age, the pooled cross sectional method was used. Resident count is reported per 100 US hospital population. Table 5 shows the significance or non-significance of resident count by age and diagnostic category over the two time periods studied. The color blue indicates the time period between 1955 and 1961. The color red indicates the time period between 1961 and 1966. An upward pointed arrow indicates a significant increase, a downward pointed arrow indicates a significant decline and a dash indicates non-significance.

The following three paragraphs describe the results of the analysis of resident count by diagnosis and age. Between 1955 and 1961, within every age group except one (over 75) the nine diagnoses show variation in resident count i.e. some diagnoses were significantly increasing, some significantly decreasing and others not significant. Unlike the other age groups, the over 75

group showed no significant declines in any diagnoses. This age group showed a significant increase in resident count for eight diagnoses and no significance for one diagnosis (psychoneuroses). Table D.1 showing the regression estimates for the analysis of resident count by disorder and age for the United States can be found in Appendix D.

Table 5. Resident count by age and diagnoses

	<24	25-34	35-44	45-54	55-64	65-74	>75
Senile brain disorder	-- --	-- ↓	↓ --	-- --	↓ --	-- ↓	-- ↓
Schizophrenia	↑ ↓	↑ ↓	-- ↓	-- ↓	↑ ↓	↑ ↓	↑ ↓
Personality disorder	↑ --	↑ ↓	↑ ↓	↑ ↓	↑ ↓	↑ ↓	↑ ↓
Alcoholic	-- ↑	-- --	↑ --	-- --	↑ ↓	↑ --	↑ ↓
Mental deficiency	↑ --	-- ↓	↑ ↓	↑ ↓	↑ ↓	↑ ↓	↑ ↓
Manic depressive	↓ ↑	↓ ↑	↓ ↑	↓ ↓	-- ↓	↓ ↓	↑ ↓
Psychoneuroses	↑ --	↑ --	↑ --	↑ ↓	↑ --	↑ ↓	↑ --
Cerebral a-s	-- ↓	↓ ↓	-- --	↓ --	-- ↓	↑ ↓	↑ ↓
Syphilis	↓ ↑	↓ ↑	↓ ↑	↓ --	↑ ↓	-- --	↑ ↓

Whereas the period of 1955 to 1961 saw variation in the resident count by diagnostic categories for six of the seven age groups, the change in the slope between the period 1955 to 1961 and the period 1961 to 1966 revealed an age effect. For the age groups under 44 (under 24, 24 to 34 and 35 to 44), the change in slope continued to show variation i.e. some diagnoses were significantly increasing, decreasing or showing non significance. However, for the age groups aged 45 and over (45 to 54, 55 to 64 and over 75) the change in slope showed no significant increase for any diagnosis. Looking closer at this change in slope between pre-1961 and post-

1961, for the age group 45 to 54, five diagnoses significantly declined (schizophrenia, personality disorder, mental deficiency, manic depressive and psychoneuroses) , 55 to 64; seven diagnoses (all except psychoneuroses and senile brain disorder), 65 to 74; seven diagnoses (all except alcoholic and syphilis) and for the over 75 group eight diagnoses significantly declined (all except psychoneuroses). The remaining diagnoses were non-significant. In the analysis of resident count by age, it was observed that the change in the resident count between pre-1961 and post-1961 was associated with age. Recall that the change in slope between the pre-1961 and post-1961 period significantly increased for those below 45 and significantly declined for those age 45 and over (refer to page 40). The results of analysis on resident count by diagnosis and age revealed that this observed age effect was not associated with specific diagnoses. Because the resident count of the age group aged 55 and over significantly declined after 1961 and seven of the nine diagnoses within this age group showed declines, it can be concluded that this decline occurred regardless of diagnostic category.

Between 1955 and 1961, for the largest diagnostic group, schizophrenia, the following age groups increased significantly; under 24, 55 to 64, 65 to 74 and over 74. Between 1961 and 1966, for the group schizophrenia, all age groups significantly declined except for under 24 which continued to significantly increase but at a slower rate. For schizophrenia, the three age groups showing the greatest change in slope (decline) between the pre-1961 and post-1961 period in descending order were 45 to 55, 55 to 64 and 65 to74. In the second largest group, mental deficiency, between 1955 and 1961 all age groups significantly increased except for 25 to 34. Between 1961 and 1966, for the mental deficiency diagnosis, all age groups except for under 24 showed a significant decline. For mental deficiency, the three age groups showing the greatest change in slope (decline) between the pre-1961 and post-1961 period in descending order were

35 to 44, 45 to 54 and 55 to 64. Table D.1 showing the regression estimates for the analysis of resident count by disorder and age for the United States can be found in Appendix D.

Analysis 5

The fifth analysis examined the population movement and impact of 1954 and 1961in high drug, middle drug and low drug states. Expenditure on drugs (both chlorpromazine and reserpine) was calculated by dividing the reported expenditure by the reported number of patients in hospital. A limitation to inferences drawn from this analysis is that drug expenditure does not equate with drug use. Although the two are likely associated, the cost of antipsychotics and dosage practices may have varied among states. Both expenditure and number of patients in hospital were collected from the California State Senate survey. Twenty nine states responded and the average expenditure for these 29 states was $16.09 per patient. The median expenditure was $11.76 per patient. Expenditure by state is presented in Table 6.

Table 6. Expenditure on drugs by state.

State	Expenditure	State	Expenditure
Alabama	3.31	Florida	11.98
California	4.30	New Jersey	12.20
Massachusetts	5.77	Oregon	12.85
North Carolina	6.11	Kentucky	13.33
Indiana	6.46	Tennessee	13.88
Colorado	7.25	Nebraska	14.76
Michigan	7.75	Montana	15.50
New York	8.06	Arizona	17.64
New Hampshire	8.19	Connecticut	20.69
Maryland	8.9	Wyoming	28.57
Rhode Island	9.47	Utah	30.00
Maine	9.71	Virginia	30.61
Ohio	10.81	Idaho	60.00
Wisconsin	11.66	New Mexico	65.00
Missouri	11.76		

Three drug groups were created based on expenditure. The high drug group consisted of six states which reported the highest expenditure; Connecticut, Wyoming, Utah, Virginia, Idaho, New Mexico. The mean expenditure for this group was $39.14. The middle drug group consisted of Ohio, Wisconsin, Missouri, Florida, New Jersey and Oregon. The mean expenditure for this group was $11.87. The low drug group consisted of six states which reported the lowest expenditure; Alabama, California, Massachusetts, North Carolina, Indiana and Colorado. The mean expenditure for this group was $5.53. Massachusetts did not report resident count by diagnoses or resident count by age. As Michigan was the seventh state in ascending order of expenditure, for the low drug analyses on resident count by diagnoses and age, Massachusetts was omitted and Michigan was used instead. The recalculated mean for this low drug group was $5.86.

For each drug group (low, middle, and high) there was an analysis of total resident count, discharges, first admissions and readmissions, resident count and first admissions by diagnostic category and resident count by age group. All analyses used the pooled cross sectional ITS design.

Hypothesis D.1 stated that the resident count would not significantly decrease between 1954 and 1961 and would significantly decrease between 1961 and 1966 in high drug, middle drug and low drug states. Between 1954 and 1961 the resident count significantly declined in all three groups; high drug (-0.09), middle drug (-0.04) and low drug (-0.07). Between 1961 and 1966, the resident count significantly declined in all three groups; high drug (-0.05), middle drug (-0.08) and low drug (-0.12). Only for the middle drug and low drug groups, was the 1961 to 1966 decline statistically greater than the 1954 to 1961 decline in resident count. For the high drug group the 1954 to 1961 decline (-0.09) was statistically greater than the 1961 to 1966

decline (-0.05) in resident count. Hypothesis D.2 stated that discharges would significantly increase between 1954 and 1966 in all three drug groups. Between 1954 and 1961, discharges significantly increased in all three groups; high drug (0.10), middle drug (0.03) and low drug (0.05) and between 1961 and 1966, there was no significant change in discharges for any group. Between 1954 and 1961, the greatest increase in discharges occurred in the high drug group, which may explain the larger decline in resident count during this period (-0.09).

Hypothesis D.3 stated that first admissions would significantly increase between 1954 and 1961 and significantly decrease between 1961 and 1966 in high drug, middle drug and low drug states. Between 1954 and 1961, first admissions only significantly increased in middle drug states and showed no significant change in other groups. Between 1961 and 1966 there was no significant change in first admissions for any group. Hypothesis D.4 stated that readmissions would significantly increase between 1954 and 1961 and significantly decrease between 1961 and 1966 in high drug, middle drug and low drug states. Between 1954 and 1961, readmissions significantly increased for all groups: high drug (0.02), middle drug (0.05) and low drug (0.04). Between 1961 and 1966, readmissions continued to significantly increase for low drug states (0.02) but at a significantly slower rate. The other groups showed no significant change. The regression estimates for the analysis of resident count, discharges, admissions and readmissions for high drug, middle drug and low drug states can be found in Table E.1 in Appendix E. Table 7 shows the significance or non-significance of resident count, discharges, first admissions and readmissions for the three drug groups over the two time periods studied. An upward pointed arrow indicates a significant increase, a downward pointed arrow indicates a significant decline and a dash indicates non-significance.

Hypothesis D.5 states for each diagnostic group, the resident count would not significantly decrease between 1954 and 1961 and would significantly decrease between 1961 and 1966 in high drug, middle drug and low drug states.

Table 7. Resident count, discharges, first admissions and readmissions for high drug, middle drug and low drug states.

		1954 – 1961	1961 - 1966
High drug ($39.14)	Resident count Discharges First admissions Readmissions	↓ ↑ -- ↑	↓ -- -- --
Middle drug ($11.87)	Resident count Discharges First admissions Readmissions	↓ ↑ ↑ ↑	↓ -- -- --
Low drug ($5.53)	Resident count Discharges First admissions Readmissions	↓ ↑ -- ↑	↓ -- -- ↑

Between 1954 and 1961, the resident count significantly declined for manic depressive, syphilis and senile brain disorder in high drug, middle drug and low drug states. Although other diagnoses significantly increased or showed no significance, no other diagnoses showed a significant decline during this period in any drug group. The diagnoses that significantly increased between 1954 and 1961 were alcoholic, personality disorder, psychoneuroses and cerebral aterio-sclerosis in high drug states, alcoholic, psychoneuroses and cerebral aterio-sclerosis in middle drug states and alcoholic, mental deficiency and psychoneuroses in low drug states. Between 1961 and 1966, the resident count significantly declined for mental deficiency in high drug states and for schizophrenia and cerebral aterio-sclerosis in low drug states. Although

other diagnoses significantly increased or were not significant, no other diagnoses showed a significant decline.

As previously stated, the greatest decline in resident count between 1954 and 1961 was observed in high drug states (-0.09). During this period, the diagnoses which significantly declined in high drug states in order of magnitude were manic depressive (-0.35), syphilis (-0.13) and senile brain disorder (-0.13). The remaining diagnoses increased or were non-significant. The greatest decline in resident count between 1961 and 1966 was observed in low drug states (-0.12). During this period, the diagnoses which significantly declined in low drug states were schizophrenia (-1.03) and cerebral aterio-sclerosis (-0.33). The regression estimates for the analysis of resident count by diagnostic category for high drug, middle drug and low drug states can be found in Table E.2 in Appendix E.

Of primary interest is the population movement of individuals with schizophrenia. There were no significant changes for schizophrenia in high drug or middle drug states between 1954 and 1966. The only significant population movement of the resident count of patients with schizophrenia occurred in low drug states as a decline between 1961 and 1966. Schizophrenia first admissions were significantly increasing between 1954 and 1961 in high drug and middle drug states but only in high drug states did first admissions significantly decline (-0.09) between 1961 and 1966.

Hypothesis D.6 stated that for each age group, the resident count would not significantly decrease between 1954 and 1961 and would significantly decrease between 1961 and 1966 in high drug, middle drug and low drug states. Between 1955 and 1961, the only significant decline in resident count was observed in high drug states for the 35 to 44 age group. Between 1961 and

1966, the only significant declines in resident count occurred in high drug states for the following age groups; 45 to 54, 55 to 64 and 65 to 74. The regression estimates for the analysis of resident count by age group for high drug, middle drug and low drug states can be found in Table E.3 in Appendix E.

Discussion

The present study found resident count in US mental hospitals to significantly increase between 1926 and 1954. This confirms previous reports on the expansion of the population of mental hospitals in the years leading up to 1955 (Torrey and Miller, 2001). The present study also observed significant increases in discharges, admissions and readmissions between 1926 and 1954 confirming previous findings by Lee Pow et al (in press) and Baumeister, Hawkins, Lee Pow and Cohen (2012).

As hospital population considerably decreased to approximately a fifth of its size in the 33 year period after the introduction of antipsychotics (Shorter, 1997) findings on the post-1954 period are essential to understanding the role of antipsychotics in depopulation. Previous work (Lee Pow et al., in press) found that the resident count decreased by 1.05% between 1954 and 1961 and decreased by 14.04% between 1961 and 1964. This previous paper examined percentage change and did not test for significance of population movement using time series analysis. The present paper found resident count to significantly decrease between 1954 and 1961 (-0.07) and significantly decrease between 1961 and 1966 (-0.09). The significant decline between 1954 and 1961 observed in the present paper and not in previous work may have occurred because the present study used time series analysis to examine changes in resident count. The previous paper conducted time series analysis on discharges and readmissions but percentage changes were used to examine resident count.

The finding of a significant decline in resident count between 1954 and 1961 (-0.07) means that hospital populations declined in the seven year period after the introduction of antipsychotics. As first admissions and readmissions were both significantly increasing between

1954 and 1961 (0.02 and 0.04 respectively) this means that this decline can be solely attributed to the rapid significant increase in discharges (0.08). This increase in discharges and decline in resident count may be accounted for by the introduction of antipsychotics. The new drugs might have assisted in the rapid discharge of those patients most suited to antipsychotic treatment leading to declines in the hospital census of specific diagnostic groups.

The resident count continued to decline significantly in the period after 1961. This decline between 1961 and 1966 was significantly steeper (-0.09) than the decline between 1954 and 1961. The acceleration of this rate of decline is accounted for by a further increase in the rate of discharges (0.10) coupled with a significant effect of the intervention 1961 on admissions and readmissions (decline in the intercept). No significant increases in the rate of state mental hospital admissions and readmissions occurred between 1961 and 1966 (significant increases in first admissions occurred for specific diagnoses or age groups but not for the total first admissions). The significant effect of the intervention 1961 on the intercept for both admissions and readmissions was declines of -0.04 and -0.10 respectively. Previous work (Lee Pow et al., in press) found readmissions and admissions to significantly decline between 1961 and 1964 (refer to Table 1). As previous work examined the time period of 1961 to 1964 and this paper analyzed data from 1961 to 1966 there are some new findings. Although this was not tested for significance, an examination of the data shows that first admissions and readmissions declined between 1961 and 1964 and increased in the years 1965 and 1966. This may explain why the rate of first admissions and readmissions was non-significant between 1961 and 1966 in this paper as opposed to significantly declining between 1961 and 1964 in the previous paper. The small number of observations between 1961 and 1966 is a limitation of this study as these possible nonlinear effects could not be tested. Furthermore, the small number of observations between

1961 and 1966 makes statistical significance more difficult to achieve and does not allow for the examination of post-1966 trends that may be useful in testing hypotheses. The decline in the intercept (effect of the intervention 1961) however remained significant for both variables.

This study confirms that the year 1961 marked the first major decline in admissions and readmissions in a 35 year period. The year 1961 is an important year because it marks the publication of the Joint Commission report Action for Mental Health (1961) and led to the first Presidential recommendation for downscaling of state mental hospitals and increased Federal government fiscal responsibility for the mentally ill. It seems implausible that the pharmacological efficacy of antipsychotics would have required a 7 year time lag to be manifest in declines in first admissions and readmissions. Although increased use and improved administration of antipsychotics may account for the post-1961 decline in admissions it is likely that the contribution of other factors, particularly policy changes and fiscal incentives, had a greater effect on this post-1961 decline.

An evaluation of the diagnoses and age of the mental hospital patients who were depopulated between 1954 and 1966 is important to understanding deinstitutionalization. From early on, chlorpromazine was recognized for its ability to treat schizophrenia (Lehmann & Hanrahan. 1954; Kinross-Wright, 1954; Winkelman, 1954: Goldman, 1955: Pollack, 1956). Brill and Patton (1959) attribute the population fall in New York hospitals after 1954 to the introduction of antipsychotics. As evidence for the role of antipsychotics, they observed the greatest decline among those diagnostic categories most suited to drug therapy (Brill & Patton, 1962). They observed the greatest decline in schizophrenia compared to psychoses of senium, involutional psychoses, alcoholic psychoses, manic-depression, character disorder and general paresis.

In marked contrast, the present study found that the significant decline in resident count observed between 1954 and 1961 can be accounted for by three diagnoses; manic depressive disorder, syphilis and senile brain disorder. Five diagnoses significantly increased and schizophrenia showed no significant change during this period. Between 1954 and 1961, only 11 states out of 47 showed a significant decline in the resident count of patients with schizophrenia. Moreover, with regard to Brill and Patton's studies (1957; 1959; 1962) New York was not one of these states. If it is assumed that antipsychotics have the greatest clinical effect on psychotic disorders the non-significance of the resident count of patients with schizophrenia does not provide support for the role of antipsychotics. Moreover, first admissions for schizophrenia significantly increased between 1954 and 1961 (0.14) indicating that they either had no effect on "hospital incidence" or they were not sufficiently available outside the hospital. The 1954 to 1961 declines observed in manic depressive disorder, syphilis and senile brain disorder may be a result of pharmacological efficacy of antipsychotics. However, these were the only three diagnoses between 1954 and 1961 that showed significant declines in first admissions. If the pharmacological efficacy of antipsychotics contributed to the decline in first admissions of these disorders it is puzzling why they did not have the same effect on first admissions of schizophrenia as well.

The significant decline in resident count between 1954 and 1961 may have occurred as an acceleration of a previous trend to deinstitutionalize. In the years leading up to 1954, the deinstitutionalization movement was underway. Discharges were significantly increasing before 1954, although not rapidly enough to depopulate hospitals. Community care had grown as result of the National Mental Health Act of 1946 (Grob, 1991) with the number of clinics growing to approximately 1200 in the 1940's (Felix, 1967). The desire to move patients into the community

was explicitly recognized in the Governor's Conference of 1949 (The Council of State Governments, 1950) and individual states such as New York and California had passed laws establishing community care in the two years before 1954. The post-1954 acceleration in discharges may have represented an acceleration of this preceding trend. This is not to say that antipsychotics did not have a non-pharmacological effect on hospital population. Although there was no significant movement of the population of patients with schizophrenia the very presence of a drug which could treat severe mental illness quickly and inexpensively on a large-scale represented a break-through. It is possible that chlorpromazine's discovery contributed to the overall movement toward depopulation, community care and the belief that the "mental hospital now appears to have the tools with which to remove most of the traditional obstacles that blocked its social emancipation" (Freyhan, 1955, p.84).

The significant decline in resident count observed between 1961 and 1966 (-0.09) can be totally accounted for by six diagnoses; schizophrenia, senile brain disorder, manic depressive disorder, syphilis, cerebral aterio-sclerosis and mental deficiency. The significant decline in the resident count of patients with schizophrenia during this period of 1961 to 1966 is accounted for by a slowing in the rate of first admissions (0.14 to 0.03) coupled with a likely increase in discharges (data on discharges by diagnoses were not available). As alluded to above, a possible explanation is that more efficient use of antipsychotics in the community did not come about until after 1961 explaining the slowing of the rate of first admissions and the delayed post-1961 depopulation of patients with schizophrenia. However, five diagnoses showed a decline in resident count that was greater post-1961 than pre-1961. Besides schizophrenia, the remaining four diagnoses of senile brain disorder, syphilis, cerebral aterio-sclerosis and mental deficiency

would not be expected to have equally benefitted from the treatment with antipsychotics seven years after their introduction.

The relationship between expenditure on drugs and the population movement of patients with schizophrenia does not provide support for the role of antipsychotics. Although the states which spent the most money on drugs (high drug group) showed the largest decline in resident count and the largest increase in discharges between 1954 and 1961 there was no significant change in the resident count of patients with schizophrenia during this period. The depopulation of all the states (high drug, middle drug and low drug) between 1954 and 1961 was accounted for by manic depressive, syphilis and senile brain disorder. Moreover, the only significant decline in the population of patients with schizophrenia occurred in those states that spent the least money on drugs (low drug states) and between 1961 and 1966. This observation that expenditure on chlorpromazine is not related to movement of the population of patients with schizophrenia does not provide support for the role of antipsychotics in deinstitutionalization. As previously stated, a limitation to inferences drawn from this analysis is that drug expenditure may not equate to drug use.

Because federal funding provided in the 1960's was targeted at the goal of depopulating by reducing the elderly population, findings on the age of the patients being depopulated contribute to understanding the role of policy change. For example, California is reported to have reduced its aged population after 1963 through the application of such federal funds in public assistance programs (Aviram & Segal, 1977; Epstein & Simon, 1968; Lerman, 1982, Segal & Aviram, 1978). An analysis was conducted on patients above and below age 55. This analysis showed that between 1955 and 1961 patients below age 55 significantly declined (-0.37) whilst patients aged 55 and above were significantly increasing (0.44). Therefore the significant decline

in resident count that occurred between 1955 and 1961 occurred among patients aged 25 to 54. This finding is not surprising as the very young and very old are less likely to function independently within the community. The patients deemed most suitable for discharge would likely be those within this middle range of 25 to 54.

The year 1961 represents a shift in the population movement by age group. For all age groups under 45 there was an increase in the change in slope for resident count between the pre-1961 and the post-1961 period. This means that the resident count was increasing for those age groups under 45. For all age groups aged 45 and over there was a decline in this change of slope meaning that the resident count was decreasing. In addition, between 1961 and 1966, patients under 55 showed no significant change in resident count and patients aged 55 and above significantly declined (-0.47). This means that in the period before 1961, depopulation was accounted for by patients below 55 whilst the 55 and over population continued to increase. After 1961, depopulation was accounted for by patients aged 55 and above whilst the under 55 population became non-significant in movement.

One possible explanation for the post-1961 decline in the aged 55 and over population is that there is a relationship between age and diagnostic category. Certain disorders occur primarily in elderly patients such as senile brain disorder and cerebral aterio-sclerosis. If these disorders benefit from antipsychotic therapy any decline in the elderly population may be explained by effective antipsychotic treatment. However, an analysis of diagnostic category by age reveals that this age effect is not associated with any particular diagnoses. For patients aged 55 and over, seven of the nine diagnoses studied showed a significant decline in slope between the pre-1961 and post-1961 period. This means that the decline in patients aged 55 and over occurred regardless of diagnoses.

The significance of the shift in population movement by age group regardless of diagnoses indicates the role of policy change. In the 1960's the first federal medical assistance program (Medical Assistance to the Aged) for the aged was passed (Lerman, 1982) making it financially beneficial to transfer elderly patients from state hospitals to nursing homes. Another policy change in 1962 from the Department of Health, Education and Welfare allowed for funding to be available to released patients in the community. As previously stated, these funds were used in at least one state (California) to establish public assistance programs and although it is not said explicitly if these funds led to the depopulation of the elderly, it is reported that California significantly reduced its aged population after 1963 (Aviram & Segal, 1977). The present study observed that for patients aged 55 and over, California's resident count significantly increased between 1954 and 1961 (0.29) and significantly declined between 1961 and 1966 (-2.34), supporting these previous findings. More important, this study observes this trend of a pre-1961 increase and post-1961 decline in the aged 55 and over population across the United States. Evidently, other states were also pursuing depopulation by reducing the elderly patient population. It is plausible that these other states, like California were using the federal assistance provided to them by transferring elderly patients out of hospital into federally assisted community settings such as nursing homes.

The passage of Medicaid and Medicare in 1965 was an important event in the history of mental health care. The resident populations of mental hospitals declined rapidly after 1965 and this change was not related to the establishment of CMHC's (Grob, 1991). Rather, this change was shaped by the passage of Medicaid and Medicare which led to a sharp decline in the number of aged chronic patients (Grob, 1991). "Medicare and Medicaid permitted an expansion of federal resources available to potential, former and actual state hospital patients" (p 91, Lerman,

1982). In 1965, Medicaid was available to those persons defined by each state (and not by the federal government) as qualifying for medical services, giving the states the choice to determine eligibility (Lerman, 1982).

Notwithstanding the significance of Medicaid and Medicare in the movement of aged patients, the present study found that the decline in elderly patients began before 1965. When a post-hoc analysis on patients aged 65 and over was conducted excluding the year 1966, it was found that patients aged 65 and over significantly declined between 1955 and 1965. This indicates that federal assistance to states, such as the 1960 Medical Assistance to the Aged (MAA), probably influenced the depopulation of elderly mental patients before the advent of Medicaid and Medicare. One author observes this impact of MAA; "Between 1960 and the 1965 passage of Medicare and Medicaid, MAA (Medical Assistance to the Aged) vendor payments for nursing homes increased ten times, and contributed one-third of the total program expenditures. By 1965, public funds provided by a public welfare program (MAA) were subsidizing a significant share of the costs of the nursing home industry" (p 215, Lerman, 1982). These statements along with the findings of the present study indicate that the depopulation of elderly patients from mental hospitals was occurring before 1965 through the assistance of MAA.

Conclusion

The resident count of US mental hospitals significantly increased between 1926 and 1954 and significantly declined between 1954 and 1966. Discharges significantly increased between 1935 and 1966. First admissions and readmissions significantly increased between 1926 and 1961 and showed no significant change in slope between 1961 and 1966.There was a decline in the intercept (significant effect of the intervention 1961) for first admissions and readmissions.

In examining the population movement of diagnostic groups, the decline in resident count between 1954 and 1961 was accounted for by three diagnoses; manic depressive, syphilis and senile brain disorder. The decline between 1961 and 1966 was accounted for by six diagnoses; schizophrenia, senile brain disorders, manic depressive, syphilis, cerebral aterio-sclerosis and mental deficiency. The resident count of patients with schizophrenia did not significantly decline between 1954 and 1961 and significantly declined between 1961 and 1966.

An analysis of population movement by age revealed significant findings regarding the composition of the post-1954 depopulation. Depopulation that occurred between 1954 and 1961 occurred among patients below age 55 whilst those patients aged 55 and above significantly increased. Depopulation between 1961 and 1966 occurred among patients aged 55 and above whilst those below 55 became non-significant in movement. Moreover, this post-1961 decline in the elderly population occurred regardless of diagnoses.

The significant decline in US mental hospital resident count that occurred between 1954 and 1966 and the non-significant movement of the population of patients with schizophrenia before 1961 suggest that post-1954 depopulation was influenced by factors other than the pharmacological efficacy of antipsychotics. The post-1954 depopulation may have been a

continuation of an ongoing trend. As previously stated discharges were increasing in the period before 1954 and there was an openly established movement toward expanding community care. The finding that depopulation between 1954 and 1961 was accounted for by three diagnoses other than schizophrenia does not support the role of antipsychotics in depopulation. Additionally, the relationship between drug expenditure and the population movement of patients with schizophrenia does not lend support. Between 1954 and 1961, states which spent the most money on drugs did not show any significant change in the resident count of patients with schizophrenia and the depopulation of the states studied was accounted for by three diagnoses other than schizophrenia. The trend to depopulate which existed before antipsychotics was bolstered by the provision of federal funds made possible by policy changes in the 1960's. Besides 1961 being the year in which the Joint Commission report was published, it was the first time in which admissions and readmissions declined in a 35-year period. That year also marks important shifts in the composition of the patients being depopulated as it became more financially beneficial to discharge elderly patients. These findings suggest that policy change did play an important role in the deinstitutionalization movement.

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Appendix A

Table A.1. Resident count, discharges, first admissions and readmissions for the United States between 1926 and 1966.

	Counter 26-54	Intervention 54	Counter 54-61	Intervention 61	Counter 61-66
Resident count	0.03* (21.12)	0.05* (3.39)	-0.10* (-18.33)	0.02 (1.39)	-0.02* (-2.48)
Discharges	0.03* (15.18)	-0.02* (-2.67)	0.05* (13.40)	-0.007 (0.43)	0.02* (3.99)
First admissions	0.01* (11.14)	-0.02 (-1.82)	0.01* (3.69)	-0.04* (-3.63)	-0.004 (-0.79)
Readmissions	0.01* (15.79)	-0.00 (-0.63)	0.03* (17.69)	-0.10* (-15.58)	-0.00 (-0.26)

Note. These numbers are the unstandardized regression coefficients . An asterisk indicates significance at the .05 level. The numbers in parentheses are the associated T statistics. Counter26-54 indicates the slope for the period 1926 to 1954. Counter54-61 indicates the change in slope between 1926 to 1954 and 1954 to 1961. Counter61-66 indicates the change in slope between 1954 to 1961 and 1961 to 1966. Intervention54 and Intervention61 indicate the immediate impact of those years (1954 and 1961) on the intercept.

Table A.2. Resident count by state between 1926 and 1966.

	Counter 26-54	Intervention 54	Counter 54-61	Intervention 61	Counter 61-66
US	0.03* (21.12)	0.05* (3.39)	-0.10* (-18.33)	0.02 (1.39)	-0.02* (-2.48)
Alabama	0.03* (11.60)	0.10* (2.16)	-0.05* (-13.05)	0.04* (2.09)	0.002 (0.65)
Arizona	0.003 (0.85)	-0.07 (-0.84)	-0.09* (-8.27)	0.05 (1.07)	0.07* (6.34)
Arkansas	0.05* (12.35)	0.15 (1.75)	-0.09* (-9.22)	0.09 (1.46)	-0.23* (-16.00)
California	0.005 (0.94)	-0.02 (-0.21)	-0.10* (-14.89)	0.04 (0.92)	-0.03* (-2.67)
Colorado	0.06* (9.81)	-0.49* (-3.89)	-0.12* (-12.81)	0.14 (1.84)	-0.33* (-17.14)
Connecticut	0.04* (5.42)	-0.42* (-3.14)	-0.15* (-11.67)	-0.08 (-1.76)	0.04* (2.65)
Delaware	0.05* (3.71)	-1.06* (-3.40)	-0.04 (-0.92)	0.32 (1.83)	-0.09 (-1.84)
Florida	0.002 (0.40)	-0.22* (-2.40)	-0.04* (-3.58)	0.03 (1.19)	0.005 (0.60)
Georgia	0.05* (41.95)	0.17* (4.96)	-0.08* (-19.67)	-0.001 (-0.15)	-0.02* (-3.57)
Idaho	0.02* (5.38)	0.005 (0.07)	-0.14* (-21.86)	0.10* (2.64)	0.04* (3.55)
Illinois	0.06* (12.59)	-0.24* (-2.90)	-0.15* (-21.75)	0.13* (2.66)	-0.05* (-5.58)
Indiana	0.01* (3.36)	-0.11 (-1.35)	-0.01 (-0.66)	0.09* (2.11)	-0.07* (-6.42)
Iowa	0.009 (1.19)	-0.52* (-3.54)	-0.09* (-9.74)	-0.07* (-2.11)	-0.05* (-4.23)
Kansas	0.02* (2.84)	-0.47* (-3.30)	-0.11* (-8.54)	-0.10* (-2.76)	0.02 (1.56)
Kentucky	0.02* (7.78)	0.26* (5.86)	-0.09* (-15.70)	-0.10* (-5.98)	-0.03* (-4.12)
Louisiana	0.003 (0.21)	0.55 (1.93)	-0.04* (-2.25)	0.01 (0.24)	-0.12* (-10.50)
Maine	0.03* (5.72)	-0.03 (-0.31)	-0.07* (-6.94)	-0.05 (-1.20)	0.04* (4.08)
Maryland	0.03* (3.26)	0.03 (0.25)	-0.13* (-8.97)	-0.07 (-1.68)	0.02 (1.33)

(Table A.2 continued)

	Counter 26-54	Intervention 54	Counter 54-61	Intervention 61	Counter 61-66
Massachusetts	0.04* (4.19)	-0.41* (-2.41)	-0.18* (-17.24)	-0.04* (-2.43)	-0.02* (-3.00)
Michigan	0.05* (5.23)	-0.49* (-3.08)	-0.08* (-7.81)	0.10* (4.71)	-0.09* (-11.84)
Minnesota	0.03* (4.39)	-0.18 (-1.16)	-0.14* (-11.32)	-0.14 (-1.82)	-0.11* (-7.88)
Mississippi	0.03* (9.09)	0.31* (3.89)	-0.07* (-16.95)	-0.05* (-4.31)	0.07* (14.09)
Missouri	0.06* (12.64)	-0.14 (-1.45)	-0.12* (-23.08)	-0.009 (-0.58)	0.007 (1.19)
Montana	0.02 (1.98)	-0.39 (-1.93)	-0.13* (-12.08)	0.14* (4.59)	0.04* (2.88)
Nebraska	0.05* (16.57)	-0.11 (-1.05)	-0.17* (-8.43)	-0.09 (-1.39)	0.04* (2.28)
Nevada	-0.03* (-2.86)	-0.48* (-3.74)	0.04* (3.00)	-0.10 (-1.29)	-0.14* (-6.94)
New Hampshire	0.06* (9.88)	-0.11 (-0.83)	-0.19* (-24.04)	0.09* (2.69)	-0.02 (-1.62)
New Jersey	0.05* (6.28)	1.10* (6.53)	-0.16* (-19.47)	0.07* (4.68)	-0.01* (-2.26)
New Mexico	0.009 (1.96)	-0.28* (-3.09)	-0.08* (-11.69)	0.12* (2.31)	0.05* (3.83)
New York	0.08* (9.97)	-0.07 (-0.39)	-0.18* (-10.05)	-0.15* (-3.27)	0.01 (0.89)
North Carolina	0.03* (22.26)	-0.05 (-0.47)	-0.05* (-3.01)	0.07 (1.52)	-0.01 (-0.55)
North Dakota	0.06* (8.84)	-0.31* (-2.15)	-0.19* (-22.67)	0.28* (7.18)	0.01 (1.22)
Ohio	0.03* (13.71)	0.01 (0.24)	-0.07* (-9.36)	-0.35* (-10.76)	-0.04* (-4.57)
Oklahoma	0.08* (9.20)	-0.31* (-2.17)	-0.18* (-13.28)	-0.02 (-0.88)	-0.05* (-4.26)
Oregon	-0.01 (-1.26)	-0.11 (-0.59)	-0.02 (-0.96)	-0.00 (-0.01)	-0.22* (-9.67)
Pennsylvania	0.11* (12.40)	-0.25 (-1.32)	-0.16* (-12.25))	-0.04 (1.39)	-0.01 (-1.19)
Rhode Island	0.05* (11.09)	-0.07 (-1.00)	-0.10* (-9.39)	0.14* (3.20)	-0.04* (-3.07)

(Table A.2 continued)

	Counter 26-54	Intervention 54	Counter 54-61	Intervention 61	Counter 61-66
South Carolina	0.04* (10.37)	0.004 (0.07)	-0.03* (-6.10)	0.05 (1.96)	-0.05* (-4.36)
South Dakota	0.02* (5.90)	-0.35* (-3.83)	-0.02 (-1.80)	-0.36* (-3.01)	0.07* (3.84)
Tennessee	0.03* (8.42)	0.12 (1.07)	-0.05* (-3.27)	-0.02 (-0.41)	-0.01 (-0.65)
Texas	0.02* (5.22)	-0.16* (-2.38)	-0.07* (-13.08)	0.01 (1.06)	0.02* (6.43)
Utah	0.00 (1.26)	0.03 (0.61)	-0.10* (-12.33)	-0.15* (-2.48)	0.00 (0.10)
Vermont	0.04* (13.81)	0.13* (2.13)	-0.14* (-15.37)	0.24* (5.23)	0.06* (5.38)
Virginia	0.02 (2.01)	-0.08 (-0.67)	-0.06* (-5.89)	0.07* (2.55)	0.00 (0.12)
Washington	0.00 (0.92)	-0.25 (-1.70)	-0.11* (-10.34)	-0.06 (-1.82)	-0.07* (-5.77)
West Virginia	0.04* (11.77)	0.25* (2.93)	-0.04* (-5.78)	0.05* (2.23)	-0.03* (-3.87)
Wisconsin	0.02 (0.96)	3.05* (6.99)	-0.08* (-3.47)	0.09 (1.57)	-0.09* (-5.17)
Wyoming	0.02* (2.94)	-0.27* (-2.57)	-0.06* (-7.78)	-0.12* (-2.23)	0.10* (5.97)
District of Columbia	0.0 (-1.17)	1.47* (3.86)	-0.00 (-0.07)	0.02 (0.28)	-0.28* (-10.53)

Note. These numbers are the unstandardized regression coefficients . An asterisk indicates significance at the .05 level. The numbers in parentheses are the associated T statistics. Counter26-54 indicates the slope for the period 1926 to 1954. Counter54-61 indicates the change in slope between 1926 to 1954 and 1954 to 1961. Counter61-66 indicates the change in slope between 1954 to 1961 and 1961 to 1966. Intervention54 and Intervention61 indicate the immediate impact of those years (1954 and 1961) on the intercept.

Appendix B

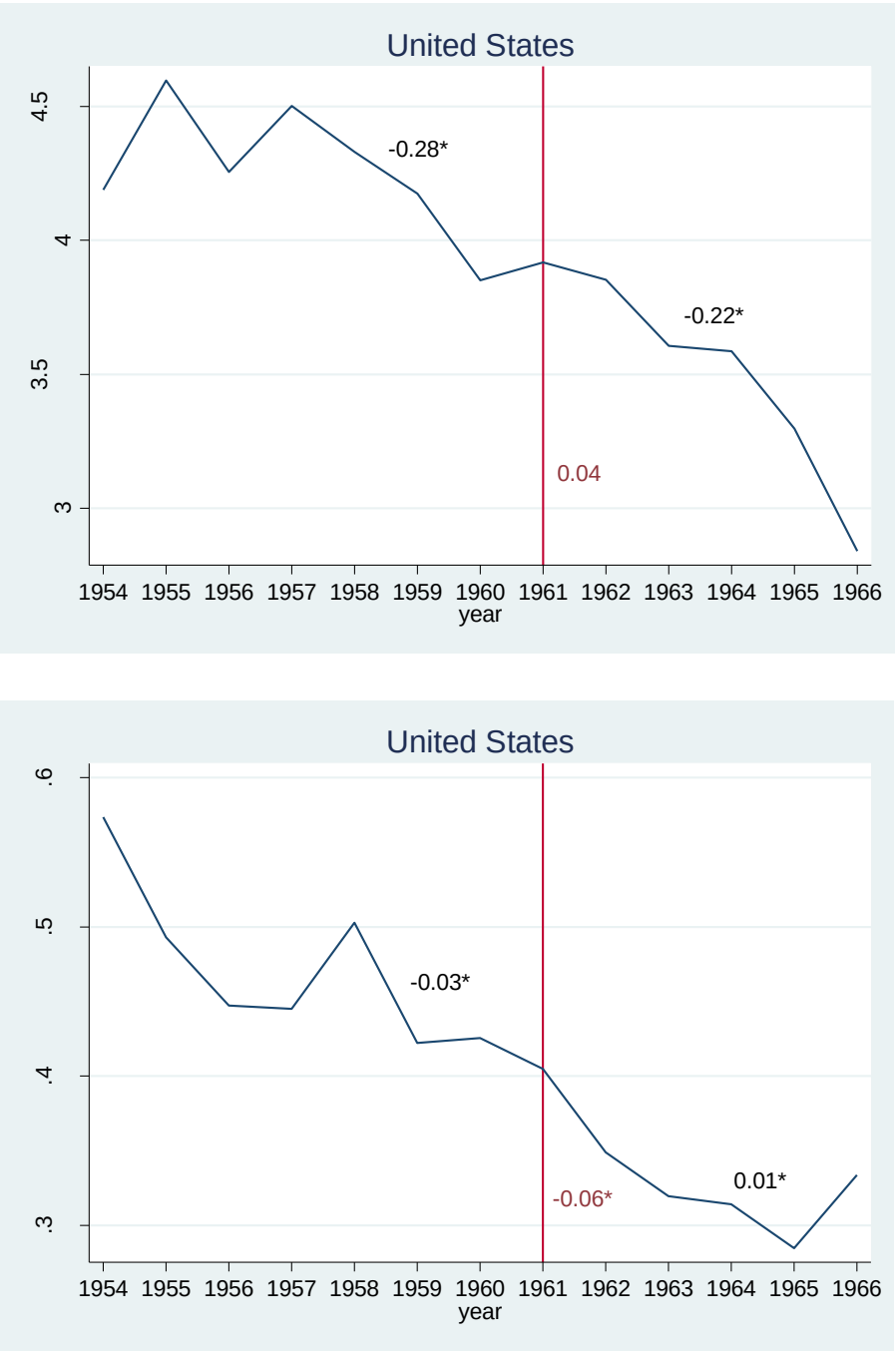
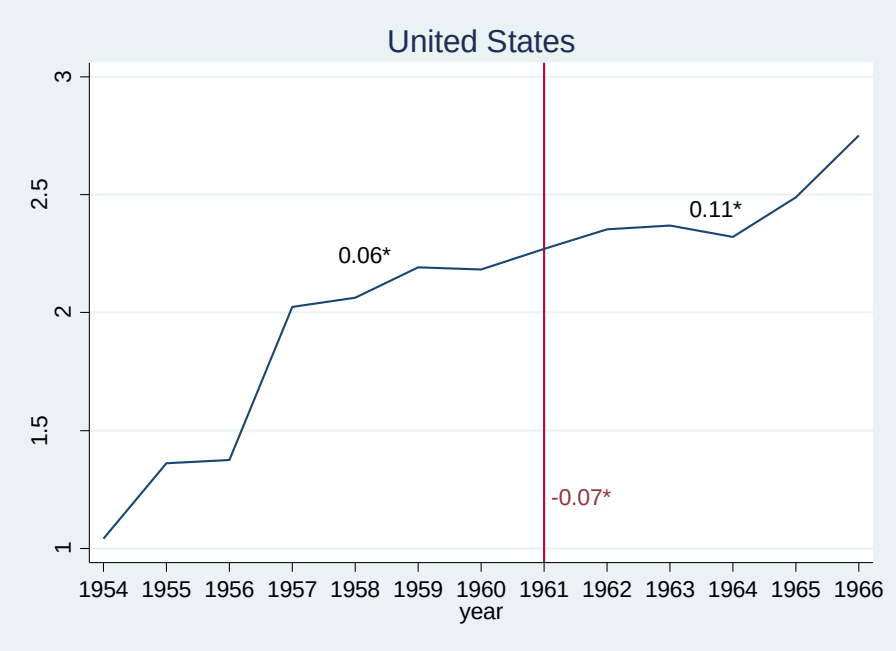
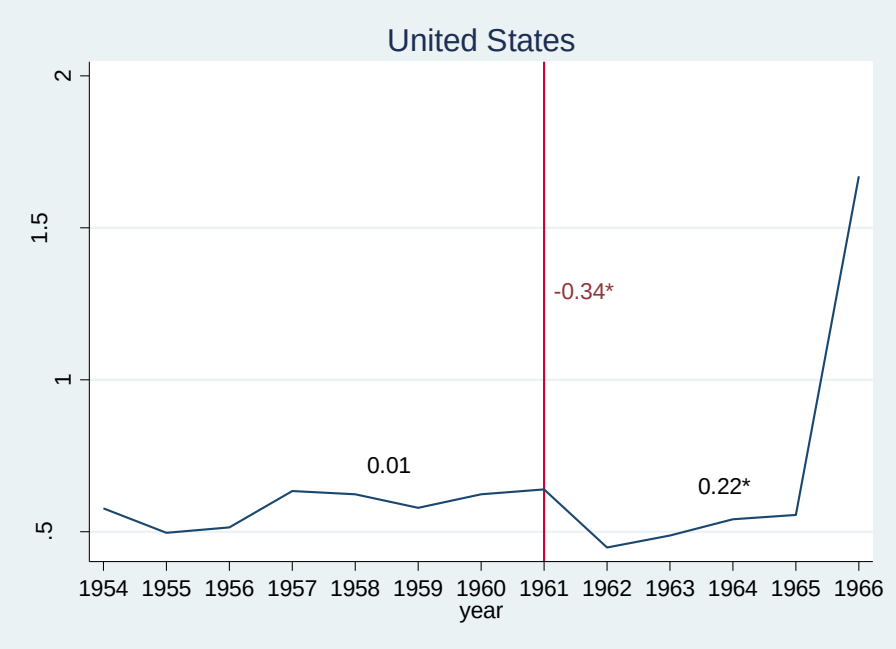


Figure B.1. United States resident count and first admissions by diagnostic category between 1954 and 1966.

(Figure B.1 continued)





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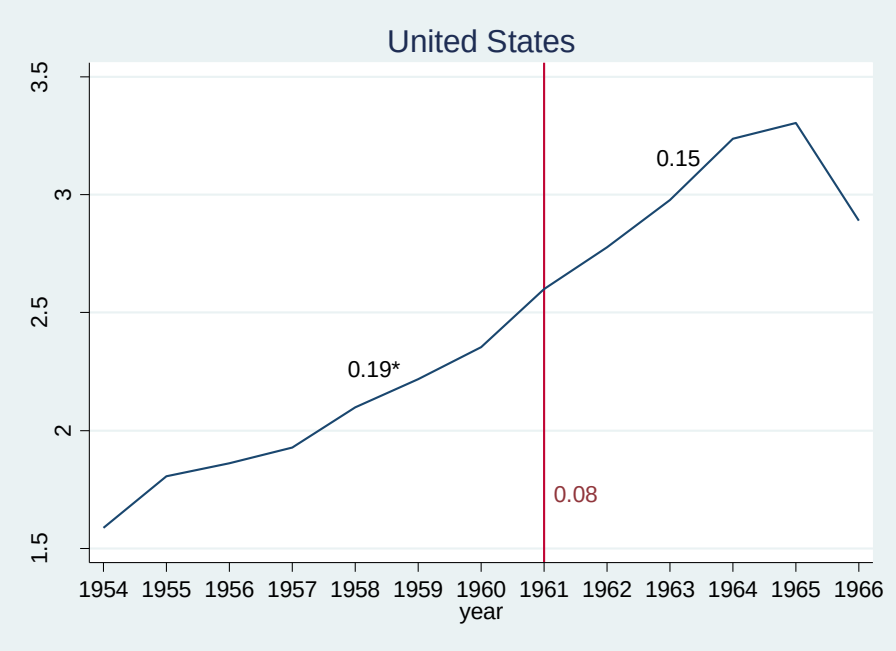

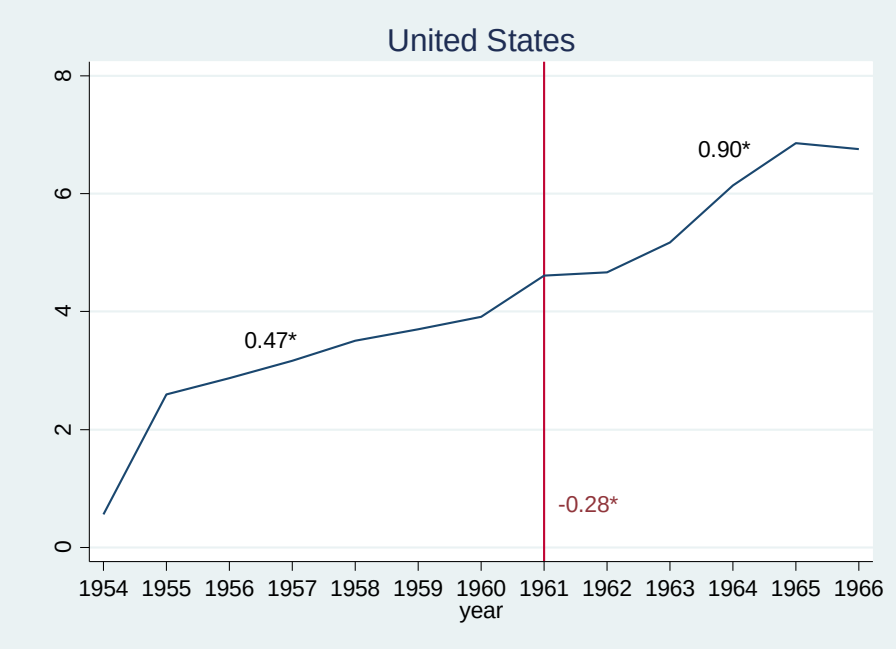

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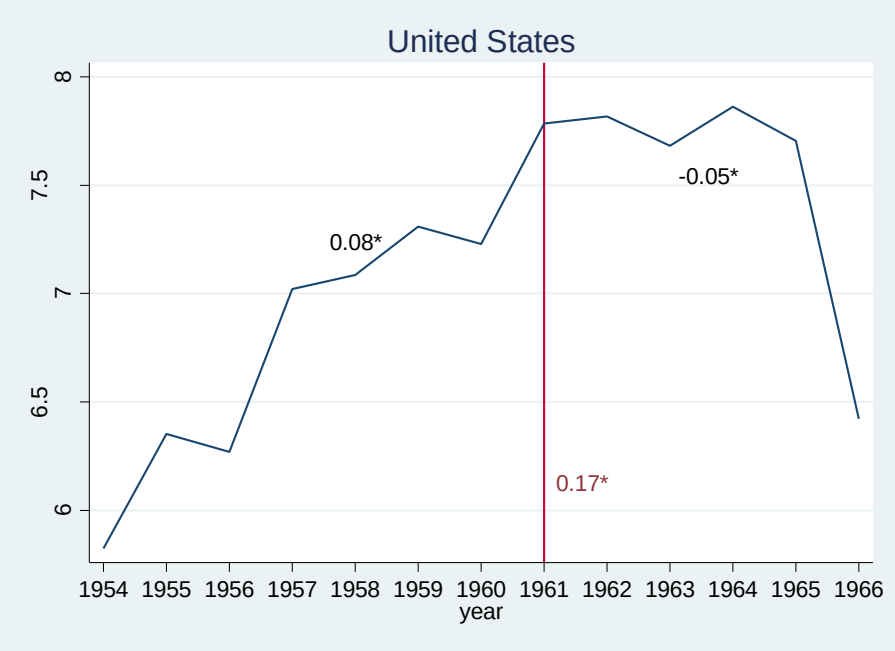

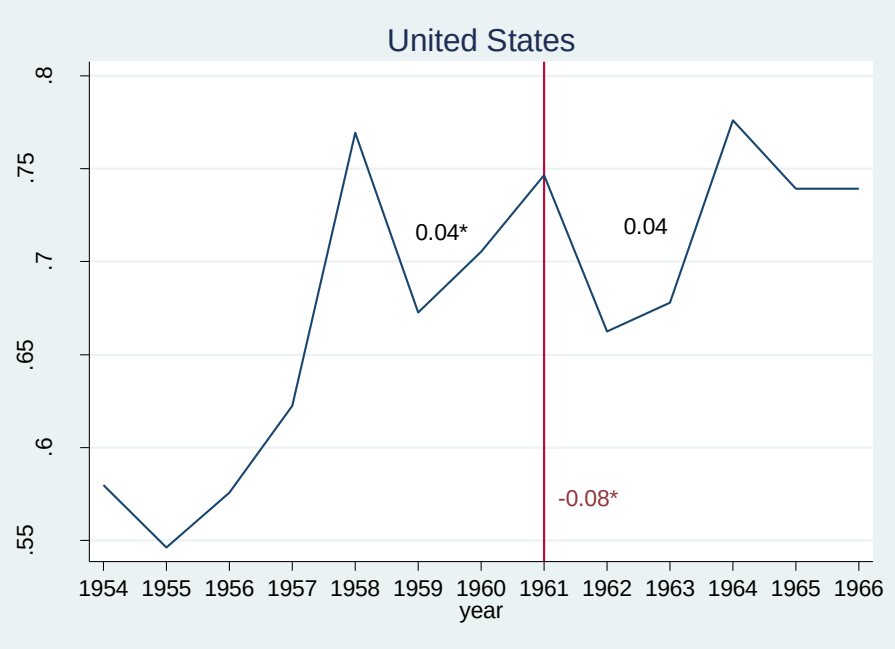

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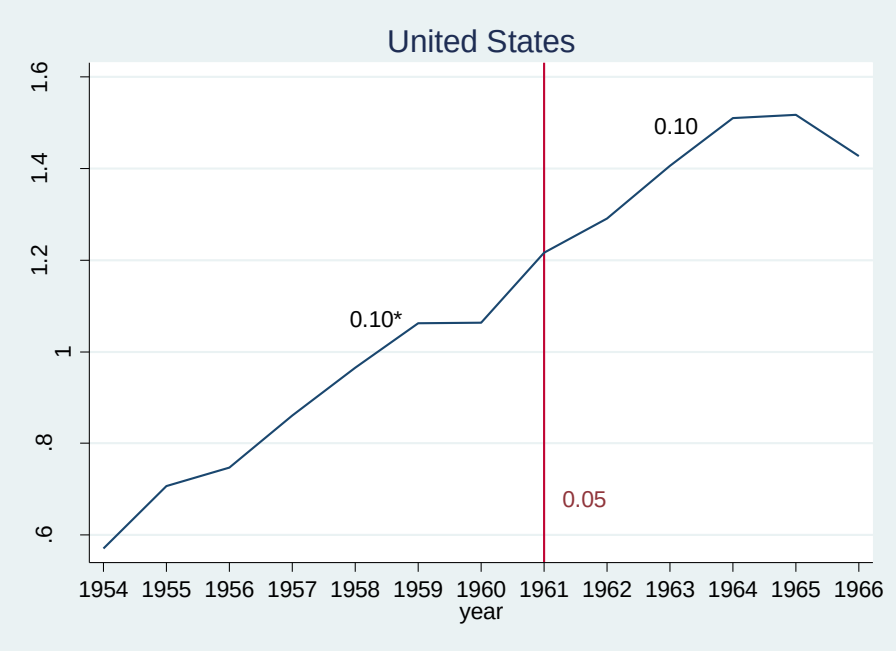

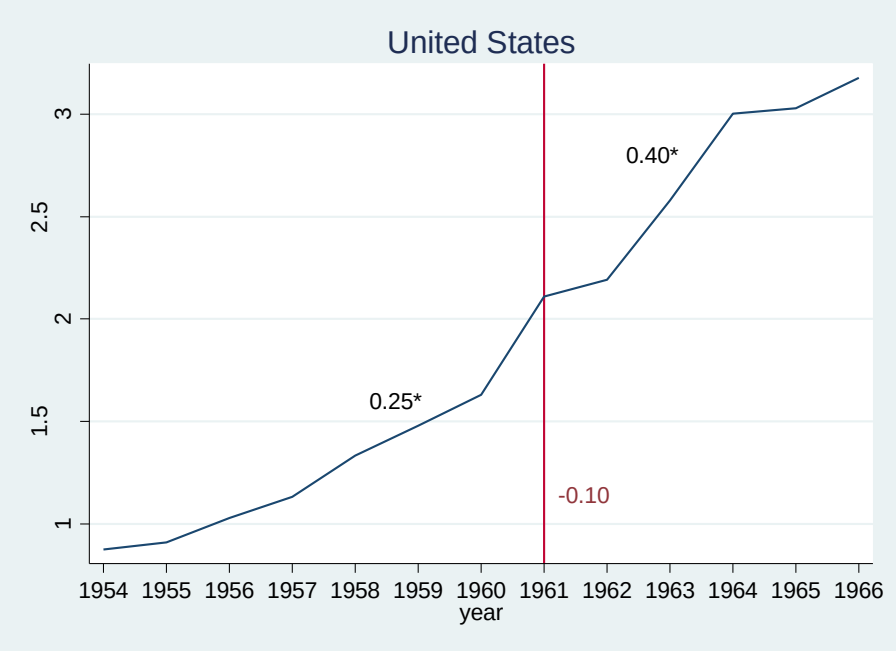

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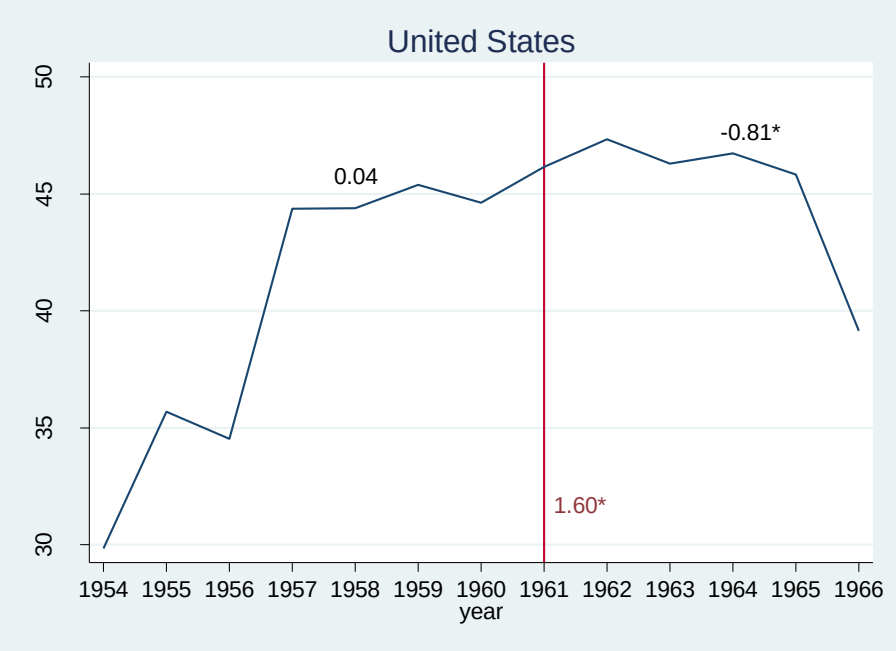
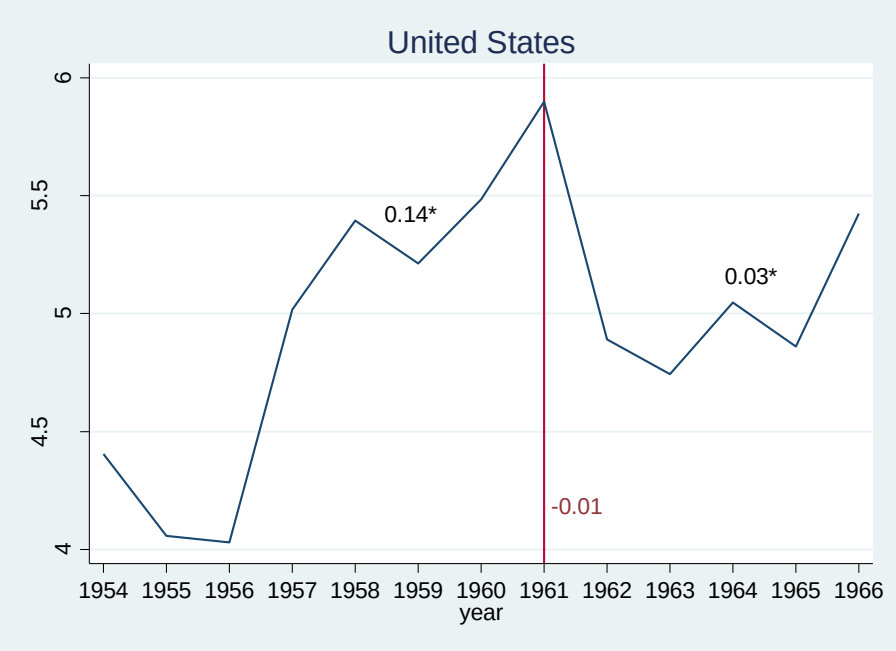
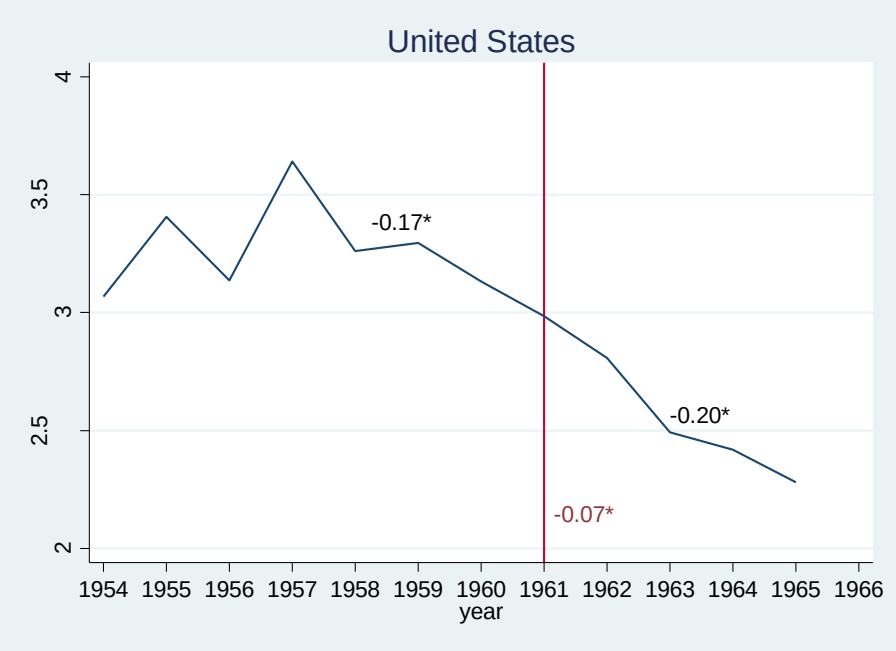
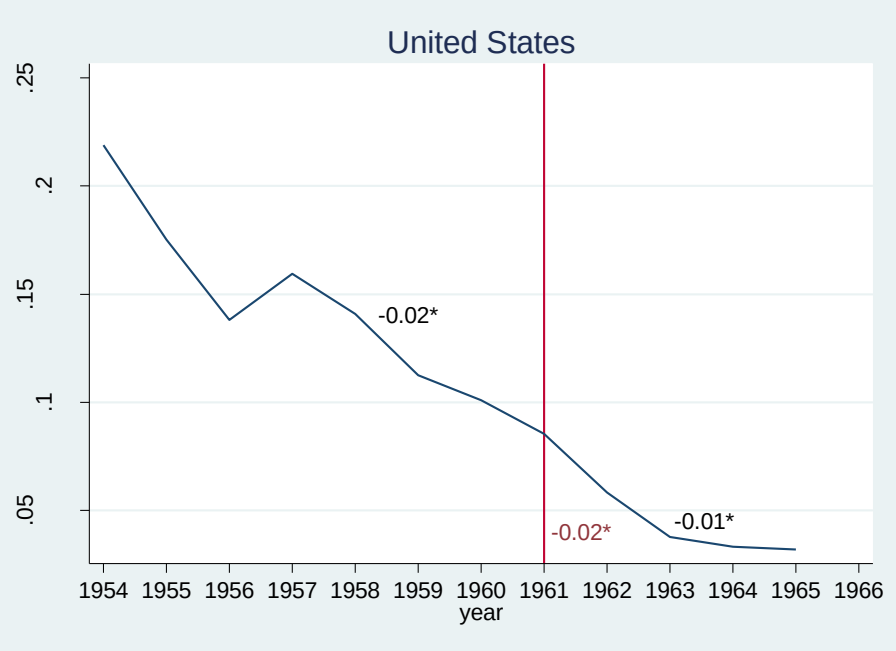


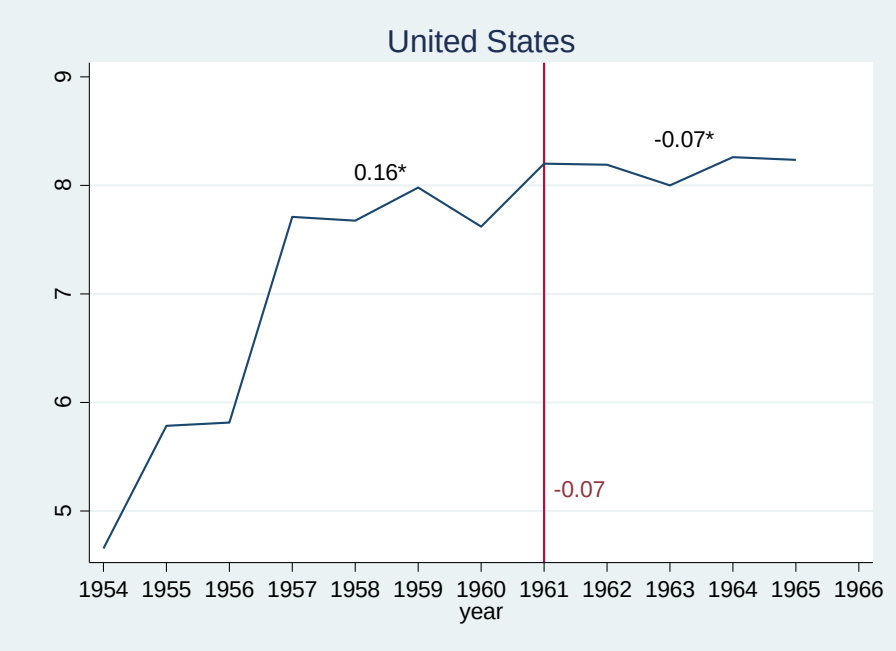


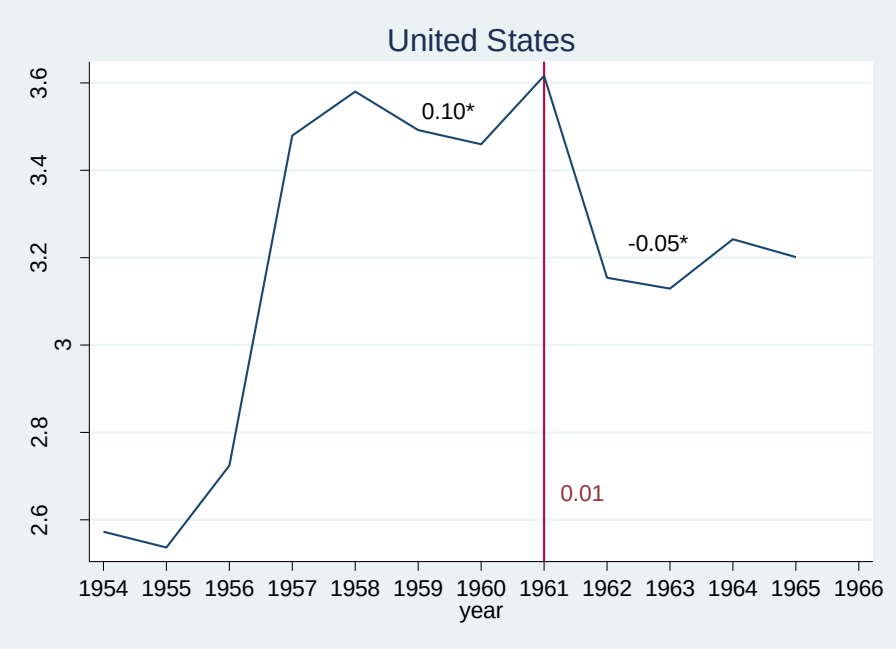
(Figure B.1 continued)



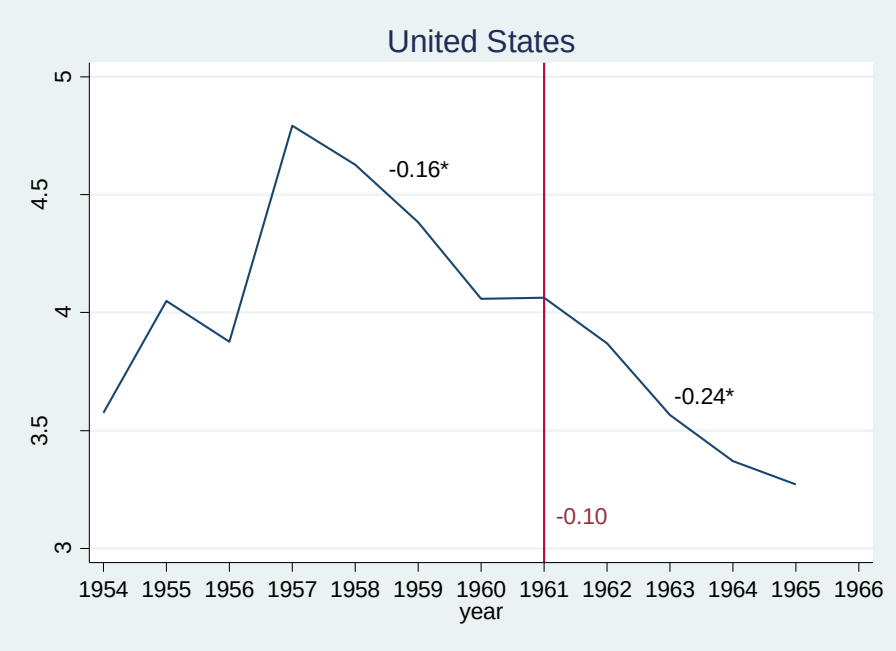


(Figure B.1. continued)





(Figure B.1 continued)



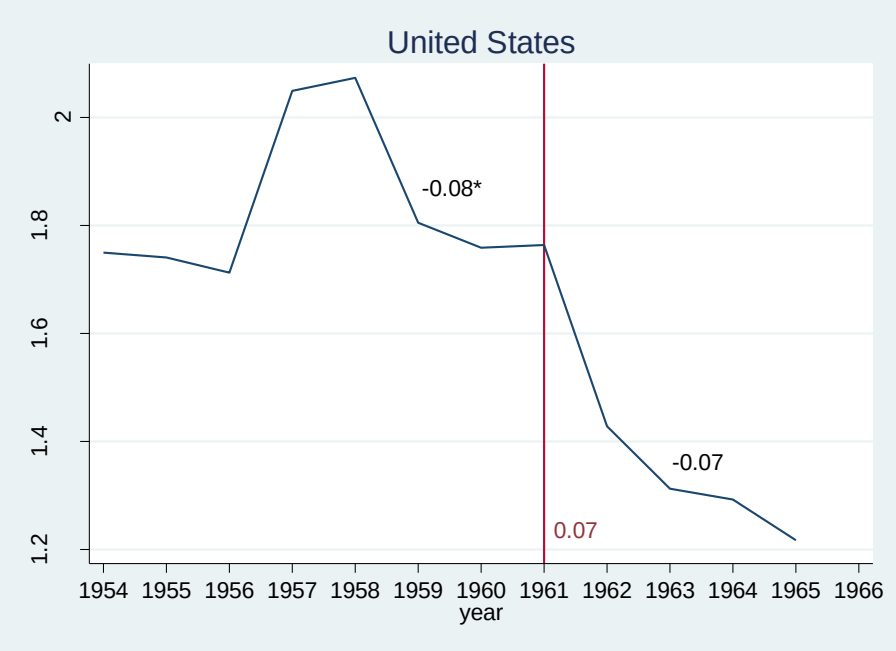


Table B.1. Resident count and first admissions by diagnostic category for the United Stated from 1954 to 1966.

Diagnosis	Resident count			First admissions		
	Counter 54-61	Intervention 61	Counter 61-66	Counter 54-61	Intervention 61	Counter 61-66
Alcoholic	0.06* (11.40)	-0.07* (-2.53)	0.05* (4.77)	0.01 (1.59)	-0.34* (-7.22)	0.21* (11.45)
Manic depressive	-0.28* (-31.83)	0.04 (1.07)	0.06* (3.23)	-0.03* (-10.24)	-0.06* (-2.95)	0.04* (5.06)
Mental deficiency	0.08* (10.57)	0.17* (3.10)	-0.13* (-6.72)	0.04* (7.91)	-0.08* (-2.73)	0.00 (0.49)
Personality disorder	0.19* (5.30)	0.08 (0.46)	-0.04 (-0.48)	0.47* (15.96)	-0.28* (-2.19)	0.43* (6.95)
Psychoneuroses	0.10* (14.72)	0.05 (1.55)	0.00 (0.08)	0.25* (15.32)	-0.10 (-1.49)	0.15* (4.62)
Schizophrenia	0.04 (0.36)	1.60* (2.71)	-0.85* (-3.77)	0.14* (6.86)	-0.01 (-0.07)	-0.11* (-2.52)
Cerebral arterio-sclerosis	0.16* (8.78)	-0.07 (-0.68)	-0.23* (-5.12)	0.10* (7.09)	0.01 (0.11)	-0.15* (-3.85)
Meningoencephalitic syphilis	-0.17* (-45.87)	-0.07* (-3.97)	-0.03* (-5.41)	-0.02* (-19.98)	-0.02* (-2.02)	0.01* (4.68)
Senile brain disorder	-0.16* (-12.78)	-0.10 (-1.39)	-0.08* (-2.31)	-0.08* (-8.90)	0.07 (1.08)	0.01 (0.33)

Note. These numbers are the unstandardized regression coefficients . An asterisk indicates significance at the .05 level. The numbers in parentheses are the associated T statistics. Counter54-61 indicates the slope for the period 1954 to 1961. Counter61-66 indicates the change in slope between 1954 to 1961 and 1961 to 1966. Intervention61 indicate the immediate impact of the year 1961 on the intercept.

Table B.2. Resident count by diagnostic category for each state from 1954 to 1966.

Schizophrenia resident count				Manic depressive resident count		
	Counter 54-61	Intervention 61	Counter 61-66	Counter 54-61	Intervention 61	Counter 61-66
US	0.04 (0.36)	1.60* (2.71	-0.85* (-3.77)	-0.28* (-31.83)	0.04 (1.07)	0.06* (3.23)
Alabama	6.94* (3.72)	10.90* (2.63)	-7.39* (-3.78)	-0.37* (-10.08)	5.22* (30.16)	-0.01 (-0.14)
Arizona	-0.33 (-2.06)	1.47 (1.07)	-0.21 (-0.43)	0.33 (0.54)	-2.65 (-0.73)	-0.65 (-1.06)
Arkansas	0.10 (0.75)	-2.05* (-3.07)	0.01 (0.04)	-0.28* (-15.90)	-0.70* (-3.97)	-0.02 (-0.51)
California	0.04 (0.43)	3.23 (1.06)	-3.05 (-2.19)	-0.17* (-18.83)	0.15 (1.76)	0.03 (1.88)
Colorado	-0.85* (-7.90)	-1.35 (-1.07)	0.09 (0.29)	-0.22* (-4.17)	0.87* (2.89)	0.00 (0.07)
Connecticut	1.50 (1.17)	-1.43 (-0.33)	-3.21* (-2.36)	0.02 (0.17)	-0.47 (-0.92)	0.07 (0.50)
Delaware	-0.05 (-0.22)	-3.80* (-2.61)	-0.93* (-3.12)	-0.11 (-1.89)	-1.10* (-2.78)	-0.01 (-0.10)
Florida	0.08 (0.45)	0.55 (0.55)	0.16 (0.65)	-0.47* (-8.72)	-0.17 (-0.67)	0.16 (2.23)
Idaho	-0.33 (-0.27)	12.30 (2.06)	-0.57 (-0.37)	-0.55* (-7.45)	0.67 (1.29)	0.34 (1.81)
Illinois	0.32* (2.83)	-0.07 (-0.10)	-1.24* (-6.70)	-0.14* (-12.67)	0.35* (6.41)	-0.01 (-0.29)
Indiana	-0.60* (-2.47)	-1.55 (-0.95)	0.60* (2.89)	-0.32* (-13.88)	0.00 (0.03)	0.18* (8.54)
Iowa	0.16 (0.14)	-0.22 (-0.06)	-2.31 (-1.76)	-0.17 (-0.66)	-1.66 (-1.81)	-0.11 (-0.42)
Kansas	-0.77* (-7.96)	1.75* (2.27)	0.59* (2.44)	-0.49* (-17.69)	0.06 (0.28)	0.18* (2.40)
Kentucky	-0.78* (-3.96)	0.45 (0.45)	0.73* (2.36)	-0.32* (-8.45)	0.25 (0.73)	0.12 (1.38)
Louisiana	-0.12 (-1.87)	-0.81 (-0.58)	0.32 (0.62)	-0.33* (-11.23)	-0.07 (-0.60)	0.19* (4.02)
Maine	-1.43 (-1.70)	6.78 (1.51)	0.70 (0.80)	-0.70 (-1.97)	2.61 (1.39)	0.08 (0.17)
Maryland	0.94 (0.52)	5.31 (0.86)	-2.13 (-1.18)	-0.03 (-0.42)	0.09 (0.44)	-0.06 (-0.91)
Michigan	0.01 (0.12)	2.59* (3.84)	-1.31* (-4.81)	-0.22* (-8.79)	0.36* (3.27)	-0.02 (-0.72)

(Table B.2 continued)

Schizophrenia resident count				Manic depressive resident count		
	Counter 54-61	Intervention 61	Counter 61-66	Counter 54-61	Intervention 61	Counter 61-66
Minnesota	-0.28* (-4.19)	-1.29 (-1.60)	1.14* (3.73)	-0.32* (-17.38)	-0.16 (-0.96)	0.24* (3.81)
Mississippi	0.26 (0.77)	2.03 (1.80)	-1.91* (-5.09)	-0.34* (-3.61)	0.59 (1.66)	0.00 (0.03)
Missouri	0.13* (3.53)	0.41 (1.49)	-1.48* (-16.86)	-0.06 (-1.26)	-0.38 (-1.63)	-0.16* (-2.95)
Montana	-0.34 (-0.93)	-2.22 (-1.43)	-0.48 (-1.08)	-0.10* (-4.61)	-0.10 (-0.89)	0.04 (1.03)
Nebraska	-0.50* (-2.30)	1.66 (1.39)	-0.66* (-3.32)	-0.36* (-8.21)	0.07 (0.45)	0.12 (1.75)
Nevada	-1.60* (-6.13)	0.51 (0.36)	0.37 (0.70)	-0.33* (-2.54)	0.64 (1.15)	0.00 (0.00)
New Hampshire	1.94 (1.21)	-2.57 (-0.62)	-2.26 (-1.34)	-0.05 (-0.72)	-0.25 (-1.01)	-0.14 (-1.80)
New Jersey	-0.35 (-1.62)	1.80 (1.94)	-0.16 (-0.73)	-0.33* (-6.60)	0.14 (0.76)	0.08 (1.58)
New Mexico	0.41* (3.36)	255.43 (1.36)	-53.55 (-1.19)	-0.20 (-1.99)	0.26 (0.32)	-0.07 (-0.38)
New York	-0.13 (-1.98)	1.58* (6.21)	-0.67* (-7.25)	-0.09* (-17.88)	0.00 (0.15)	0.01 (1.98)
North Carolina	1.31* (3.24)	3.31 (1.13)	-3.40* (-8.11)	-0.43* (-10.53)	1.89 (0.57)	0.06 (0.06)
North Dakota	-0.06 (-0.21)	-3.60 (-2.16)	-0.81 (-1.25)	-0.10* (-4.99)	-0.37 (-1.95)	0.04 (0.66)
Ohio	-0.03 (-0.20)	5.16* (6.76)	0.22 (1.24)	-0.40* (-7.30)	0.07 (0.23)	0.24* (4.61)
Oklahoma	-0.21 (-1.04)	2.27 (1.59)	-0.33 (-0.85)	-0.35* (-14.26)	0.23 (1.08)	0.25* (3.43)
Oregon	1.89 (0.66)	14.03 (0.90)	-1.74 (-0.62)	0.47* (4.81)	-0.94 (-1.78)	-0.65* (-6.67)
Pennsylvania	0.03 (0.16)	1.48 (1.64)	-0.20 (-0.90)	-0.34* (-13.26)	0.13 (1.42)	0.08* (3.05)
Rhode Island	-0.69* (-5.60)	0.15 (0.17)	0.35 (1.55)	-0.21* (-3.80)	0.54 (1.44)	-0.16 (-2.16)
South Carolina	0.13 (0.63)	0.79 (0.84)	-0.93* (-4.74)	-0.32* (-7.37)	0.11 (0.51)	0.06 (1.14)

(Table B.2. continued)

Schizophrenia resident count				Manic depressive resident count		
	Counter 54-61	Intervention 61	Counter 61-66	Counter 54-61	Intervention 61	Counter 61-66
South Dakota	-0.88* (-2.47)	10.21 (1.33)	-4.32 (-1.65)	-0.29* (-3.46)	0.02 (0.03)	0.05 (0.23)
Tennessee	3.82 (1.54)	-5.85 (-0.98)	-4.10 (-1.66)	0.33 (0.54)	-1.28 (-0.87)	-0.83 (1.36)
Texas	0.73 (2.08)	0.45 (0.44)	-0.75 (-1.96)	-0.67* (-4.79)	0.26 (0.65)	0.20 (1.46)
Utah	-2.33* (-6.38)	-5.69 (-1.67)	2.33* (2.57)	-0.29 (-2.20)	-0.34 (-0.70)	-0.37* (-2.50)
Vermont	-0.05 (-0.20)	-1.71 (-1.13)	-0.25 (-0.89)	0.01 (0.06)	-0.10 (-0.19)	-0.48* (-3.18)
Virginia	0.40 (1.96)	1.90* (2.35)	-0.93* (-4.22)	-0.88* (-8.38)	-0.18 (-0.55)	0.45* (4.26)
Washington	-0.21 (-1.18)	-2.32* (-2.50)	-0.11 (-0.33)	-0.31* (-5.02)	-0.29 (-0.95)	0.15 (1.70)
West Virginia	0.95* (3.08)	-1.85 (-1.23)	-0.26 (-0.79)	-0.21* (-2.81)	-0.29 (-1.29)	-0.17 (-1.90)
Wisconsin	0.27* (4.29)	-1.20 (-1.43)	-0.11 (-0.42)	-0.22* (-10.49)	0.18 (1.51)	0.09* (3.72)
Wyoming	-0.33 (-0.84)	5.17* (2.68)	-2.07* (-3.81)	-0.39* (-6.22)	-0.34 (-0.80)	-0.72* (-5.23)
District of Columbia	-0.95* (-10.82)	1.49* (4.05)	0.25 (1.79)	-0.13* (-27.69)	0.00 (0.02)	0.05* (4.97)

(Table B.2 continued)

Alcoholic resident count				Psychoneuroses resident count		
	Counter 54-61	Intervention 61	Counter 61-66	Counter 54-61	Intervention 61	Counter 61-66
US	0.06* (11.40)	-0.07* (-2.53)	0.05* (4.77)	0.10* (14.72)	0.05 (1.55)	0.00 (0.08)
Alabama	-0.05* (-3.20)	0.04 (0.81)	0.12* (4.23)	-0.06* (-5.47)	0.08 (1.16)	0.11* (3.99)
Arizona	0.03 (0.80)	0.22 (0.76)	0.06 (1.18)	0.24* (2.69)	0.08 (0.17)	-0.16 (-1.71)
Arkansas	0.01 (1.60)	-0.01 (-0.22)	0.00 (0.04)	0.06* (2.67)	0.09 (0.40)	0.19* (3.45)
California	0.07* (3.49)	-0.16 (-1.38)	-0.01 (0.27)	-0.03 (-1.14)	0.40* (2.85)	0.15* (5.26)
Colorado	0.31* (4.83)	-0.43 (-0.94)	-0.46* (-3.92)	0.07* (7.23)	-0.07 (-0.31)	0.29* (3.33)
Connecticut	0.14 (1.28)	-0.31 (-0.61)	0.02 (0.13)	0.16* (6.41)	-0.20 (-1.72)	-0.00 (-0.04)
Delaware	0.18* (3.25)	-0.04 (-0.13)	0.34* (4.50)	-0.08 (-2.24)	0.64* (2.76)	0.29* (7.92)
Florida	0.04 (1.42)	-0.21 (-1.37)	0.17* (5.42)	0.14* (10.12)	-0.07 (-0.68)	-0.20* (-5.90)
Idaho	-0.07 (-1.50)	0.93* (3.42)	-0.13 (-2.26)	-0.14* (-3.16)	0.75 (2.13)	0.07 (0.60)
Illinois	0.15* (12.33)	-0.17 (-2.06)	-0.23* (-14.73)	0.08* (6.35)	-0.02 (-0.36)	-0.05* (-4.06)
Indiana	0.06* (5.57)	0.12 (1.58)	0.03 (1.03)	0.04* (2.74)	-0.09 (-1.23)	-0.04 (-2.19)
Iowa	-0.009 (-0.16)	-0.26 (-1.07)	0.05 (0.67)	0.12 (2.05)	0.16 (0.45)	0.08 (0.78)
Kansas	0.003 (0.28)	-0.15* (-2.37)	0.01 (0.77)	0.25* (11.53)	0.73 (1.40)	-0.01 (-0.09)
Kentucky	-0.03* (-5.08)	-0.10 (0.27)	0.10* (2.67)	0.12* (8.43)	0.27 (1.54)	0.00 (0.03)
Louisiana	0.09* (4.73)	-0.46* (-4.70)	0.12* (3.99)	0.13* (2.93)	-0.05 (-0.17)	0.02 (0.40)
Maine	-0.04 (-1.41)	0.75* (3.11)	-0.23 (-2.11)	0.13* (3.63)	0.41* (2.37)	-0.01 (-0.21)

(Table B.2 continued)

Alcoholic resident count				Psychoneuroses resident count		
	Counter 54-61	Intervention 61	Counter 61-66	Counter 54-61	Intervention 61	Counter 61-66
Maryland	0.16* (2.45)	-0.81 (-2.12)	0.37* (4.28)	0.07 (1.71)	0.57* (3.11)	0.04 (0.89)
Michigan	0.02* (3.04)	0.02 (0.44)	-0.05* (-4.85)	0.03* (4.86)	0.08 (0.98)	-0.12* (-4.88)
Minnesota	0.09* (8.01)	-0.08 (-0.49)	-0.04 (-0.60)	0.08* (8.95)	-0.02 (-0.18)	0.22* (6.01)
Mississippi	0.04* (12.36)	0.05 (0.64)	-0.06* (-2.76)	-0.03* (-3.43)	0.14 (2.23)	-0.02 (-2.02)
Missouri	0.03* (4.49)	-0.01 (-0.09)	-0.02 (-0.57)	0.08* (8.87)	0.27* (3.40)	-0.15* (-8.43)
Montana	0.15* (9.97)	-0.64* (-4.13)	0.03 (0.74)	-0.12 (-1.49)	0.06 (0.18)	0.27* (3.43)
Nebraska	0.08* (10.22)	-0.43 (-1.93)	0.16 (1.78)	0.06 (1.59)	0.53 (1.60)	-0.14* (-2.36)
Nevada	0.39 (1.46)	-0.72 (-0.74)	-0.56 (-1.48)	-0.01 (-0.12)	1.75* (3.18)	-0.50* (-2.69)
New Hampshire	-0.14* (-4.35)	0.36 (2.05)	0.36* (8.16)	-0.11 (-2.19)	0.80 (1.18)	0.19 (1.48)
New Jersey	0.01 (1.04)	-0.41 (-1.25)	0.25 (2.29)	0.08* (6.50)	0.01 (0.10)	-0.10* (-4.68)
New Mexico	0.02 (0.68)	0.99* (2.75)	-0.17 (-1.75)	0.34* (5.06)	-0.05 (-0.14)	-0.41* (-4.94)
New York	0.13* (26.79)	-0.17 (-1.06)	0.10 (2.20)	0.02 (1.39)	-0.23 (-1.45)	0.08 (1.62)
North Carolina	-0.01 (-1.48)	-0.23 (-1.34)	0.17* (2.72)	0.20* (4.30)	0.74 (1.75)	-0.14 (-1.52)
North Dakota	0.11* (4.96)	-0.12 (-0.98)	0.09* (2.32)	-0.03 (-0.66)	0.62 (0.98)	0.22 (1.53)
Ohio	0.03 (2.26)	0.18 (0.56)	0.06 (0.69)	0.05 (1.92)	0.02 (0.15)	0.09* (3.63)
Oklahoma	0.02 (0.98)	-0.93* (-3.93)	0.22 (2.77)	0.00 (0.23)	0.30 (1.43)	0.14 (2.53)
Oregon	0.46* (7.06)	-0.82 (-2.03)	-0.47* (-5.38)	0.24* (6.85)	0.11 (0.41)	-0.17 (-2.15)

(Table B.2 continued)

Alcoholic resident count				Psychoneuroses resident count		
	Counter 54-61	Intervention 61	Counter 61-66	Counter 54-61	Intervention 61	Counter 61-66
Pennsylvania	0.04* (3.04)	-0.22 (-1.73)	0.17* (3.15)	0.06* (16.32)	0.09 (1.42)	-0.01 (-0.49)
Rhode Island	-0.19 (-2.15)	1.42* (2.55)	-0.22 (-1.42)	0.13* (4.39)	-0.93* (-3.14)	0.24 (1.91)
South Carolina	0.01 (0.78)	-0.08 (-0.56)	0.11 (1.78)	0.09* (3.90)	0.73 (1.88)	-0.13 (-1.89)
South Dakota	-0.03 (-1.21)	-0.25 (-1.11)	0.15 (1.96)	0.25* (8.46)	0.58 (1.14)	-0.30 (-1.69)
Tennessee	0.04 (2.23)	0.19 (1.90)	0.01 (0.53)	0.14* (4.15)	0.39* (2.32)	-0.02 (-0.45)
Texas	-0.01 (-0.30)	0.21 (1.07)	0.05 (1.32)	0.04 (1.66)	0.00 (0.02)	0.09 (2.03)
Utah	0.16* (5.27)	-0.08 (-0.15)	-0.16 (-1.05)	0.01 (0.23)	-0.29 (-0.71)	0.63* (4.53)
Vermont	0.06* (2.51)	0.21 (1.78)	0.15* (5.16)	0.05 (0.73)	0.10 (0.29)	0.01 (0.12)
Virginia	0.06* (12.32)	-0.35* (-3.74)	0.09* (2.68)	0.11* (10.54)	-0.22 (-2.26)	-0.04 (-1.34)
Washington	0.02 (1.36)	-0.38* (-2.49)	0.25* (4.57)	0.23* (6.52)	-0.41 (-1.95)	-0.03 (-0.36)
West Virginia	0.03 (0.69)	0.00 (0.00)	-0.14 (-2.06)	0.05 (1.34)	0.59* (3.33)	-0.17* (-2.95)
Wisconsin	0.07* (5.56)	-0.25* (-4.51)	-0.04* (-2.74)	0.09* (11.19)	0.24 (1.02)	-0.09 (-1.08)
Wyoming	0.12 (1.42)	1.09 (1.45)	0.08 (0.52)	0.04 (0.55)	-0.47 (-1.38)	0.26* (3.81)
District of Columbia	0.18* (17.10)	0.17 (0.63)	0.11 (0.93)	0.15* (50.73)	-0.13 (-1.77)	-0.22* (11.14)

(Table B.2 continued)

Mental deficiency resident count				Personality disorder resident count		
	Counter 54-61	Intervention 61	Counter 61-66	Counter 54-61	Intervention 61	Counter 61-66
US	0.08* (10.57)	0.17* (3.10)	-0.13* (-6.72)	0.19* (5.30)	0.08 (0.46)	-0.04 (-0.48)
Alabama	1.38* (3.24)	4.22* (4.14)	-1.52* (-3.63)	0.16* (4.88)	0.39 (1.52)	-0.03 (-0.37)
Arizona	-0.03 (-0.06)	-0.15 (-0.14)	-0.33 (-0.58)	0.25* (3.99)	-0.73* (-3.14)	0.22* (2.39)
Arkansas	-0.04 (-0.98)	-2.34* (-3.22)	-0.21 (-0.74)	0.03 (1.24)	0.59 (0.87)	-0.01 (-0.05)
California	-0.07* (-6.41)	0.23* (4.17)	0.03* (2.68)	0.02 (0.43)	0.15 (0.63)	0.30* (3.74)
Colorado	0.01 (0.34)	-1.32 (-1.23)	0.37 (0.93)	0.62* (21.13)	-1.74* (-2.47)	0.00 (0.00)
Connecticut	0.10 (1.05)	-0.02 (-0.06)	-0.23* (-2.34)	0.11* (12.19)	0.32 (2.25)	0.30* (7.33)
Delaware	-0.23* (-8.37)	0.28 (1.63)	0.11 (1.69)	0.12* (2.61)	1.76* (5.32)	0.18 (1.89)
Florida	-0.18* (-9.99)	-0.29* (-2.97)	-0.09* (-3.91)	0.11* (2.54)	0.08 (0.62)	-0.16* (-3.38)
Idaho	0.23 (0.99)	-2.83 (-1.26)	1.69* (3.62)	-0.52* (-3.86)	0.76 (1.07)	0.02 (0.08)
Illinois	0.06 (2.36)	-2.02 (-1.36)	0.54 (1.35)	0.20* (5.76)	0.03 (0.12)	-0.17* (-3.22)
Indiana	0.10 (2.17)	-0.19 (-0.46)	0.14* (2.42)	-0.03 (-0.40)	0.57 (1.80)	0.19* (2.37)
Iowa	0.38* (4.45)	-0.63 (-1.72)	-0.70* (-6.67)	0.41* (6.61)	-1.48* (-2.37)	1.11* (4.54)
Kansas	-0.30* (-5.23)	1.01* (4.28)	-0.22* (-2.68)	0.37* (4.47)	0.59 (0.86)	0.27* (2.56)
Kentucky	0.11* (3.15)	0.72* (4.60)	-0.35* (-6.42)	0.17* (3.63)	-0.18 (-1.00)	0.07 (1.23)
Louisiana	0.02 (0.39)	-0.58* (-2.27)	0.18 (1.93)	0.11* (6.09)	-0.66* (-4.03)	0.24* (4.09)
Maine	0.05 (1.36)	0.18 (0.51)	-0.01 (-0.15)	0.05* (2.40)	0.34* (5.78)	-0.04 (-1.74)

(Table B.2 continued)

Mental deficiency resident count				Personality disorder resident count		
	Counter 54-61	Intervention 61	Counter 61-66	Counter 54-61	Intervention 61	Counter 61-66
Maryland	-0.08 (-0.21)	1.55 (1.28)	-0.50 (1.31)	0.17* (2.95)	0.23 (0.54)	0.63* (8.53)
Michigan	0.11* (13.05)	0.23 (1.83)	-0.19* (-3.89)	0.28* (18.73)	0.93 (1.39)	-0.27 (-1.10)
Minnesota	-0.21* (-8.65)	-0.70* (-5.92)	0.12* (2.94)	0.27 (1.97)	-0.13 (-0.50)	0.37* (2.67)
Mississippi	1.49* (4.74)	0.11 (0.08)	-0.64 (-1.27)	-0.00 (-0.08)	0.44 (1.43)	-0.08 (-1.45)
Missouri	0.50* (4.17)	-0.09 (-0.17)	-0.85* (-6.82)	0.09* (2.52)	0.07 (0.32)	-0.02 (-0.29)
Montana	0.54* (4.88)	-0.08 (-0.19)	-0.61* (-5.09)	-0.36 (-1.50)	36.86* (2.35)	-8.28 (-1.97)
Nebraska	-0.27* (-4.08)	1.01 (2.04)	0.09 (1.48)	0.38* (14.29)	37.54 (2.23)	-9.46 (-2.17)
Nevada	0.98* (5.91)	-7.19 (-2.18)	2.89* (2.94)	0.02 (0.28)	31.25 (2.12)	-8.14 (-1.61)
New Hampshire	-0.58* (-4.07)	1.55 (1.44)	1.36* (4.76)	-0.06 (-0.95)	0.40 (1.00)	0.36* (3.22)
New Jersey	0.04 (1.97)	0.24 (1.79)	0.05 (1.10)	0.13* (14.70)	0.16 (1.83)	-0.19* (-8.15)
New Mexico	0.44* (2.80)	1.11 (1.53)	-1.52* (-8.24)	0.36* (4.00)	-0.21 (-0.40)	-0.06 (-0.31)
New York	0.02* (4.90)	0.06 (0.94)	-0.02 (-0.78)	0.04* (8.92)	0.13 (0.73)	0.12* (2.83)
North Carolina	0.12 (1.43)	0.88 (1.48)	-0.23* (-2.50)	3.44 (1.45)	-18.32 (-1.43)	-3.05 (-1.29)
North Dakota	-0.05 (-0.92)	-0.45 (-1.29)	0.27* (3.75)	4.62 (1.47)	-22.39 (-1.50)	-3.77 (-1.21)
Ohio	0.22 (1.29)	-4.51* (-5.34)	-0.20 (-1.21)	3.42 (1.53)	-16.60 (-1.37)	-3.25 (-1.45)
Oklahoma	-0.29* (-5.29)	2.52* (4.32)	-0.43 (-2.51)	0.20* (4.48)	-0.58 (-2.44)	0.31* (6.26)
Oregon	0.40 (1.34)	-1.69 (-0.94)	-0.47 (-1.47)	0.74* (4.83)	-2.36 (-2.04)	-0.26 (-1.27)

(Table B.2 continued)

Mental deficiency resident count				Personality disorder resident count		
	Counter 54-61	Intervention 61	Counter 61-66	Counter 54-61	Intervention 61	Counter 61-66
Pennsylvania	-0.01 (-0.48)	0.46* (7.57)	-0.10* (-4.44)	0.07* (2.43)	-0.20 (-2.23)	0.11* (3.64)
Rhode Island	0.26* (5.12)	-0.84 (-1.30)	-0.08 (-0.33)	0.18* (3.01)	-0.45 (-0.75)	0.57* (2.38)
South Carolina	-0.08 (-1.03)	0.01 (0.05)	0.32* (3.02)	-0.01 (-0.74)	0.43* (6.99)	0.02 (0.86)
South Dakota	-0.08* (-4.05)	-0.00 (-0.01)	-0.26* (-3.23)	0.45* (6.16)	0.87 (0.48)	-0.78 (-1.40)
Tennessee	0.78 (1.57)	-1.06 (-0.81)	-1.12 (-2.24)	0.16* (3.56)	0.50* (3.92)	-0.16* (-3.16)
Texas	-0.12 (-0.78)	1.57 (1.96)	-0.49 (-1.76)	0.13 (1.71)	0.40 (0.90)	-0.01 (-0.07)
Utah	0.25* (4.50)	2.47 (2.24)	-2.03* (-6.84)	0.53* (6.74)	0.89 (0.84)	1.08* (2.74)
Vermont	0.29* (2.72)	-0.19 (-0.42)	-0.57* (-5.17)	0.02 (0.64)	-0.47 (-1.88)	0.22* (3.02)
Virginia	-0.02 (-0.32)	-0.58* (-3.99)	0.09 (1.62)	0.08* (5.05)	-0.16 (-1.71)	0.06 (1.98)
Washington	-0.04 (-1.71)	-0.33* (-2.49)	0.14* (3.64)	0.11* (2.49)	-0.68* (-3.08)	0.02 (0.46)
West Virginia	0.33 (0.79)	1.28 (1.25)	-0.00 (-0.01)	0.16 (1.69)	0.31 (0.66)	-0.26* (-2.54)
Wisconsin	0.13* (2.91)	-0.21 (-0.43)	0.10 (0.60)	0.18* (8.74)	0.05 (0.49)	-0.17* (-6.62)
Wyoming	0.01 (0.82)	0.44 (0.84)	-0.10 (-0.74)	0.59* (3.37)	4.33* (4.20)	0.34 (0.96)
District of Columbia	0.04* (15.28)	0.02 (0.51)	0.04* (2.85)	0.23* (5.13)	0.47 (1.60)	-0.11 (-0.94)

(Table B.2 continued)

Cerebral aterio-sclerosis resident count				Syphilis resident count		
	Counter 54-61	Intervention 61	Counter 61-66	Counter 54-61	Intervention 61	Counter 61-66
US	0.16* (8.78)	-0.07 (-0.68)	-0.23* (-5.12)	-0.17* (-45.87)	-0.07* (-3.97)	-0.03* (-5.41)
Alabama	0.43* (13.25)	2.98 (1.64)	-1.91* (-2.79)	-0.05 (-1.74)	2.47* (3.78)	-0.58 (-2.24)
Arizona	0.17 (0.98)	-1.15 (-1.10)	0.22 (0.52)	0.05 (0.93)	-0.07 (-0.23)	-0.40* (-6.70)
Arkansas	0.07 (0.74)	-1.64 (-1.98)	-0.50* (-2.39)	-0.22* (-7.72)	-0.41 (-1.50)	-0.09 (-1.18)
California	-0.24* (-5.72)	0.56* (3.00)	-0.33* (-6.07)	-0.18* (-77.08)	0.09* (3.60)	-0.04* (-4.46)
Colorado	0.06 (1.00)	-1.17 (-2.23)	-0.62* (-4.09)	-0.24* (-19.98)	-0.17* (-4.38)	0.04* (2.40)
Connecticut	0.17 (1.09)	-0.03 (-0.04)	0.11 (0.68)	-0.02 (-0.51)	-0.17 (-1.24)	-0.13* (-2.63)
Delaware	0.45 (2.01)	0.94 (0.73)	0.38 (1.37)	-0.42* (-6.03)	-0.21 (-0.86)	0.06 (0.68)
Florida	-0.09 (-1.46)	0.97* (3.40)	0.28* (3.86)	-0.36* (-7.12)	-0.08 (-0.44)	0.04 (0.66)
Idaho	-0.03 (-0.36)	0.50 (1.33)	0.57* (4.19)	0.01 (0.11)	0.10 (0.31)	-0.20 (-2.13)
Illinois	-0.13* (-2.89)	-0.01 (-0.10)	0.27* (6.10)	-0.17* (-23.57)	-0.06 (-2.04)	-0.07* (-9.74)
Indiana	0.06 (0.82)	-1.50* (-5.34)	-0.28* (-4.07)	-0.40* (-14.19)	-0.42* (-2.66)	0.20* (7.26)
Iowa	0.10 (0.57)	2.73* (3.17)	-0.10 (-0.30)	-0.10 (-1.60)	-0.23 (-0.98)	-0.19* (-2.99)
Kansas	-0.36* (-5.85)	0.54 (1.52)	0.36* (2.55)	-0.28* (-16.27)	0.21 (1.73)	-0.11* (-5.05)
Kentucky	0.01 (0.17)	-1.17 (-1.69)	0.49* (2.83)	-0.22* (-25.65)	0.24* (3.04)	0.02 (0.59)
Louisiana	0.04 (0.61)	-0.05 (-0.23)	-0.40* (-5.36)	-0.34* (-11.48)	-0.10 (-1.56)	0.16* (5.26)
Maine	0.71* (5.17)	-1.16 (-0.73)	-0.45 (-0.87)	-0.11* (-5.62)	-0.15 (-1.50)	-0.15* (-3.80)

(Table B.2 continued)

Cerebral aterio-sclerosis resident count				Syphilis resident count		
	Counter 54-61	Intervention 61	Counter 61-66	Counter 54-61	Intervention 61	Counter 61-66
Maryland	0.45 (2.06)	0.38 (0.44)	0.05 (0.25)	0.03 (0.12)	0.59 (0.68)	-0.36 (-1.41)
Michigan	-0.15* (-3.96)	-0.29 (-1.47)	-0.20* (-5.31)	-0.25* (-84.44)	-0.13 (-2.27)	-0.01 (-0.88)
Minnesota	-0.09 (-0.86)	-1.57* (-3.06)	-0.41* (-3.70)	-0.16* (-14.57)	0.29 (1.44)	-0.07 (-1.10)
Mississippi	-0.07 (-1.27)	0.73* (2.90)	-0.20* (2.75)	-0.24* (-4.11)	0.64* (3.03)	-0.11 (-1.75)
Missouri	0.08* (4.11)	0.17 (1.49)	0.26* (4.95)	-0.25* (-2.35)	-0.16 (-0.76)	-0.06 (-0.59)
Montana	0.40* (3.43)	1.29 (1.42)	-0.68* (-4.10)	-0.08* (-14.77)	-0.29* (-10.43)	0.10* (12.71)
Nebraska	0.30 (1.87)	0.43 (0.59)	-0.59* (-2.35)	-0.15* (-10.40)	-0.04 (-0.98)	-0.03 (-1.77)
Nevada	0.89* (3.17)	-1.24 (-0.66)	-2.20* (-6.05)	0.12 (0.64)	-0.12 (-0.26)	-0.47* (-2.33)
New Hampshire	-0.22* (2.33)	1.10 (2.09)	-0.58* (-4.73)	-0.00 (-0.05)	0.34 (0.92)	-0.12 (-1.08)
New Jersey	0.28* (6.73)	0.00 (0.02)	-0.26* (-2.89)	-0.16* (-9.34)	-0.00 (-0.06)	0.03 (1.57)
New Mexico	0.34 (1.98)	1.19* (2.56)	-1.39* (-7.84)	-0.08 (-0.29)	-1.17 (-1.71)	-0.36 (-1.32)
New York	0.14* (15.36)	-0.27 (-2.53)	0.15* (5.90)	-0.14* (-25.98)	0.00 (0.15)	-0.01 (-1.06)
North Carolina	0.74* (7.47)	0.81 (1.61)	-0.61* (-5.49)	-0.14 (-0.86)	-1.96* (-2.58)	0.20 (1.22)
North Dakota	0.59* (4.29)	1.66* (2.90)	-0.62* (-3.70)	-0.14* (-6.33)	-0.14 (-1.19)	0.06 (1.50)
Ohio	0.07 (0.77)	0.16 (0.26)	-0.11 (-1.18)	-0.37* (-19.10)	0.64* (5.46)	-0.01 (-0.55)
Oklahoma	0.21* (3.96)	-9.14* (-11.05)	0.82* (2.94)	-0.27* (-8.89)	-5.40* (-6.32)	1.04* (3.13)
Oregon	1.70* (6.80)	--0.02 (-0.03)	-3.01* (-10.91)	0.19* (3.45)	-0.66 (-1.95)	-0.29* (-4.98)

(Table B.2 continued)

Cerebral aterio-sclerosis resident count				Syphilis resident count		
	Counter 54-61	Intervention 61	Counter 61-66	Counter 54-61	Intervention 61	Counter 61-66
Pennsylvania	0.29* (6.41)	-0.78* (-2.86)	0.02 (0.35)	-0.19* (-22.91)	0.04 (1.04)	0.01 (1.30)
Rhode Island	-0.06 (-1.75)	-0.25 (-0.33)	1.23* (5.70)	-0.17* (-7.07)	0.07 (0.47)	0.06 (2.08)
South Carolina	0.34* (6.07)	-0.46 (-1.11)	-0.60* (-3.55)	-0.26* (-14.87)	-0.10 (-0.92)	0.09* (3.55)
South Dakota	-0.46* (-8.71)	2.24* (2.40)	0.67 (2.13)	-0.10* (-5.71)	0.12 (0.97)	0.01 (0.28)
Tennessee	0.81 (1.93)	-1.59 (-1.45)	-0.88 (-2.06)	0.19 (0.95)	-0.42 (-0.87)	-0.40 (-1.98)
Texas	0.42* (15.30)	0.00 (0.01)	-0.65* (-22.81)	-0.21 (-1.26)	0.44 (0.42)	-0.05 (-0.31)
Utah	-0.41* (-3.49)	-1.71* (-4.66)	1.43* (10.25)	-0.05 (-1.42)	-0.37 (-1.75)	-0.03 (-0.44)
Vermont	-0.36* (-3.87)	1.78* (3.42)	0.14 (1.58)	-0.07* (-5.02)	-0.07 (-0.74)	-0.04 (-1.89)
Virginia	0.18* (6.40)	-0.30 (-1.39)	-0.09 (-1.19)	-0.17* (-16.55)	-0.45* (-4.89)	0.09* (2.69)
Washington	-0.21* (-10.17)	-0.04 (-0.13)	-0.03 (-0.33)	-0.17* (-14.72)	-0.21* (-2.45)	0.02 (0.60)
West Virginia	0.20 (1.87)	-0.90 (-2.18)	-0.37 (-2.06)	0.04 (0.48)	-1.17* (-4.14)	-0.11 (-1.01)
Wisconsin	0.09 (1.55)	-1.91* (-7.47)	0.14 (2.02)	-0.13* (-32.03)	-0.13* (-6.97)	0.05* (7.00)
Wyoming	0.79* (7.38)	2.80* (3.28)	-2.05* (-15.61)	-0.45 (-1.85)	2.33 (1.59)	-0.26 (-0.89)
District of Columbia	0.29* (5.18)	0.33 (0.51)	-0.61* (-3.75)	-0.29* (-16.57)	0.16 (1.98)	0.10* (4.99)

(Table B.2 continued)

Senile brain disorder resident count			
	Counter 54-61	Intervention 61	Counter 61-66
US	-0.16* (-12.78)	-0.10 (-1.39)	-0.08* (-2.31)
Alabama	-0.08* (-9.15)	3.47* (3.37)	-0.48 (-1.26)
Arizona	-0.11 (-0.99)	-0.65 (-1.52)	0.08 (0.67)
Arkansas	-0.15* (-2.87)	0.43 (1.68)	-0.33* (-3.84)
California	-0.11 (-2.24)	0.06 (0.38)	-0.59* (-8.75)
Colorado	-0.41* (-2.36)	-2.48* (-2.41)	-0.55* (-3.07)
Connecticut	0.05 (0.30)	-1.11 (-1.39)	0.08 (0.49)
Delaware	0.02 (0.37)	-1.42* (-3.51)	-0.32* (-4.65)
Florida	0.22* (4.06)	-0.55* (-2.73)	-0.25* (-3.64)
Idaho	-0.54* (-3.19)	0.26 (0.31)	0.21 (1.06)
Illinois	-0.03 (-0.73)	-0.06 (-0.45)	-0.48* (-13.28)
Indiana	-0.52* (-14.08)	-0.17 (-1.89)	0.34* (9.06)
Iowa	-0.09 (-0.49)	-1.43 (-1.62)	0.01 (0.06)
Kansas	-0.02 (-0.23)	-0.77 (-1.47)	-0.16 (-1.43)
Kentucky	-0.44* (-21.71)	-0.02 (-0.23)	0.21* (4.54)
Louisiana	-0.11* (-4.35)	-0.61* (-4.24)	-0.08* (-3.30)
Maine	-0.36* (-2.75)	0.59 (0.73)	0.48* (3.01)

(Table B.2 continued)

Senile brain disorder resident count			
	Counter 54-61	Intervention 61	Counter 61-66
Maryland	-0.19 (-1.06)	0.45 (0.73)	-0.46* (-2.58)
Michigan	-0.28* (-48.95)	-0.24 (-2.08)	0.14* (3.39)
Minnesota	-0.31* (-8.02)	-0.92* (-3.27)	0.09 (1.41)
Mississippi	-0.24 (-2.21)	0.02 (0.04)	0.25 (2.05)
Missouri	-0.47* (-14.35)	0.21 (1.72)	0.35* (8.55)
Montana	-0.52* (-4.85)	-0.25 (-0.84)	0.57* (4.67)
Nebraska	-0.19 (-2.18)	1.16* (3.04)	0.16 (1.73)
Nevada	-0.49* (-5.22)	0.32 (0.92)	-1.09* (-10.03)
New Hampshire	-0.00 (-0.01)	1.05* (3.01)	-0.83* (-12.88)
New Jersey	-0.20* (-4.49)	0.19 (0.87)	-0.18* (-2.40)
New Mexico	-0.01 (-0.20)	-0.73* (-2.74)	-0.10 (-1.41)
New York	-0.32* (-4.55)	0.25 (1.44)	0.13 (1.59)
North Carolina	0.12 (1.65)	1.10 (1.89)	-0.41* (-4.21)
North Dakota	0.35 (2.11)	-1.69 (-1.42)	-0.87* (-3.66)
Ohio	0.31* (-9.86)	0.47 (1.54)	0.07 (1.19)
Oklahoma	-0.68* (-21.51)	0.66 (2.75)	0.61* (9.79)
Oregon	0.62* (3.89)	-3.09* (-3.38)	-0.44 (-1.98)

(Table B.2 continued)

Senile brain disorder resident count			
	Counter 54-61	Intervention 61	Counter 61-66
Pennsylvania	-0.29* (-11.18)	0.26 (2.25)	0.16* (6.09)
Rhode Island	0.56* (10.44)	-1.17* (-3.14)	-0.67* (-8.12)
South Carolina	-0.16* (-7.59)	0.47 (2.12)	0.07 (1.08)
South Dakota	0.62* (2.32)	0.58 (0.50)	-1.20* (-2.56)
Tennessee	0.11 (0.58)	-0.34 (-0.72)	-0.12 (-0.59)
Texas	-0.08 (-1.70)	0.38 (1.98)	-0.60* (-8.15)
Utah	0.01 (0.49)	-0.04 (-0.22)	-0.53* (-8.94)
Vermont	-0.02 (-0.46)	1.88* (6.15)	-0.51* (-4.69)
Virginia	-0.17* (-6.75)	-0.31 (-1.82)	0.23* (4.21)
Washington	0.30* (-4.43)	-0.06 (-0.19)	0.66* (7.52)
West Virginia	-0.24* (-4.08)	-1.38* (-7.79)	0.13 (1.93)
Wisconsin	-0.29* (-3.40)	-1.62* (-5.11)	0.41* (3.87)
Wyoming	-0.85* (-7.75)	-1.62* (-3.94)	0.29 (1.31)
District of Columbia	-0.19* (-8.69)	0.03 (0.27)	0.28* (8.44)

Note. These numbers are the unstandardized regression coefficients . An asterisk indicates significance at the .05 level. The numbers in parentheses are the associated T statistics. Counter54-61 indicates the slope for the period 1954 to 1961. Counter61-66 indicates the change in slope between 1954 to 1961 and 1961 to 1966. Intervention61 indicate the immediate impact of the year 1961 on the intercept.

Appendix C

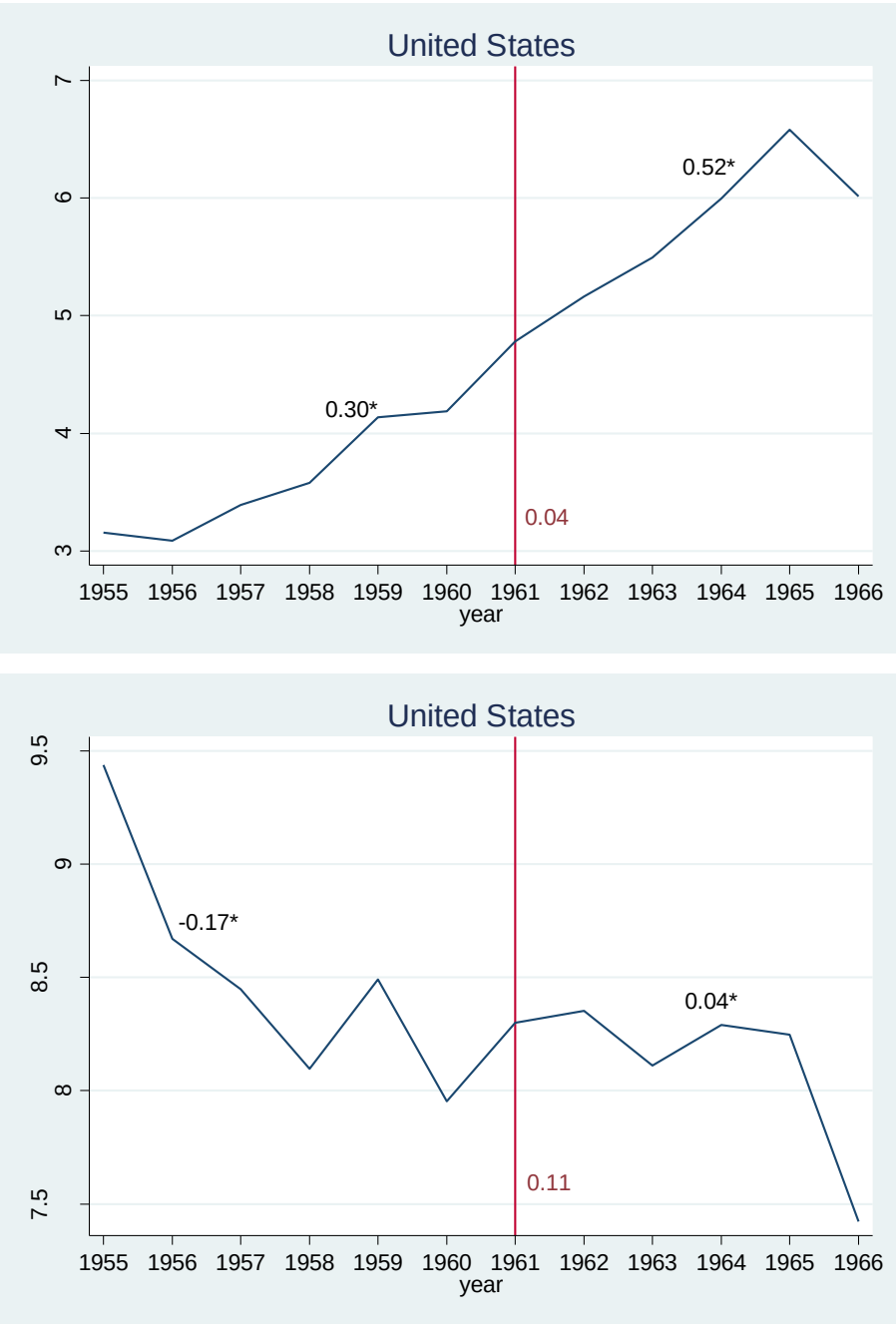
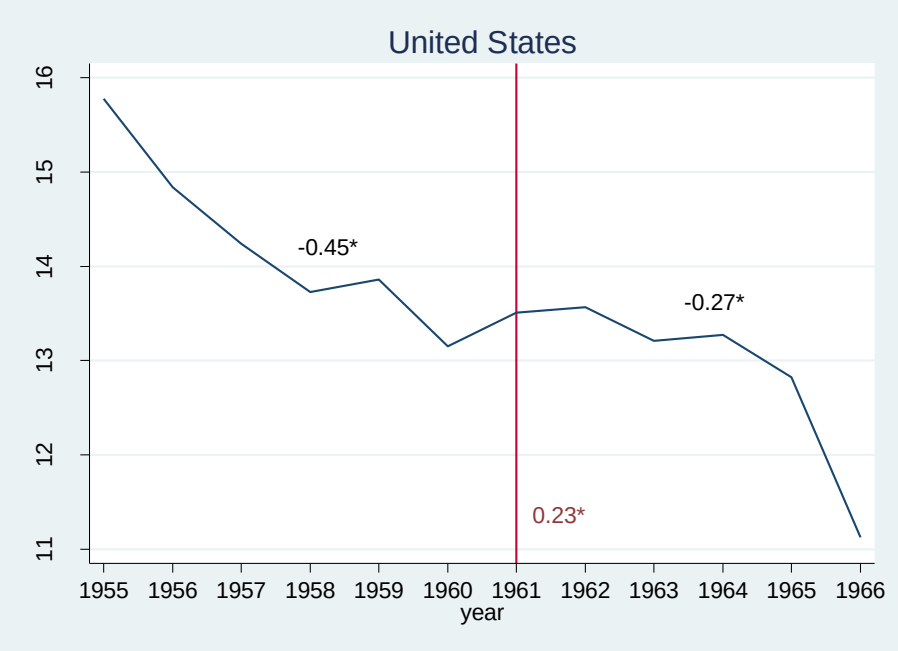
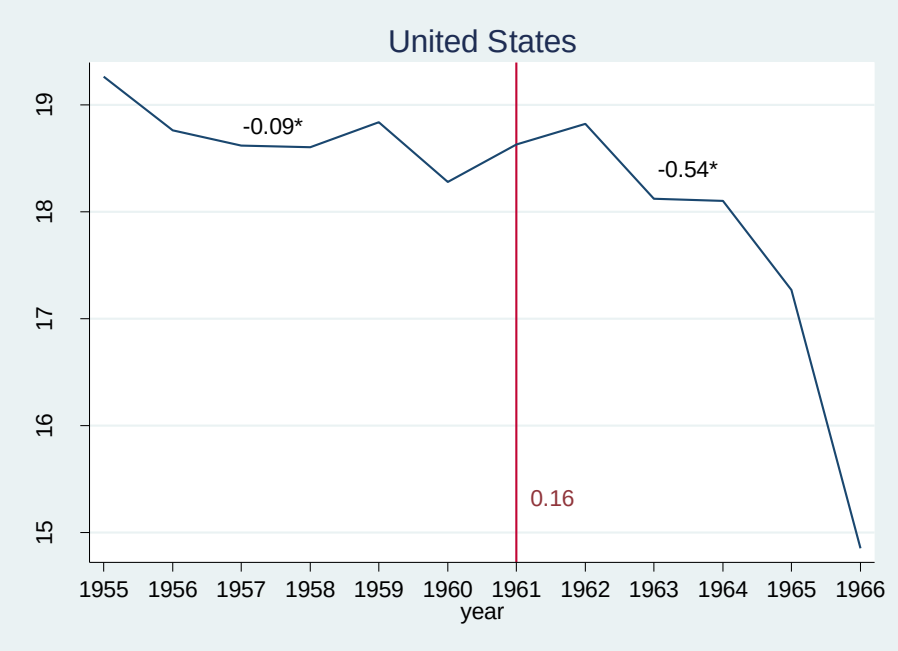


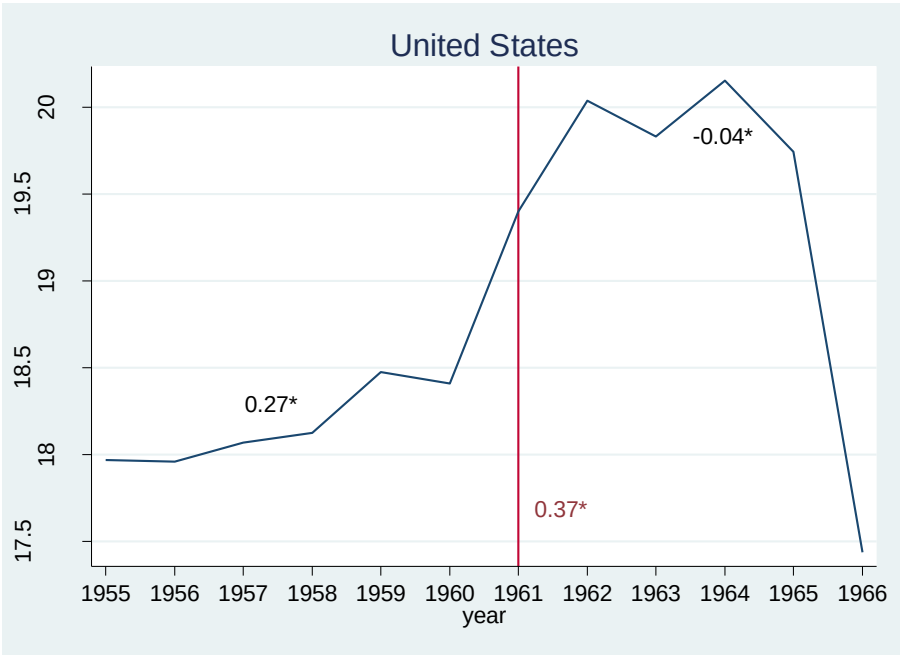
Figure C.1. United States resident count by age group between 1955 and 1966.

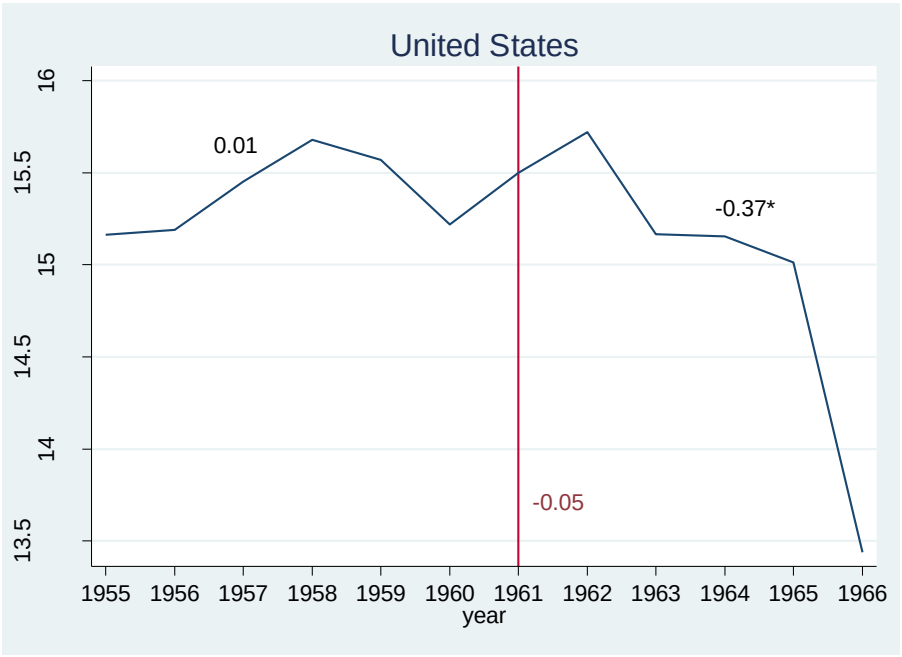
(Figure C.1 continued)





(Figure C.1 continued)





(Figure C.1 continued)

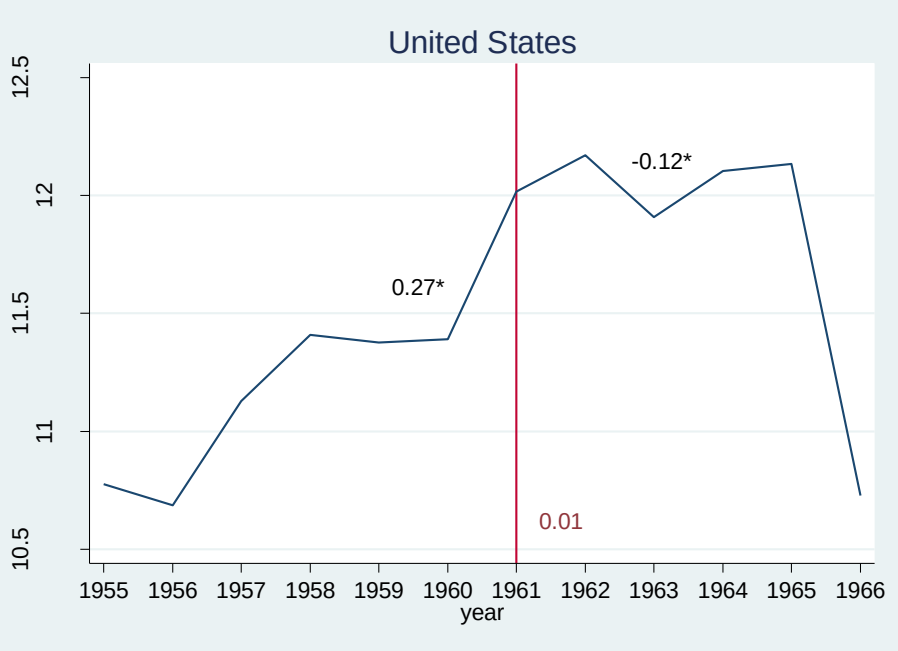


Table C.2. Resident count by age for the United States from 1955 to 1961.

Age	Resident count		
	Counter 55-61	Intervention 61	Counter 61-66
<24	0.30* (16.16)	0.04 (0.42)	0.22* (5.67)
25-34	-0.17* (-9.05)	0.11 (1.11)	0.21* (5.23)
35-44	-0.45* (-20.27)	0.23* (2.02)	0.18* (4.05)
45-54	-0.09* (-5.22)	0.16 (1.53)	-0.45* (-11.76)
55-64	0.27* (10.69)	0.37* (2.79)	-0.31* (-6.29)
65-74	0.01 (0.26)	-0.05 (-0.39)	-0.36* (-6.91)
>75	0.27* (9.70)	0.01 (0.13)	-0.39* (-7.21)
<55	-0.37* (-6.93)	1.01* (3.28)	0.09 (0.78)
>55	0.44* (6.84)	0.14 (0.46)	-0.91* (-7.15)
<65	-0.19* (-3.16)	1.68* (4.73)	-0.30* (-2.41)
>65	0.26* (6.16)	-0.04 (-0.17)	-0.71* (-8.29)

Note. These numbers are the unstandardized regression coefficients . An asterisk indicates significance at the .05 level. The numbers in parentheses are the associated T statistics. Counter54-61 indicates the slope for the period 1954 to 1961. Counter61-66 indicates the change in slope between 1954 to 1961 and 1961 to 1966. Intervention61 indicate the immediate impact of the year 1961 on the intercept.

Table C.3. First admissions by age for the United States from 1955 to 1961.

	First admissions		
Age	Counter 55-61	Intervention 61	Counter 61-66
<24	0.37* (13.12)	-0.53* (-2.85)	0.16* (2.89)
25-34	0.22* (8.56)	-0.59* (-3.48)	0.04 (0.85)
35-44	0.23* (10.27)	-0.67* (-4.53)	0.04 (0.94)
45-54	0.18* (7.92)	-0.63* (-4.16)	0.04 (0.84)
55-64	0.11* (4.92)	-0.59* (-3.91)	0.06 (1.34)
65-74	0.07* (2.40)	-0.61* (-2.94)	-0.03 (-0.49)
>75	0.13* (3.18)	-0.60 (-2.19)	-0.08 (-0.97)

Note. These numbers are the unstandardized regression coefficients . An asterisk indicates significance at the .05 level. The numbers in parentheses are the associated T statistics. Counter54-61 indicates the slope for the period 1954 to 1961. Counter61-66 indicates the change in slope between 1954 to 1961 and 1961 to 1966. Intervention61 indicate the immediate impact of the year 1961 on the intercept.

Appendix D

Table D.1. United States resident count by diagnostic category and age from 1955 to 1961.

	Under 24			25 to 34		
	Counter 55-61	Intervention 61	Counter 61-66	Counter 55-61	Intervention 61	Counter 61-66
Senile brain disorder	0.000 (-0.21)	0.000 (1.13)	-0.000 (-1.47)	0.000 (1.07)	0.000 (1.26)	-0.001* (-3.00)
Schizophrenia	0.320* (12.35)	0.336 (1.55)	-0.227* (-2.51)	0.091 (1.83)	0.077 (0.38)	-0.259* (-3.49)
Personality disorder	0.147* (6.29)	0.214 (1.29)	-0.099 (-2.04)	0.076* (5.79)	0.071 (1.14)	-0.064* (-3.40)
Alcoholic	0.000 (0.73)	-0.005 (-1.79)	0.004* (3.25)	0.002* (2.92)	-0.021 (-2.08)	0.008 (2.11)
Mental deficiency	0.052* (5.10)	0.007 (0.10)	-0.003 (-0.10)	0.008 (1.72)	0.047 (1.12)	-0.060* (-4.10)
Manic depressive	-0.001* (-3.57)	-0.010 (-0.99)	0.009* (3.77)	-0.012* (-5.88)	0.015 (2.18)	0.011* (3.79)
Psychoneuroses	0.020* (11.97)	0.031 (1.12)	-0.001 (-0.11)	0.011* (9.18)	0.012 (0.93)	-0.001 (-0.46)
Cerebral arterio-sclerosis	0.001 (1.86)	0.000 (0.22)	-0.001* (-2.92)	-0.000* (-3.01)	0.000 (0.34)	-0.001* (-2.63)
Meningoencephalitic syphilis	-0.004* (-13.65)	-0.008* (-2.39)	0.006* (8.16)	-0.008* (-11.68)	-0.012* (-2.78)	0.009* (5.34)

(Table D.1. continued)

	35 to 44			45 to 54		
	Counter 55-61	Intervention 61	Counter 61-66	Counter 55-61	Intervention 61	Counter 61-66
Senile brain disorder	-0.001* (-4.84)	0.002* (2.89)	-0.000 (-2.32)	-0.000 (-0.17)	-0.003 (-1.52)	-0.000 (-0.13)
Schizophrenia	0.070 (0.84)	0.446 (1.118)	-0.518* (-3.51)	0.797 (2.03)	0.895 (0.95)	-1.431* (-3.39)
Personality disorder	0.104* (6.01)	0.031 (0.47)	-0.088* (-4.52)	0.103* (5.97)	0.027 (0.42)	-0.099* (-5.09)
Alcoholic	0.016* (2.32)	-0.058 (-1.67)	0.005 (0.44)	0.029 (2.22)	-0.048 (-1.13)	-0.014 (-0.99)
Mental deficiency	0.049* (7.83)	0.150 (1.73)	-0.135* (-4.63)	0.058* (11.69)	0.166 (1.89)	-0.128* (-4.09)
Manic depressive	-0.042* (-7.61)	0.033 (1.72)	0.027* (4.98)	-0.035* (-11.08)	0.046* (2.76)	-0.028* (-5.10)
Psychoneuroses	0.014* (15.70)	0.033 (1.69)	-0.010 (-1.92)	0.016* (14.72)	0.019 (1.58)	-0.013* (-2.98)
Cerebral arterio-sclerosis	-0.003 (-1.31)	0.007 (1.38)	-0.003 (-1.03)	-0.004* (-4.64)	-0.014 (-1.95)	0.003 (1.71)
Meningoencephalitic syphilis	-0.035* (-14.02)	-0.029* (-2.57)	0.026* (5.79)	-0.070* (-8.19)	-0.101 (-2.30)	-0.004 (-0.43)

(Table D.1. continued)

	55 to 64			65 to 74		
	Counter 55-61	Intervention 61	Counter 61-66	Counter 55-61	Intervention 61	Counter 61-66
Senile brain disorder	-0.002* (-4.31)	-0.004 (-0.65)	-0.002 (-0.97)	-0.022 (-1.32)	-0.046 (-0.68)	-0.044* (-2.63)
Schizophrenia	0.805* (2.51)	1.019 (1.30)	-1.058* (-2.98)	0.459* (3.21)	0.268 (0.72)	-0.644* (-4.04)
Personality disorder	0.069* (6.09)	0.040 (0.90)	-0.068* (-4.72)	0.030* (5.91)	-0.003 (-0.17)	-0.033* (-5.25)
Alcoholic	0.110* (3.22)	-0.123 (-1.17)	-0.083* (-2.45)	0.064* (2.44)	-0.088 (-1.16)	-0.050 (-1.91)
Mental deficiency	0.056* (16.60)	0.171 (2.12)	-0.111* (-4.31)	0.019* (4.43)	0.067* (2.47)	-0.049* (-4.39)
Manic depressive	-0.016 (-2.16)	0.078 (1.74)	-0.055* (-3.89)	-0.017* (-2.48)	0.042 (1.30)	-0.042* (-3.87)
Psychoneuroses	0.016* (18.42)	0.028 (1.94)	-0.011 (-2.20)	0.010* (13.11)	0.004 (0.98)	-0.007* (-5.75)
Cerebral arteriosclerosis	0.023 (2.21)	-0..034 (-1.01)	-0.033* (-3.15)	0.122* (2.59)	-0.200 (-1.16)	-0.138* (-3.00)
Meningoencephalitic syphilis	0.039* (3.75)	0.023 (0.72)	-0.111* (-9.86)	0.011 (1.52)	-0.060 (-1.85)	-0.013 (-1.97)

(Table D.1. continued)

	Over 75		
	Counter 55-61	Intervention 61	Counter 61-66
Senile brain disorder	0.026 (0.54)	-0.206 (-1.22)	-0.150* (-3.12)
Schizophrenia	0.192* (10.23)	0.142 (1.50)	-0.223* (-5.35)
Personality disorder	0.010* (5.94)	0.004 (0.73)	-0.013* (-6.98)
Alcoholic	0.023* (3.78)	-0.022 (-1.28)	-0.018* (-3.16)
Mental deficiency	0.010* (7.58)	0.024* (3.25)	-0.020* (-6.24)
Manic depressive	0.012* (4.11)	0.039 (1.48)	-0.039* (-4.23)
Psychoneuroses	0.004* (10.85)	0.003 (0.90)	-0.003 (-2.05)
Cerebral arterio-sclerosis	0.259* (6.47)	-0.151 (-0.70)	-0.224* (-3.02)
Meningoencephalitic syphilis	0.008* (6.75)	-0.006 (-0.98)	-0.011* (-8.64)

Note. These numbers are the unstandardized regression coefficients . An asterisk indicates significance at the .05 level. The numbers in parentheses are the associated T statistics. Counter54-61 indicates the slope for the period 1954 to 1961. Counter61-66 indicates the change in slope between 1954 to 1961 and 1961 to 1966. Intervention61 indicate the immediate impact of the year 1961 on the intercept.

Appendix E

Table E.1. Resident count, discharges, first admissions and readmissions for high drug, middle drug and low drug states from 1926 to 1966.

	Counter 54-61	Intervention 61	Counter 61-66
High drug			
Resident count	-0.11* (-8.83)	-0.02 (-0.63)	0.04* (2.31)
Discharges	0.07* (3.75)	0.02 (0.45)	0.02 (0.70)
First admissions	-0.00 (-0.03)	-0.03 (-0.98)	0.01 (0.95)
Readmissions	0.02* (3.05)	-0.08* (-3.27)	-0.02 (-1.59)
Middle drug			
Resident count	-0.08* (-4.17)	-0.10 (-1.78)	-0.04 (-1.34)
Discharges	0.03* (4.41)	0.02 (1.16)	-0.01 (-1.31)
First admissions	0.02* (2.17)	-0.08* (-2.71)	-0.02 (-1.40)
Readmissions	0.04* (6.77)	-0.05* (-2.69)	-0.02 (-1.71)
Low drug			
Resident count	-0.09* (-6.77)	0.06 (1.88)	-0.05* (-2.86)
Discharges	0.03* (4.60)	-0.02 (-1.14)	0.02 (1.94)
First admissions	0.01 (1.20)	-0.01 (-0.32)	-0.01 (-0.62)
Readmissions	0.04* (8.44)	-0.13* (8.44)	-0.02* (-2.04)

Note. These numbers are the unstandardized regression coefficients . An asterisk indicates significance at the .05 level. The numbers in parentheses are the associated T statistics. Counter54-61 indicates the slope for the period 1954 to 1961. Counter61-66 indicates the change in slope between 1954 to 1961 and 1961 to 1966. Intervention61 indicate the immediate impact of the year 1961 on the intercept.

Table E.2. Resident count and first admissions by diagnostic category for high drug, middle drug and low drug states from 1954 to 1966.

Diagnosis	High drug resident count			High drug first admissions		
	Counter 54-61	Intervention 61	Counter 61-66	Counter 54-61	Intervention 61	Counter 61-66
Alcoholic	0.09* (3.92)	-0.19 (1.50)	0.02 (0.35)	0.01 (0.36)	-0.44 (-1.79)	0.32* (3.74)
Manic depressive	-0.35* (-5.35)	-0.22 (-0.58)	-0.12 (-0.83)	-0.07* (-3.69)	-0.03 (-0.27)	0.08 (1.83)
Mental deficiency	0.06 (1.06)	0.63 (1.91)	-0.31* (-2.33)	0.04 (1.75)	-0.20 (-1.21)	0.06 (1.04)
Personality disorder	0.30* (3.82)	-0.16 (-0.86)	0.29* (2.51)	0.97* (4.93)	-0.25 (-0.48)	0.66* (2.53)
Psychoneuroses	0.13* (4.87)	-0.15 (-1.05)	0.02 (0.41)	0.29* (4.91)	-0.32 (-1.34)	0.13 (1.09)
Schizophrenia	0.66 (0.46)	4.52 (0.50)	-2.45 (-1.57)	0.29* (3.30)	-0.06 (-0.16)	-0.38* (-2.07)
Cerebral arterio-sclerosis	0.18* (4.33)	-0.14 (-0.42)	-0.07 (-0.59)	0.13* (2.28)	-0.25 (-0.54)	-0.16 (-0.94)
Meningoencephalitic syphilis	-0.13* (-5.36)	-0.36* (-2.17)	0.02 (0.38)	-0.01* (-2.72)	0.01 (0.33)	-0.01 (-0.55)
Senile brain disorder	-0.13* (-2.22)	-0.27 (-0.99)	-0.03 (-0.20)	-0.13* (-3.18)	0.16 (0.54)	0.14 (1.18)

(Table E.2. continued)

Diagnosis	Middle drug resident count			Middle drug first admissions		
	Counter 54-61	Intervention 61	Counter 61-66	Counter 54-61	Intervention 61	Counter 61-66
Alcoholic	0.06* (3.82)	-0.17* (-2.13)	0.07* (2.18)	-0.01 (-0.67)	-0.40* (-2.87)	0.20* (4.39)
Manic depressive	-0.26* (-10.21)	0.05 (0.42)	0.07 (1.23)	-0.03* (-4.10)	-0.03 (-0.59)	0.01 (0.47)
Mental deficiency	0.03 (0.45)	-0.21 (-0.66)	-0.14 (-0.94)	0.04* (3.61)	-0.16* (-2.28)	-0.00 (-0.12)
Personality disorder	0.28 (1.68)	-0.32 (-0.33)	-0.22 (-0.60)	0.34* (12.58)	-1.12* (-5.39)	0.34* (5.68)
Psychoneuroses	0.10* (7.56)	0.08 (1.13)	-0.08* (-2.62)	0.25* (9.68)	-0.11 (-0.75)	0.02 (0.36)
Schizophrenia	0.29 (1.32)	1.68 (1.57)	-0.18 (-0.38)	0.12* (3.78)	-0.23 (-0.98)	-0.11 (-1.45)
Cerebral arterio-sclerosis	0.22* (6.10)	0.14 (0.54)	-0.16 (-1.63)	0.16* (7.91)	0.12 (0.76)	-0.38* (-6.32)
Meningoencephalitic syphilis	-0.23* (-9.93)	-0.12* (-2.60)	0.02 (0.76)	-0.02* (-5.04)	-0.02 (-0.69)	0.00 (0.59)
Senile brain disorder	-0.19* (-4.65)	-0.50* (-2.26)	0.08 (0.71)	-0.09* (-4.62)	0.05 (0.38)	0.04 (0.75)

(Table E.2. continued)

Diagnosis	Low drug resident count			Low drug first admissions		
	Counter 54-61	Intervention 61	Counter 61-66	Counter 54-61	Intervention 61	Counter 61-66
Alcoholic	0.05* (3.89)	-0.12 (-1.59)	0.02 (0.89)	0.01 (0.44)	-0.26* (-2.36)	0.16* (4.26)
Manic depressive	-0.20* (-5.59)	0.32 (1.38)	0.02 (0.28)	-0.02* (-2.84)	0.06 (1.57)	0.00 (0.01)
Mental deficiency	0.10* (2.81)	0.04 (0.22)	0.03 (0.42)	0.01 (1.47)	-0.09 (-1.74)	0.02 (1.08)
Personality disorder	0.30 (1.39)	-1.01 (-1.04)	0.10 (0.23)	0.34* (4.91)	-0.58 (-1.76)	0.64* (4.27)
Psychoneuroses	0.09* (4.12)	0.01 (0.11)	-0.02 (-0.51)	0.21* (3.36)	-0.28 (-1.20)	0.16 (1.33)
Schizophrenia	0.07 (0.50)	1.27 (1.07)	-1.10* (-2.67)	0.08 (1.47)	0.41 (1.21)	-0.18 (-1.38)
Cerebral arterio-sclerosis	-0.07 (-1.27)	-0.12 (-0.55)	-0.26* (-2.23)	0.08* (2.04)	-0.16 (-0.78)	-0.14 (-1.44)
Meningoencephalitic syphilis	-0.24* (-19.96)	-0.04 (-0.58)	0.00 (0.12)	-0.02* (-7.85)	-0.01 (-0.47)	0.01 (1.73)
Senile brain disorder	-0.24* (-5.73)	-0.05 (-0.27)	-0.04 (-0.39)	-0.13* (-6.77)	-0.01 (-0.04)	0.05 (1.00)

Note. These numbers are the unstandardized regression coefficients . An asterisk indicates significance at the .05 level. The numbers in parentheses are the associated T statistics. Counter54-61 indicates the slope for the period 1954 to 1961. Counter61-66 indicates the change in slope between 1954 to 1961 and 1961 to 1966. Intervention61 indicate the immediate impact of the year 1961 on the intercept.

Table E.3. Resident count by age group for high drug, middle drug and low drug states from 1954 to 1966.

Age	Resident count for high drug states			Resident count for low drug states		
	Counter 55-61	Intervention 61	Counter 61-66	Counter 55-61	Intervention 61	Counter 61-66
<25	0.50* (3.69)	0.36 (1.04)	0.16 (0.81)	0.45* (4.44)	-0.09 (-0.19)	0.83* (4.24)
25-34	0.04 (0.35)	1.39* (2.12)	-0.31 (-1.24)	-0.14 (-0.56)	0.17 (0.16)	1.21* (2.59)
35-44	-0.31* (-2.27)	0.74 (1.00)	-0.06 (-0.22)	-0.40 (-1.05)	2.17 (1.43)	1.05 (1.64)
45-54	0.04 (0.19)	0.48 (0.57)	-0.77* (-1.98)	-0.01 (-0.02)	1.56 (0.76)	0.17 (0.19)
55-64	0.38* (2.22)	0.56 (0.67)	-0.73* (-2.10)	0.27 (0.55)	1.66 (0.99)	0.09 (0.11)
65-74	0.06 (0.48)	0.98 (1.29)	-0.94* (-3.46)	0.05 (0.17)	1.21 (1.11)	-0.36 (-0.71)
>75	0.34* (1.94)	0.05 (0.06)	-0.41 (-1.00)	0.48 (1.91)	0.25 (0.31)	-0.30 (-0.69)

(Table E.3. continued)

Age	Resident count for middle drug states		
	Counter 55-61	Intervention 61	Counter 61-66
<25	0.76 (1.09)	1.84 (0.58)	0.29 (0.21)
25-34	0.38 (0.48)	2.19 (0.62)	0.29 (0.18)
35-44	0.54 (0.40)	3.38 (0.56)	0.51 (0.19)
45-54	1.35 (0.65)	3.96 (0.43)	0.12 (0.03)
55-64	1.70 (0.73)	5.14 (0.51)	0.58 (0.13)
65-74	1.06 (0.55)	3.04 (0.37)	0.17 (0.04)
>75	1.34 (0.71)	2.79 (0.35)	-0.21 (-0.06)

Vita

Joni Lee Pow graduated from the University of the West Indies in 2009 with a Bachelor of Science in Psychology. She graduated with First Class Honors and as Valedictorian of the Faculty of Social Sciences. She is a recipient of a Further Additional National Scholarship in 2006 and a Postgraduate Scholarship in 2009, both from the Government of Trinidad and Tobago. She attended graduate school at Louisiana State University where she was a recipient of the Huel D. Perkins Fellowship and received her Master's degree in Biological Psychology in 2012. She is a candidate to receive her Ph.D. in May 2015 in Biological Psychology at Louisiana State University.