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THE CONNECTION BETWEEN ALCOHOL AND HOMICIDE:
A REPLICATION AND EXTENSION

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the
Graduate School of The Ohio State University

By

Tanya Jane Poteet, M.A., J.D.

*****

The Ohio State University
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This dissertation answers one question. Does alcohol have a significant and independent effect on homicide, net the effects of other traditionally important explanatory variables, specifically economic deprivation, race composition, and age structure of the population? To answer this question, I assembled and examined data at two levels of analysis: at the state-level using pooled cross-sectional analysis covering 1970, 1980, and 1990; and at the national-level using longitudinal time series analysis covering 1950 to 1995 and 1960 to 1995.

The results of these analyses clearly show that alcohol, and specifically beer, is an important explanatory factor that has been overlooked in most previous studies of homicide. These results replicate and extend the findings of Robert Nash Parker in Alcohol and Homicide (1995) by demonstrating that alcohol is significant in explaining homicides over time. Specifically, in the state-level analysis, beer, liquor, and ethanol were significant and positively affected homicide rates, but wine was not significant. In addition, alcohol, in the form of wine, liquor, and ethanol, exhibited interaction effects with poverty. At the national-level, only beer was significant and positive, liquor was significant but negatively related to changes in homicide rates (in
the 1950 to 1995 analysis only), and neither wine nor ethanol were significant.

Finally, the results confirm previous research which found economic deprivation, race composition, and age structure of the population to be important causal factors of homicide.

This research points to three important implications for scholarly understandings of homicide. First, these findings indicate Parker was right. Alcohol matters in the context of homicide. Second, multivariate analyses of homicide that do not include a measure of alcohol are almost certainly misspecified. Third, it is important to fully operationalize alcohol to better isolate and understand how it effects homicide.

Future research on the connection between alcohol and homicide should be conducted at different levels of analysis, such as metropolitan statistical areas, cities, and census tracks, to further confirm and specify the connection between alcohol and homicide. Also, this study indicates the need to examine the social context of beer consumption to see why it is uniquely important in explaining homicide.
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CHAPTER 1

INTRODUCTION

Statement of the Problem

Does alcohol play a significant causal role in homicide? Are the connections in the alcohol studies and qualitative criminology literatures between alcohol and violence visible using multivariate quantitative data? Are the recent quantitative findings reported by Robert Nash Parker in Alcohol and Homicide generalizable?

This dissertation answers these questions. In this chapter, I review previous research in the alcohol studies, qualitative criminology and quantitative criminology literatures. Each literature provides insight into the connection between alcohol and homicide, yet problems exist in each literature that need to be addressed by additional research. Also, I examine Parker’s book, its contributions and limitations, because this dissertation replicates and extends his analysis by examining alcohol and homicide over time in a pooled cross-sectional analysis (covering 1970, 1980, and 1990) and two longitudinal analyses (covering 1950-1995 and 1960-1995), thereby including more recent time periods than used by Parker and adding a stronger measure of alcohol consumption.
Alcohol and Homicide

Descriptive Statistics

Alcohol has long been recognized as having a connection to violence generally and homicide in particular. A Justice Department study of inmates in jails and prisons showed that over half of the offenders incarcerated for violent crimes used alcohol or other drugs immediately before their crimes (U.S. Dept. of Justice 1989). Also, a majority of all persons arrested self-reported using alcohol in the seventy-two hours prior to arrest (U.S. Dept. of Justice 1988). Finally, in a study released in 1998, the Justice Department found that 40% of violent felonies (murders, rapes, sex assaults, robberies, and assaults) were committed by someone who had been drinking, 75% of spousal abuse crimes involved alcohol, and 40% of convicted murders self-reported that they had been drinking at the time of their offense (U.S. Dept. of Justice 1998).

These descriptive statistics suggest that many criminals use alcohol near or at the time of their crimes. However, a problem with these statistics is that they fail to explore whether there is a causal connection between alcohol and homicide, especially net of other important explanatory variables. This dissertation remedies that problem by examining alcohol and homicide while controlling for other important causal factors.
Alcohol Studies Literature

The field of alcohol studies also suggests a causal connection between alcohol and homicide. In this field, much research has been done on the connection between alcohol and aggression (Cherek, Steinberg, and Manno 1985; Leonard, et al. 1985; Pihl, Peterson, and Lau 1993), between alcohol and fatal injuries, including traffic accidents, suicide, and homicide (Cherpitel 1996; Lester 1980, 1993, 1995; Welte and Abel 1989), and between alcohol and violence in general (Collins 1981; Roizen 1981).

Some of the alcohol studies research has been experimental in design, where a few people are subjected to experimental conditions and the effect of alcohol is analyzed (see review in Bushman and Cooper 1990). In these studies, the primary issue is whether people choose more aggressive response options after ingesting alcohol than without alcohol (Cherek, Steinberg and Manno 1985; Taylor and Chermack 1993). Other studies have consisted of secondary data analysis, such as the analysis of alcohol in victims of fatal injuries (Cherpitel 1996; Welte and Abel 1989). Studies in this field suggest a connection between alcohol and violence by consistently reporting that alcohol is linked with aggressive behavior (Brain 1986; Collins 1981; Pemanen 1976, 1981).

In addition to finding empirical evidence of a link between alcohol and aggression, there has been some attempt in this literature to explain how alcohol is connected to aggression and violence. For example, some studies indicate that alcohol may facilitate the expression of aggressive behavior by inhibiting the effect that fear
normally has on the expression of dangerous behavior. (Gray 1982, 1987; Pihl, Peterson and Lau 1993). A "normal" fear response in an aggressive interaction would be flight or choosing a safe, non-confrontational behavior. Some alcohol studies suggest that when alcohol has been consumed, this response may be inhibited and more dangerous behavioral responses may be chosen by the people engaged in the interaction (see Pihl, Peterson and Lau 1993:132 for a review of these studies).

However, there are problems here as well. These studies fail to include structural and control variables that criminologists have found to be significant in explaining violence. For example, alcohol studies usually do not include measures of poverty, race, population size, population density, or age in the analysis. All of these variables have been found in the criminology literature to be significant predictors of violence (Land, McCall and Cohen 1990). Thus, a full understanding of how alcohol fits into the causal framework of homicide and violence has not been explored in the alcohol studies. This dissertation will address this problem by offering a quantitative analysis of the causal effect of alcohol on homicide rates which includes the structural and control variables that have been found to be significant predictors of homicide in the criminology literature.
Sociology Literature

Qualitative Criminological Research

Qualitative criminological studies provide rich descriptive detail of homicides and the potential role of alcohol in homicidal episodes. In *Murder in Miami* (Wilbanks 1984), for instance, the author reproduces case narratives for every 1980 homicide in Dade County, Florida. These narratives are based on interviews with homicide detectives, and review of the files of the medical examiner and the police. Several of these cases illustrate the potential role of alcohol in homicide. For example, in Case number 41 (1984:245), two men drinking together at a bar became involved in an argument over a dice game. The men went outside of the bar and continued arguing. The victim pushed the offender twice. After the second push, the offender stepped back, pulled out a gun, and shot the victim twice. The blood alcohol level of the victim was .23 at the time of his death. Thus, this case gives us a description of and insight to the possible influence of alcohol on the violent behavioral choices of people in circumstances that resulted in death but could have ended differently if other choices had been made.

Another example of qualitative analysis comes from *Murder in Space City* by Henry Lundsgaarde (1977). In this book, the author examined all 300 homicides in Houston during 1969. Several of these homicides also present descriptions of the potential role of alcohol in homicidal episodes. One example is Case number 125 (1977:56), which involved the homicide-suicide of a husband and wife. The couple
was found by their daughter. The wife was shot in the back of the head and the husband then committed suicide by shooting himself in the head. The police noted that a large garbage can filled with empty beer cans was found in the apartment. The daughter reported to the police that the man had just been released from a hospital for treatment of alcoholism, and both parents were reported to be alcoholics. The best explanation by the police was that the act was committed in an alcohol stupor. No alcohol was found in the wife's blood, and no autopsy was performed on the husband.

However, alcohol is not a part of every homicidal episode. Several examples of homicides that did not involve alcohol can be found in both Wilbanks' and Lundsgaarde's works. One example from Wilbanks' study can be found in Case number 361 (1984:285). In this case, the victim and the offender were acquaintances who became involved in a dispute that developed into a fistfight. The victim pulled out a gun but the offender took the gun away and pistol whipped the victim with the gun. Other people who were present broke up the fight, but the offender picked up the gun again and shot the victim. Wilbanks does not report any evidence of alcohol being a factor in this homicide.

Another example of a homicide without the involvement of alcohol can be found in Lundsgaarde's study in Case number 148 (1977:109). In this case, the victim and his wife went to visit their nephew. When they arrived at their nephew's house, the victim parked his car in such a manner that it blocked the driveway of his nephew's neighbor. The neighbor asked the man to move his car so that he could get
his truck out of the driveway. The man obliged, but after the truck was moved, he again parked his car so as to block the driveway. This action led to an argument and the neighbor went into his house, got a shotgun, and returned to the driveway threatening to shoot the man if he did not move his car. The man refused, and the neighbor shot and killed him with one shot. In this case as well, there was no evidence of drinking by either man prior to the incident.

An important problem with this literature, then, is that although the descriptions very clearly indicate that some homicides involve alcohol, others just as clearly show no alcohol involvement. Thus, the unresolved issue is whether the involvement of alcohol in homicides is significant. This dissertation will address this problem by presenting an empirical causal analysis of the effect of alcohol on homicide rates.

Quantitative Criminological Research
Wolfgang’s Research

The initial quantitative criminological study in the area of alcohol and homicide is Marvin Wolfgang’s research (1958) which examined all criminal homicides in Philadelphia from 1948-1952. In this study, Wolfgang found that in 64% of all homicides either the offender, the victim, or both had been drinking alcohol. Wolfgang also found that victims who had precipitated their own deaths by initiating
ultimately deadly confrontations, through physical force, were more likely to have been drinking than victims who did not precipitate their own homicide (for illustrations of victim precipitation, see Wolfgang 1958:253).

A significant problem with Wolfgang's study of Philadelphia homicides, although still frequently cited, is that the analysis is dated and limited to a single city. This raises questions about whether Wolfgang's findings are generalizable to other places and other time periods. This dissertation will address this problem by presenting a quantitative analysis of the role of alcohol on homicide which includes other locations and the most recent years available for analysis, 1990 in the state-level analysis and 1995 in the national-level analysis.

Contemporary Studies

Recent years have seen some development on establishing the causal connection between alcohol and homicide (Fagan 1990; Lenke 1990; Parker 1989, 1993, 1995a, 1995b; Pemanen 1991; Peterson, Krivo, and Harris 1997). Sociologist Kai Pemanen's book Alcohol in Human Violence (1991) explored the role of alcohol on aggressive behavior in a community of northwest Ontario, Canada. Pemanen found drinking to be present in 42% of all violent crimes in that community. He also found a connection between young people, especially males, and drinking and violence.
Also recently, Peterson, Krivo, and Harris’ (1997) study of crime in neighborhoods focused on the effects of disadvantage on crime but included the presence of bars in a neighborhood, a measure similar to that used by Parker (1995b). Although alcohol was not the focus of this study, the findings provide insight to the alcohol/violence connection. In this study the authors found that greater numbers of bars in a neighborhood was related to increased criminal violence. The authors concluded that “this result is consistent with arguments that bars are a context in which non-conventional activities take place, drinking is more prevalent, and inhibitions and social control are undermined” (1997:17). In addition, the authors found that bars interact with extreme economic deprivation such that “the effect of bars on the violent crime rate increases significantly across levels of disadvantage but only within extremely disadvantaged neighborhoods” (1997:17). As a result, the authors concluded that “bars appear to be a breeding ground for violent crime in neighborhoods that also confront the many problems associated with substantial levels of economic deprivation” (1997:19).

There are also problems with these contemporary studies. For example, Pemanen’s study is limited to a single community in Canada. This dissertation will address this problem by analyzing the alcohol/homicide connection at the aggregate level, the 50 states and the whole nation, rather than in a single community.

A problem with the study by Peterson, Krivo and Harris is their measure of alcohol (the presence of bars in neighborhoods). This is not a full measure of alcohol
because it does not directly capture alcohol consumption. This dissertation will
address this problem by using a measure of alcohol, specifically alcohol sales, which
is more closely related to actual alcohol consumption.

**Robert Nash Parker's Study**

The most thorough and recent quantitative analysis is Robert Nash Parker’s,
*Alcohol and Homicide: A Deadly Combination of Two American Traditions* (1995b).
Parker’s goal was to develop a theoretical analysis of how alcohol influences
homicide. This study is unique in that it did not merely add an alcohol variable to
standard research designs of homicide. Rather, it started with a theoretical description
of the causal connection between alcohol and homicide and then placed alcohol within
the overall context of other explanations of homicide, such as routine activities, social
bonds, and economic deprivation.

Parker begins by advancing the concept of “selective disinhibition” to explain
the causal connection between alcohol and homicide. Disinhibition interacts with
“constraints,” or the impact of norms, on individual behavior.

Selective disinhibition operates through the interplay of
passive and active constraint—that is, the way norms affect
behavior, and the social setting of that behavior—including
alcohol consumption. . . . In the logic of this approach,
then, alcohol leads to homicide when the situation is one in
which violence is a potentially useful approach, as
perceived by at least one actor, and alcohol has been
consumed by at least that same actor. (1995b:35).
In addition, Parker asserts that this selective disinhibition may be a "threshold effect, with the location of the threshold also dependent on the particular situation and the individuals involved, so that the same amount of consumption might be sufficient to overcome active constraint in one situation and not sufficient in a similar situation" (Parker 1995b:35). Thus, he posits that the effect of alcohol occurs in a continuum "along which there is a point when active constraint is overcome and violence results" (Parker 1995b:35).

Therefore, selective disinhibition works in certain circumstances to overcome behavioral norms and allow aggressive behavior to be used in situations that, if alcohol was not involved, aggression would not occur. Many circumstances that might be ignored or dismissed if one was not using alcohol (such as a dispute over a dice game, Case number 41 from Wilbanks' book discussed above) may have deadly consequences with the addition of alcohol. This reality is pointed to by Roger Lane in his book Murder in America (1997:127) when he notes that the disputes that give rise to murder are usually trivial: "The answer to What was at stake? is too often. Nothing—except perhaps an alcoholic conception of male honor."

According to Parker, then, selective disinhibition is the mechanism at the individual level by which alcohol makes violence more likely in some interpersonal disputes. For this to be true at the microlevel, Parker correctly notes there must be macrolevel forces that also reveal the same connection, otherwise what is observed at the microlevel is spurious or is being caused by unspecified variables. Parker
therefore asserts that at the macrolevel, higher rates of alcohol consumption should be associated with higher levels of homicide. This connection is consistent with the microlevel assumption from selective disinhibition theory that individual use of alcohol makes homicide more likely in certain circumstances.

With the need for macrolevel data clear, Parker compiled longitudinal time series data from 256 cities in 1960, 1970, and 1980. Along with alcohol, his study included the effects of control variables, routine activities variables, social bonds variables, and economic deprivation variables. Parker's control variables were southern region, and population density. His three measures of routine activities were female labor force participation, median age, and money spent in retail eating/drinking establishments. He measured social bonds with a social bond index (including school enrollment, employment, and households of two or more persons), and mobility. Finally, economic deprivation was measured by median family income, single-parent households, and racial composition.

The focus of Parker's study was the direct effect of alcohol availability, which he measured as liquor stores per 1,000 population as an indicator of alcohol consumption. He also examined three potential interaction effects of alcohol on homicide. The interaction effects he posited included routine activities and alcohol (measured as low median age by high alcohol availability), economic deprivation and alcohol (measured as high percentage of children in one-parent households by high alcohol availability), and social bonds and alcohol (measured as low attachment to
traditional institutions by high alcohol availability). Thus, Parker’s model captured elements of routine activities, social bonds, economic deprivation, the direct effect and interaction effects of alcohol, with some typical control variables.

Parker’s findings are intriguing, but not definitive. Parker found alcohol availability to have a direct effect on homicide. However, this effect was only significant in 1970, one of the three time periods he studied. Parker’s analysis also showed interaction effects between alcohol and other predictors of homicide such as poverty, youth, and low social bonds. However, these effects also were inconsistent because they were not found at every time period examined. For example, the poverty/alcohol interaction variable was only significant in 1970, the youth/alcohol interaction variable was only significant in 1960, and the social bond/alcohol interaction variable was also only significant in 1960. Thus, although Parker found a causal effect of alcohol on homicide, the findings suggest that alcohol was causally related to homicide in the past, 1960 and 1970, but not more recently.

Other variables that Parker’s study found significant in each time period, 1960, 1970, and 1980, were race and female labor force participation. Interestingly, female labor force participation, a measure of routine activities theory, was negatively associated with homicide which is the opposite connection from what the theory would project. Parker suggests that this may be a “crime specific” result in that women are usually killed by their intimate partners -- husbands, boyfriends, ex-husbands and ex-boyfriends (Parker 1995b:82). Thus, although routine activities
theory suggests that when people leave their homes they become more vulnerable to
potential offenders, this connection may not be true for women as victims of homicide.
Parker argues that when women leave home to go to work, they actually leave their
most likely offender, in terms of homicide, at home. Women, then, become less
vulnerable to homicide when they work. Parker also suggests that women who work
have the financial resources to either leave when they are abused at home, thus giving
them an option that might prevent being killed by their most likely offenders, or to buy
things that may offer them protection from non-intimate offenders, such as personal
automobiles (Parker 1995b:82-83).

Without disaggregating homicides by sex and comparing the effects of female
labor force participation on male and female homicides, however, the validity of
Parker’s assertions cannot be known. In addition, although there is some support for
this position in the literature, other studies contradict Parker’s position. For example,
Gartner, Baker and Pampel (1990) explored sex differences in homicide victimization
rates and found that, as compared to men, a woman’s risk of homicide increases as
they move away from traditional domestic roles, including working in the labor force.
On the other hand, supporting Parker, Straus and Gelles (1986) examined the decrease
in wife beating in the United States between 1975 and 1985 and found that “full-time
housewives experience a higher rate of wife beating; thus, the rapid increase in paid
employment [for women] might also be associated with a lower rate of wife beating”
Clearly there are limitations to Parker’s findings and Parker is generally quick to acknowledge them. First, the fact that he only found alcohol to be significant in 1970 is curious. Parker suggests that one possible explanation for this finding is that his measure of alcohol availability, number of liquor stores per 1,000 population, mostly captures liquor sales. In the 1970s, liquor sales peaked and then declined while at the same time homicide rates continued to increase and beer sales continued to increase (Parker 1995b:83-84). This dissertation will address this problem by including in the analysis four measures of alcohol consumption: beer consumption, wine consumption, liquor consumption, and ethanol (total alcohol) consumption.

A second problem is that each interaction effect of alcohol was only significant in one time period, and none was significant more recently than 1970. These results could also be caused by Parker’s measure of alcohol consumption. In addition, the operationalization of the interaction effects is unconventional. Parker created measures which he believed would capture the extreme of each component of the interaction terms. For example, the poverty/alcohol interaction term was created by multiplying two dummy variables representing high poverty and high alcohol consumption (1995b:74-75). Normally, interaction terms are created by multiplying the values of the direct measures together. This dissertation will attempt to address the inconsistent findings of the interaction effects by analyzing similar effects of alcohol, using conventional interaction terms, in the cross-sectional state-level analysis covering the years 1970, 1980, and 1990, thereby including more recent time periods.
Finally, this dissertation will probe the importance of other variables in Parker's analysis, specifically routine activities, social bonds, and economic deprivation variables. This will allow comparison with Parker’s results to see if his findings are generalizable.

Summary of Previous Research

The alcohol studies, qualitative criminology, and quantitative criminology literatures all indicate a connection between alcohol and violence. Yet, problems exist within each of these literatures. The alcohol studies literature consistently reports a link between alcohol and aggression. However, some of these studies are problematic because they fail to control for the effects of other important variables, such as poverty, race, population size, population density, and age, that criminologists have found to be significant in explaining violence.

The qualitative criminology literature demonstrates that alcohol is part of some homicides. However, this literature also shows that alcohol is not part of other homicides. Accordingly, these studies do not reveal whether alcohol plays a significant causal role in homicide.

The quantitative criminology literature also suggests an empirical causal connection between alcohol and homicide. These studies are problematic, however, for several reasons. The initial study by Wolfgang (1958) is old and is limited to one city (Philadelphia) and one time period (1948-1952). Other studies, such as
Pemanen's (1991), are limited to one community. Still other studies, such as Peterson, Krivo, and Harris’ (1997), are not focused on the role of alcohol in homicide but include a measure of alcohol (the presence of bars in a neighborhood) in the analysis which is not a full measure of the effects of alcohol consumption on homicide.

Finally, Parker’s recent study (1995b) provides a thorough analysis of the connection between alcohol and violence in a macrolevel study that focuses on the causal effect of alcohol on homicide. However, this study is also problematic because of the measure of alcohol consumption. In Parker’s study, his measure fails to capture all types of alcohol consumed and specifically the most common type, beer. Also, Parker only found direct effects of alcohol in one time period, 1970, and indirect effects in 1960 and 1970. His results, then, are inconsistent.

The Present Research

This study examines alcohol and homicide with a special focus on the problems that plague previous research, such as a lack of control variables, limited focus, and incomplete measures of alcohol. Most importantly, this study will replicate and expand on Parker’s work by using similar independent variables and similar model structure to test his general hypothesis on the connection between alcohol and homicide. Replication is an important part of developing scholarly understandings of social issues. Lundman (1993:49) notes the importance of replication in advancing general research conclusions:
To replicate is to repeat a previous project...in most of its essential elements. Replication is fundamental to the development of confidence in the generalizability of the results of earlier projects.... The gain in confidence is greatest when replications do not repeat in exact detail all of the elements of previous projects. The question to be answered by...replicative studies is whether a hypothesis [examined] under a variety of circumstances is effective, not whether a project precisely repeated would have the same results.

The importance of replication is also clear from the Minneapolis Experiment on domestic violence arrests (Sherman and Berk 1984). After Sherman and Berk reported a specific deterrent effect of arrest in the context of male-on-female domestic violence, fifteen states passed mandatory arrest laws by 1991, before this effect could be confirmed by replication studies. In 1992, five of six replication studies were completed and three of the five reported no long-term deterrent effect of arrest on repeat domestic violence, and instead these studies found a long-term increase in subsequent violence (Sherman and Smith 1992). Thus, replication studies allow for ongoing scholarly development of research hypotheses.

I have chosen to replicate Parker’s work because it is a uniquely important contribution to the homicide literature. Parker begins with a theoretical description of the causal connection between alcohol and homicide, and he places alcohol within the overall context of other theories on homicide, specifically routine activities, social bonds, and economic deprivation. He then demonstrates significant direct and interaction effects of alcohol on homicide.
However, in replicating and extending Parker’s work, several problems that exist in his study will be addressed by this dissertation. First, Parker’s measure, the number of liquor stores per 1,000 population, is presented as an indicator of alcohol availability. However, this is too removed from actual alcohol consumption. The availability of a liquor store does not reveal anything about actual sales of alcohol or actual consumption of alcohol. Another limitation of this measure is that it mostly captured potential liquor sales rather than also including beer and wine sales. This is significant because beer makes up most of the total alcohol consumed in the United States (U.S. Bureau of the Census 1992:133). My four measures of alcohol consumption - beer sales, wine sales, liquor sales, and ethanol sales - will address both of these limitations of Parker’s measure of alcohol.

Also, Parker’s study is dated as the time periods covered are 1960, 1970, and 1980. My study includes more recent data. The pooled cross-sectional analysis includes the years 1970, 1980, and 1990, at the state-level. The longitudinal analyses cover the years 1950-1995 and 1960-1995, at the national-level.

My study, therefore, addresses troublesome gaps in the alcohol and homicide literature generally, and Parker’s uniquely important study in particular. In this study, I will first control for factors which have been found to be significant in explaining homicide, including economic deprivation, race composition, and age structure of the population. I will then add the other variables used by Parker. Finally, I will add
alcohol to examine whether it has a significant and independent effect on homicide, net of the effects of the other variables.

Chapter Summary

This chapter reviewed the key literatures that suggest an alcohol/violence connection - the alcohol studies literature, the qualitative criminology literature, and the quantitative criminology literature. In addition, the problems in each literature that need to be addressed by additional research have been identified. Finally, I described some of the ways the present research will address the gaps in the literature and how it will replicate and extend Parker's analysis.

In Chapter 2, I summarize the homicide literature, isolate the theoretical relationships I expect to find between the independent variables in this analysis and the dependent variable, homicide rates, and present the research hypotheses. In Chapter 3, I present the operationalizations of the variables and review the research methods used in the analysis. Chapter 4 presents the results of the cross-sectional analysis at the state-level, and Chapter 5 presents the results of the longitudinal analysis at the national-level. In Chapter 6, I present the conclusions of this research and the directions for future research on alcohol and homicide.
CHAPTER 2
THEORETICAL RELATIONSHIPS
AND RESEARCH HYPOTHESES

This study examines the connection between alcohol and homicide, net of other factors previous research has demonstrated are central to homicide - economic deprivation, race composition, and age structure of the population (Land, McCall and Cohen 1990). Also, additional variables from the three theories examined by Parker (1995b), routine activities, social bonds, and economic deprivation, will be replicated and extended.

In this chapter, I review the homicide literature and present the theoretical relationships between the independent variables used in the analysis and the dependent variable, homicide rates. Finally, I present the research hypotheses explored in this study. These hypotheses describe the expected effects on homicide rates of the independent variables: several important control variables, the core variables (economic deprivation, race composition, and age structure), the explanatory variables from Parker's analysis (routine activities, social bonds, and economic deprivation), the direct effect of alcohol consumption, and interaction effects of alcohol consumption.
Previous Research on Homicide

Core Variables

The research on homicide indicates that economic deprivation, race composition, and the age structure of the population are key to understanding the causes of homicide. These three factors will be referred to as the "core variables" in this study as a result of the importance of these concepts in the homicide literature. In this section, I discuss the previous research in each of these three areas and the various measures that have been used to represent these concepts.

Economic Deprivation

Much of the literature on homicide focuses on economic deprivation as one key to explaining homicide rates (Bonger 1969; Vold 1958). The landmark study is Blau and Blau’s (1982) research on violent crime in 125 Standard Metropolitan Statistical Areas. Blau and Blau theorized that: “Economic inequality entails conflict of interest over the distribution of resources; [and] much inequality spells a potential for violence” (1982:118). At the center of their research, then, is the idea that when people realize their unequal position in society, frustration results and manifests itself in violent crime (Blau and Blau 1982:119).

Blau and Blau (1982:120) explore the effects of two measures of economic deprivation. The first, percent poor, is a measure of absolute economic deprivation.
The second, the Gini index, is a measure of relative economic deprivation. They report (1982:121) that relative economic deprivation is the engine that drives homicide.

Following Blau and Blau’s landmark study, much research was done to explore the connection between economic deprivation and violence. Within the literature, the debate centered on whether it is absolute economic deprivation (lacking the resources to meet basic needs) or relative economic deprivation (a lack of resources as compared to the economic situation of others) that is connected to violence (see Bailey 1984 and Messner 1982, 1983). Research suggests both are important. Thus, some studies find that absolute economic deprivation contributes to high homicide rates (Bailey 1984; Huff-Corzine, Corzine and Moore 1986; Loftin and Parker 1985; Messner 1983; Sampson 1985; Williams 1984; Williams and Flewelling 1989). Others report a relationship between relative economic deprivation and increased homicide rates (Blau and Blau 1982; Carroll and Jackson 1983; Harer and Steffensmeier 1992; Loftin and Hill 1974; Rosenfeld 1986; Sampson 1986; Simpson 1985). Although the measures differ, the overall impact of this literature is the finding that economic deprivation, in general, is a key variable in explaining homicide rates.

As suggested by the debate over the importance of absolute versus relative deprivation on homicide, different structural variables have been used to measure economic deprivation. Some research includes absolute deprivation, measured as percent of the population living below the federal poverty line (Bachman 1991; Bailey
1984; Blau and Blau 1982; Harer and Steffensmeier 1992; Land, McCall and Cohen 1990; Messner and Golden 1992; Peterson and Krivo 1993; Smith and Brewer 1992; Williams and Flewelling 1988). Other studies have included unemployment rates (Bachman 1991; Carroll and Jackson 1982; LaFree et al. 1992; Land, McCall and Cohen 1990; Messner and Golden 1992; Smith and Brewer 1992). Also, several studies have used the Gini index of income inequality (Bailey 1984; Blau and Blau 1982; Carroll and Jackson 1983; Golden and Messner 1987; Harer and Steffensmeier 1992; Messner 1983; Messner and Golden 1992; Rosenfeld 1986; Sampson 1986; Simpson 1985). Finally, some studies have measured economic deprivation by the percentage of single-parent households (Brewer and Smith 1992; Huff-Corzine et al. 1986; Loftin and Hill 1974; Messner 1983; Parker 1995b; Parker and Smith 1979; Smith and Parker 1980).

Because different measures of economic deprivation have been used in previous research, the present research also examines a variety of measures including poverty, unemployment, and female-headed households. These measures are discussed below in the hypothesis section and again, more fully, in Chapter 3 which includes the operationalizations of all the independent variables.

Race Composition

Race composition and its effect on violence has also been a key aspect of the homicide literature (Land, McCall and Cohen 1990). To examine the effect of race
composition, many studies include percent black in the analysis of homicide and violence, generally as a control variable (Blau and Blau 1982; Blau and Golden 1986; Sampson 1985; Williams 1984). Despite being relegated to the status of control variable, percent black has often been found to have a significant positive effect on aggregate homicide rates, independent of the other variables used in the analyses (Bailey 1984; Carroll and Jackson 1983; Harer and Steffensmeier 1992; Land, McCall and Cohen 1990; Messner 1983; Sampson 1985; Williams 1984). In fact, in the twenty-four homicide studies reviewed by Land, McCall and Cohen (1990), percent black was positive and significant in explaining homicide rates in virtually every study. Only one study reported a negative and significant effect of percent black, and three studies reported no significant effect. Overall then, I think the research clearly supports a significant and independent effect of race composition on homicide. I therefore join Land, McCall and Cohen (1990) in isolating race composition as a core variable in the context of homicide.

**Age Structure**

Finally, much research on homicide includes an analysis of the effects of age on violence. The existence and invariance of the age-crime propensity relationship is well established (Cohen and Land 1987). This research has generally been based on the observation that teenagers and young adults commit more crimes than individuals in other age groups (Land, McCall and Cohen 1990; Hirschi and Gottfredson 1983).
In addition to observing this “crime fact,” routine activities theory offers an explanation for the connection between youth and crime. Routine activities theory, in general, explains crime as the result of bringing together potential victims, motivated offenders, and an absence of effective guardians (Cohen and Felson 1979; Sampson 1987). These factors may converge and result in increased crime rates when there is an increase in work and leisure activities outside the home (Cohen and Felson 1979).

Thus, routine activities theory states that people who maintain a “high-risk” lifestyle, such as staying out late at night and having frequent activity away from home, run increased chances of victimization (Miethe, Stafford, and Stone 1990). As a result, this theory posits that young people are at risk for higher levels of both victimization and offending because youth lifestyles include increased activities away from the home as compared to other age groups (Cohen and Felson 1979; Cohen and Land 1987; Land, McCall and Cohen 1990).

Despite the invariance of the age/crime connection, different measures of age have been used in the literature. Frequently used age ranges are 15-24 and 20-34 (Land, McCall and Cohen 1990). However, Cohen and Land (1987) and Land, McCall and Cohen (1990) use 15-29 and Peterson and Krivo (1993) use 15-34. Land, McCall and Cohen (1990:926,fn.9) discuss this issue and conclude:

we have experimented empirically with several variations on the definition of this percentage and find that they are highly correlated for the units of analysis of concern in the present paper [cities, SMSAs, and states]. Thus, the particular age range used in a given study is not likely to be of great importance.
Because, the particular age range chosen for analysis does not seem to affect outcomes, the age/crime connection remains invariant. I therefore include age structure as a core variable.

Additional Variables from Parker’s Analysis

In addition to the core variables presented above, Parker’s analysis of alcohol and homicide (1995b) includes variables from three theories - routine activities, social bonds, and economic deprivation. Two of these theories, routine activities and economic deprivation, have been discussed above as part of the core variables. These theories will be discussed again briefly as they relate to Parker’s analysis. In addition, social bonds theory and its use by Parker will be presented.

Routine Activities

In addition to the age and violence hypothesis presented above, Parker (1995b:59) uses routine activities theory to examine the effect of two other aspects of lifestyles that are related to crime: women working outside the home, and time spent away from the home in leisure activities.

Routine activities theory is primarily a theory of victimization and it suggests that crime can be explained by activities that bring together potential victims, motivated offenders, and an absence of effective guardians (Cohen and Felson 1979; Sampson 1987). Cohen and Felson (1979) illustrate their argument by noting that
increased female participation in the work force leads to fewer guardians at home during the day, thus leading to increased property crime. Further, by working outside of the home, women would be expected to come into contact with more potential offenders than if they remained at home, thereby increasing their potential for victimization.

However, Parker (1995b:82) found that homicide rates decreased with increased female labor force participation. He suggests that this is a homicide-specific result rather than a fundamental flaw in routine activities theory. Parker claims that because females are most likely to be killed by their intimate partners, working takes them away from their potential offenders who are at home, rather than putting them in contact with potential offenders when away from home (Parker 1995b:82). Thus, Parker suggests that routine activities theory explains the connection between women working away from the home and homicide as a result of the lowered likelihood of coming into contact with potential offenders while engaged in work activities. As discussed in Chapter 1, Parker does not explore the validity of his explanation by disaggregating homicide rates by sex. However, his explanation finds some support in Straus and Gelles’ (1986) suggestion that female labor participation may reduce the rate of wife beatings. Thus, this finding should be explored in future research on routine activities theory. As a replication of Parker, however, I use female labor force participation as a measure of routine activities.
Social Bonds

Parker uses social bonds theory to explore the effects of commitment to traditional social institutions (work, school, family, and community), and the length of that commitment, on homicide (1995b:60-61). As initially developed by Hirschi (1969), social bonds theory suggests that connection to work, family, and school act as "bonding agents" such that individuals with these connections are less likely to engage in deviant behavior. In addition to these traditional societal institutions that help regulate behavior, Hirschi (1969) speculated that the length of commitment may affect behavior. "Involvement," defined as time and energy devoted to an activity such as school, work or community, is a factor in social control. Also, Shaw and McKay (1942) suggest that population mobility leads to a weakening of social control, through lowered community ties, resulting in increased crime and delinquency.

Parker used these hypotheses to examine the effects of connection to and involvement with community on homicide. He used an index of social bonds which included employment, school enrollment, and living in a household of two or more persons to measure connection to community (1995b:60), and he used population mobility to measure involvement with community (1995b:61). Following Parker, I use population mobility as a measure of social bonds.\(^1\)

\(^1\) The social bond index used by Parker is not included in this study. Parker constructed a social bond index which consisted of adding together the z-scores for three measures: percent of the population aged 5-24 enrolled in school, percent of the population living in households having two or more members, and percent of the population employed (1995b:74). Parker did not indicate the reliability of his index measure. Initially in this analysis, I created a social bond index variable using the same process as Parker, however, factor analysis of the index indicated that it was not a reliable measure (alpha = .54).
Economic Deprivation

Parker uses three different measures of economic deprivation in his analysis. As described above, this theory suggests that the more economically deprived one is, the more likely one is to engage in criminal behavior. In his analysis, Parker uses median family income, percent of single-parent households, and percent black as measures of economic deprivation (1995b:61-62). Following Parker, I use three measures of economic deprivation: poverty, unemployment², and percent of female-headed households. Unlike Parker, I use percent black as a population measure because it is not clearly a measure of economic deprivation.

Alcohol and Homicide

My dissertation analyzes the effects of alcohol on homicide, net of the effects of the variables representing the theories discussed above. Previous research, as discussed in Chapter 1, suggests that alcohol may be causally linked with homicide but many troublesome problems remain. Parker’s recent study (1995b) offers a uniquely important quantitative analysis of the effects of alcohol on homicide, but his findings are limited and his data are not current. This study addresses the limitations of the previous research with a special focus on replicating and extending Parker’s study.

² Parker uses employment as an indicator of social bonds, building on Hirschi’s (1969) concept of connection to work as a bonding factor affecting crime. In this analysis, unemployment will be used as an indicator of economic deprivation as discussed earlier in this chapter.
Alcohol Consumption

Parker (1995b) suggests that selective disinhibition theory explains the causal connection between alcohol and homicide. According to this theory, in some situations homicide will result in interactions where at least one of the actors has been using alcohol. The effect of alcohol varies, and there is a threshold point at which alcohol overrides constraints on behavioral norms resulting in violence and homicide (Parker 1995:35). This threshold point varies with the amount of alcohol consumed, the person involved, and the interaction engaged in.

In Parker’s study, he found that alcohol availability had a direct effect on homicide. However, this effect was only significant in 1970 (his analysis included 1960, 1970 and 1980). A possible explanation for this finding is Parker’s measure of alcohol consumption as the number of liquor stores per 1,000 population. This measure captures mostly liquor sales rather than other forms of alcohol such as beer and wine. This dissertation addresses this issue by analyzing alcohol consumption in its four forms: beer, wine, liquor, and ethanol (total pure alcohol).

In addition, Parker’s study found interaction effects between alcohol and other predictors of homicide. However, these results, like his finding of a direct effect of alcohol on homicide, were inconsistent. The poverty/alcohol interaction variable was only significant in 1970, the youth/alcohol interaction variable was only significant in 1960, and the social bond/alcohol interaction variable was only significant in 1960.
This dissertation probes this inconsistency by analyzing similar interaction effects in a pooled cross-sectional analysis covering the years 1970, 1980, and 1990.

Finally, this dissertation presents more recent data than was analyzed by Parker. This study includes a pooled cross-sectional analysis of the years 1970, 1980, and 1990, at the state-level, and two longitudinal analyses covering 1950-1995 and 1960-1995, at the national-level.

My dissertation, therefore, makes three key contributions. First, I examine alcohol and homicide, net of other important variables, including economic deprivation, race composition, and age structure of the population. Second, I correct a number of problems in previous research. Third, I replicate and extend Parker’s important study, Alcohol and Homicide.

**Hypotheses**

This section presents the research hypotheses I will explore. These hypotheses describe the expected effects on homicide rates of the independent variables: the control variables (southern region, population density, executions, and Uniform Crime Reports coverage), the core variables (economic deprivation, race composition, and age structure), additional variables from Parker’s analysis (representing routine activities, social bonds, and economic deprivation), the direct effect of alcohol consumption, and interaction effects of alcohol consumption. Table 1, at the end of this chapter, summarizes the variables and hypothesized direction of effects.
All of these hypotheses will be explored in the state-level analysis, except for the hypothesis concerning percent Uniform Crime Reports coverage, which will only be used in the national-level analysis. At the national-level, only a small number of variables will be examined because of the limited number of cases (N = 46 in the 1950-1995 analysis; N = 36 in the 1960-1995 analysis) and the severe autocorrelation that is created when many variables are included in the models. Thus, the national-level analysis will only explore the hypotheses concerning percent UCR coverage (a control variable), unemployment (economic deprivation), percent black (race composition), young adult population (age structure), and alcohol consumption (in all four forms - beer, wine, liquor, and ethanol). The core variables were chosen for inclusion because of their importance in the homicide literature, alcohol consumption is included because it is the focus of this study, and percent UCR coverage is included to control for possible variation in the national-level dependent variable.

**Control Variables**

Following Parker (1995b) and other homicide studies (Bailey 1984; Messner 1983; Peterson and Krivo 1993), several control variables will be included in this study. In Parker’s analysis, he included Southern region and population density as

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3 Percent Uniform Crime Reports coverage measures the percent of the U.S. population that was included in the jurisdiction of police units that reported crime figures to the Federal Bureau of Investigation. This variable controls for the variation in population coverage, which has ranged in the time period covered in this study from a low of 23% (1957) to a high of 93% (1981).

4 Autocorrelation will be discussed in detail in the research methods section of Chapter 3.

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control variables. These variables will be replicated in this analysis. Also, two additional control variables which were not used by Parker will be included in the analysis, executions and Uniform Crime Reports (UCR) coverage (national-level analysis only).

**Southern Region**

Hackney (1969) and Gastil (1971) hypothesize that the South has a distinct culture that encourages violence. Although this hypothesis has not been consistently upheld in the literature, especially after the 1970s (see Land, McCall and Cohen 1990 and Parker 1989), Parker (1995b) nonetheless included southern region as a control variable. I include it as well. Thus,

\[ H_1: \text{Areas located in the South will have higher homicide rates.} \]

**Population Density**

Parker also included population density as a control variable because it has been found to influence homicide rates in the literature (Jackson 1984; Shaw and McKay 1942; Williams and Flewelling 1988; Wirth 1938). This variable is also included in this study, represented as urban population. Thus,

\[ H_2: \text{As population density increases, homicide rates will increase.} \]
**Executions**

Executions have been examined as indicators of deterrence theory (McFarland 1984; Phillips 1980). Deterrence theory suggests that executions by the government deter people in the general population from committing homicide. However, a number of contradictory studies exist which fail to clearly confirm or refute this hypothesis (Archer and Gartner 1984; Bowers and Pierce 1975; Ehrlich 1975; Peterson and Bailey 1988, 1991; Sellin 1967). Yet, deterrence theory continues to influence research and theory in criminology. Thus,

H3: As the number of executions increases, homicide rates will decrease.

**Uniform Crime Reports Coverage**

The population coverage of the Uniform Crime Reports has varied over time with more recent years covering a larger proportion of the total U.S. population than in the years prior to 1960 (Federal Bureau of Investigation 1951-1996). As the UCR increases its population coverage, it generally adds areas of smaller population sizes than are included in the reports when UCR population coverage is lower (Federal Bureau of Investigation 1951-1996). Because crime rates are generally lower in less urban areas than urban areas of the United States (Weisheit, Falcone, and Wells 1996:25-65), I expect:

H4: As UCR coverage increases, homicide rates will decrease.
Core Variables

Economic Deprivation

Three measures of economic deprivation will be explored in this analysis: poverty, unemployment, and percent of female-headed households. As discussed above, the literature supports the use of each of these measures. Percent of female-headed households is discussed below in the section on hypotheses replicating the Parker analysis. Poverty is presented as the core variable in the state-level analysis and unemployment is presented as the core variable in the national-level analysis.

Blau and Blau (1982) found that economic conditions are key to the understanding of violent crime. Several studies have shown that absolute economic deprivation, such as low income or poverty, is linked to higher levels of homicide (Bailey 1984; Blau and Golden 1986; Jackson 1984; Messner 1983; Sampson 1985; Williams 1984; Williams and Flewelling 1988). Thus,

H5: The more people living in poverty, the higher the homicide rates.

In addition, several other studies use unemployment as a measure of economic deprivation (Bachman 1991; Carroll and Jackson 1982; LaFree et al. 1992; Land, McCall and Cohen 1990; Messner and Golden 1992; Smith and Brewer 1992). Also,

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3 During the preliminary research, both variables were used in the analysis. However, poverty was significant at the state-level but not at the national-level and unemployment was significant at the national-level but not at the state-level. As a result, each measure is used separately as a core variable corresponding with the level of analysis in which the variable was significant to capture the effect of economic deprivation on homicide.
Cantor and Land (1985) and Land, Cantor and Russell (1994) found the relationship between unemployment and crime to be positive and more pronounced in time series analysis. Thus,

\[ H_6: \text{As unemployment increases, homicide rates will increase.} \]

**Race Composition**

Race composition, as measured by percent black, has been found to have a significant positive effect on aggregate crime rates independent of other variables used in the analyses (Bailey 1984; Carroll and Jackson 1983; Harer and Steffensmeier 1992; Land, McCall and Cohen 1990; Messner 1983; Sampson 1985; Williams 1984). In the twenty-four homicide studies reviewed by Land, McCall and Cohen (1990), percent black was positive and significant in explaining homicide rates in twenty of the studies. Thus,

\[ H_7: \text{As the African-American population increases, homicide rates will increase.} \]

**Age Structure**

The age-crime connection is virtually invariant and therefore well-established (Land, McCall and Cohen 1990). Cohen and Land (1987) note that teenagers and young adults commit crime more frequently and are more likely to be victims of crime than other age groups. Routine activities theory suggests that youth are more likely to be crime victims and offenders because of their increased activities away from the
home as compared to other age groups (Cohen and Felson 1979; Cohen and Land 1987; Land, McCall and Cohen 1990). Thus,

\[ H_8: \] As the young adult population increases, homicide rates will increase.

**Additional Variables from Parker’s Analysis**

**Routine Activities**

Routine activities theory (Cohen and Felson 1979), primarily a theory of victimization, suggests that violence increases as a result of the activities and lifestyles in which people engage. Generally, routine activities theory suggests that activities away from home increase the likelihood of being a victim of crime (Cohen and Felson 1979). However, Parker (1995b) claims that because females are most likely to be killed by their intimate partners, working takes them away from their potential offenders who are at home, rather than putting them in contact with potential offenders when away from home. Thus, as Parker found, I expect

\[ H_9: \] As more women are in the labor force, homicide rates will decrease.

**Social Bonds**

Hirschi (1969) suggested that “involvement,” defined as time and energy devoted to an activity such as school, work or community, is a factor in social control. In addition, others suggest that population mobility leads to a weakening of social
control, through lowered community ties, resulting in increased crime and delinquency (Kornhauser 1978; Sampson and Groves 1989; Shaw and McKay 1942). Thus,

\[ H_{10}: \text{As mobility increases, homicide rates will increase.} \]

**Economic Deprivation**

A third measure of economic deprivation theory, which replicates Parker’s measure, is included in this analysis. Several studies use the percentage of single-parent households as an indicator of economic deprivation (Brewer and Smith 1992; Huff-Corzine et al 1986; Loftin and Hill 1974; Messner 1983; Parker 1995b; Smith and Parker 1980). Also, female-headed households are generally poorer than male-headed or two parent households (U.S. Bureau of the Census 1992:413). Thus,

\[ H_{11}: \text{As the prevalence of female-headed households increases, homicide rates will increase.} \]

**Alcohol and Homicide**

**Direct Effect of Alcohol Consumption**

Alcohol has been causally linked to homicide rates in several studies (Fagan 1990; Lenke 1990; Parker 1989, 1993, 1995a, 1995b; Pemanen 1991; Peterson, Krivo and Harris 1997; Wolfgang 1958). Despite the limitations of these studies discussed in Chapter 1, they indicate that a connection exists between alcohol and homicide. Thus,

\[ H_{12}: \text{As alcohol consumption increases, homicide rates will increase.} \]
Interaction Effects of Alcohol Consumption

This study will also explore whether alcohol consumption has an interaction effect with other variables that explain homicide rates. Such an effect would be consistent with the complex relationship between alcohol and homicide suggested by selective disinhibition theory, and the expectation that homicide does not always occur in aggressive encounters when alcohol is involved. Parker's research (1995b) indicates that alcohol consumption may have an interaction effect with variables from the theories presented in his study. Thus,

H13: Increases in the size of the young adult population interact with alcohol consumption to produce higher homicide rates.

H14: Increases in poverty interact with alcohol consumption to produce higher homicide rates.

Chapter Summary

In this chapter, I summarized the relevant homicide literature, focusing on the impact of economic deprivation, race composition, and age structure of the population on homicide. I then discussed the theoretical relationships of the independent variables on homicide. Finally, I presented the research hypotheses that will be explored.

In the next chapter, I present the operationalizations of these variables and describe the research methods used to analyze the data. As a replication and extension
of Parker’s 1995 study, this analysis examines the effects on homicide of the control variables (southern region, population density, executions, and Uniform Crime Reports coverage), the core variables from the homicide literature (economic deprivation, race composition, and age structure), and the additional variables presented in Parker’s analysis (representing routine activities, social bonds, and economic deprivation). Finally, alcohol is introduced to examine whether alcohol has a significant and positive effect on homicide, net of the effects of the other variables.
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<td>Ethanol Consumption</td>
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<td>Interaction Terms</td>
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<td>Youth/Alcohol Consumption</td>
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<td>Poverty/Alcohol Consumption</td>
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Table 1. Independent Variables and the Expected Direction of Effects
CHAPTER 3

DATA AND METHODS

In this chapter, I describe the levels of analysis, the units of analysis and cases, the operationalizations of the variables, and the research methods I will use.

Levels of Analysis

This study involves two levels of analysis. First, I present state-level data, pooled across 1970, 1980, and 1990. I chose these years because census data are available, which allows for comparison of the states over time and for consideration of years beyond those included in Parker's study. Second, I present national-level data for the years 1950 to 1995. The data are limited to these years because I was able to find measures for all of the variables back to 1950 and up to 1995. For example, mobility was available prior to 1950 but female-headed households was only available from 1950 forward. Also, some variables such as poverty were measurable up to 1996 yet other variables such as school enrollment were limited to 1995.\(^6\)

\(^6\) In the final national-level analysis, only percent UCR coverage, the core variables, and the alcohol variables are used because of severe autocorrelation when additional variables are added to the models.
These two levels of analysis are explored because good measures of alcohol consumption are available at both the state and national levels. In addition, the effects of alcohol, if they are real, should be visible at both levels of analysis. Finally, the national-level analysis provides a strict test of the connection between alcohol and homicide because the number of cases is small and the variables are second differenced. As Jacobs and Helms note (1997:1372) “results based on second-differenced variables are far less likely to be spurious because joint time-related movements in variables are eliminated.”

Units of Analysis and Cases

At the state-level, my unit of analysis is the state year. Because I examine the 50 states at three points in time (1970, 1980, and 1990), the state-level analysis involves 150 cases. At the national-level, my unit of analysis is the year. Thus, the 1950-1995 analysis includes 46 cases, and the 1960-1995 analysis includes 36 cases.

Operationalizations of the Variables

The operationalization of each variable is the same at the state and national-level, unless otherwise specified. The state-level analysis includes all variables except percent UCR coverage. The national-level analysis uses this variable along with the core variables and the measures of alcohol consumption. Table 2 summarizes the operationalizations and expected direction of effects for the independent variables.
**Dependent Variable**

The dependent variable is the homicide rate, as reported by the Federal Bureau of Investigation (FBI) in the Uniform Crime Reports (UCR). For the state data, homicide rates are calculated for each state as estimated homicides per 100,000 state population in 1970, 1980 and 1990, as estimated by the FBI (FBI 1971, 1981, 1991). For the national data, homicide rates are calculated for each year as actual reported homicides per 100,000 covered national population (FBI 1951-1996).

**Independent Variables**

**Control Variables**

Two variables that have been consistently used in the homicide literature, and were used by Parker, as control variables are included in this study: southern region and population density. Two additional control variables are also used, executions and percent of the population covered by the Uniform Crime Reports.

**Southern Region**

Southern region is measured as southern (confederate) or non-southern region. Southern region has been measured as confederate states in some previous studies.

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7 The FBI provides information on actual numbers of reported crimes and the rate of occurrence per 100,000 of the covered population, which is the population within the jurisdiction of the police agencies that reported crime figures to the FBI. These rates are used for the national data. The FBI also provides estimated crime rates by using the reported crime and covered population figures to estimate crime rates for the entire U.S. population, based on census estimates of the population total. These rates are used for the state data (for an example, see FBI 1991:156 for actual offenses, and 1991:60 for estimated offenses).
(Hackney 1969; Messner 1983). The eleven confederate states are: Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, and Virginia (Guralnik 1982:297). On the state-level, southern region is represented as a dummy variable. A score of 1 represents a state that seceded from the United States to form the confederacy in 1860 or 1861, and 0 represents a non-southern state.

**Percent Urban**

The measure of population density is operationalized as the percent of the population living in urban areas, defined by the census as areas of 2500 or more persons. The state-level data are from the census bureau’s web site (www.census.gov; see also U.S. Bureau of the Census 1983b, 1993a). *

**Executions**

Executions is measured as the actual number of executions occurring in any given state year. The state data are from the NAACP Legal Defense and Education Fund, Inc. (New York, New York).

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* To obtain information from the web site on the internet, key in “www.census.gov”, then click on “Subjects A-Z”. Next, click on the subject title to locate the data, i.e., “urban/rural” to obtain data on percent urban, or “income” to obtain data on percentage of people living below the poverty level.
Percent UCR Coverage

Percent UCR coverage is measured as percent of the total population covered by the Uniform Crime Reports, and is only used in the national analysis. This measure represents and controls for the variation in the amount of the population covered by the UCR each year (FBI 1951-1996). Prior to 1960, less than 40% of the U.S. population was covered by the UCR (FBI 1951-1960). After 1960, there was an increase in the coverage of the UCR with some years achieving close to 90% coverage (FBI 1960-1996). As a control variable, this measure allows estimates of the other variables in the models, net of the effects of variation in the population coverage. I use percent UCR coverage as a control for variation in population coverage and the national-level analysis will be conducted for the entire time period, 1950-1995, and for the limited years of 1960-1995, when coverage greatly increases.

Core Variables

Three concepts which have consistently been found to be causally related to homicide are analyzed at both the state and national levels (Land, McCall and Cohen 1990). These concepts are economic deprivation, race composition, and age structure of the population.

Economic Deprivation

Two measures of economic deprivation are used as core variables in the analysis: poverty and unemployment. Poverty is used in the state-level analysis as a
core variable and unemployment is used in the national-level analysis as a core
variable representing economic deprivation.\(^9\)

\textit{Poverty}

Poverty is measured as percent of the population below the federal poverty
level. At the state-level, this measure is for 1969, 1979, and 1989, because the
decennial census records the number of people in poverty during the previous year.
For instance, the 1970 census determines who was living in poverty in 1969. The data
come from the census bureau’s web site (www.census.gov; see also U.S. Bureau of the

\textit{Unemployment}

At the national-level, unemployment is measured as the percent of the
population in the civilian labor force that is unemployed. The national data are for

\footnote{As mentioned in Chapter 2, footnote 5, poverty and unemployment are used separately to represent economic deprivation. In the preliminary analysis, both variables were used. However, poverty was only significant at the state-level and unemployment was only significant at the national-level. Thus, each measure is used separately in the level of analysis in which the variable was significant to capture the effect of economic deprivation on homicide.}
Race Composition

Percent Black

Race composition is measured as percent of the population that is African-American. At the state-level, the data are from the Marvell data set obtained from the author’s web site (http://morton.wm.edu/~cemood/crime.dat; see also Marvell and Moody 1996). These data are collected from the decennial census. At the national-level, for the years prior to 1960, the percentage of African-American population is calculated as 91% of the non-white population, as reported in the census data (U.S. Bureau of the Census 1975b). The 91% figure was computed by averaging the percent African-American of the total non-white population during the years 1960 to 1970.\(^\text{10}\) From 1960 to 1995, the census reports population data specifically on African-Americans (U.S. Bureau of the Census 1974b, 1975b, 1982b, 1993d, 1996e).

Age Structure

Young Adult Population

Young adult population is measured as percent of the population ages 18-34. This measure captures the percent of the population that is young, and it also is focused on the crime prone ages, specifically as age relates to homicide. The literature clearly indicates that youth is connected to crime in general, often measured as 15-24

\(^{10}\) For example, in 1970 African-Americans made up 89.8 percent of the non-white population reported by the census bureau. During the eleven years from 1960 - 1970, on average, African-Americans made up 91% of the non-white population (U.S. Bureau of the Census 1975b).
or 20-34 (Land, McCall and Cohen 1990). Homicide, specifically occurs in a slightly older age group, as indicated by arrest data (Maguire and Pastore 1995:384-385) so the measure of age in this study will focus on the homicide prone age group of 18-34.


Additional Variables from Parker's Analysis

Routine Activities

Female Labor Force Participation

Female labor force participation is measured as percent of the female population age 16 and older employed in the civilian labor force. At the state-level, this variable is measured in 1970, 1980 and 1990. The state-level data are from the decennial census (U.S. Bureau of the Census 1973c, 1983c, 1993c).

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11 In addition to the variables discussed in this section, five other variables were initially considered for inclusion to replicate Parker's study. These variables were households of two or more persons, war, retail eating activity, school enrollment, and unemployment. However, because of severe collinearity between these variables and two other variables, young adult population and female labor force participation, they were not included in the analysis. The process used to determine which variables to omit from the analysis is presented in Appendix A.
Social Bonds

Mobility

This measure captures population mobility and thus the level of connection to a community. At the state-level, mobility is measured by the percent of the population age 5 and older who have moved to a different county in the previous five years, and the data are from the decennial census (U.S. Bureau of the Census 1973c, 1983c, 1993c).

Economic Deprivation

One additional measure of economic deprivation is analyzed in this study to replicate Parker’s analysis. This measure is female-headed households.

Female-Headed Households

Previous studies use single-parent households to represent economic deprivation (Brewer and Smith 1992; Huff-Corzine et al. 1986; Loftin and Hill 1974; Messner 1983; Parker 1995b; Parker and Smith 1979; Smith and Parker 1980).

Following Parker, family structure is presented as an outcome measure of poverty (Parker 1995b). Female-headed households is operationalized as the percent of children 18 years old and younger living in a female-headed household with no spouse present. This measure captures the generally poorer condition of households with only one parent, and specifically households where that one parent is female (U.S. Bureau...
of the Census 1992:413). At the state-level, the data are from the decennial census (U.S. Bureau of the Census 1973b, 1983b, 1993b).

Alcohol

Alcohol Consumption


Alcohol is measured in its three common forms - beer, wine, and liquor - and in the aggregate as ethanol (total alcohol). Ethanol is pure alcohol and ethanol gallons is the total amount of pure alcohol sold as beer, wine, and liquor. The measure of ethanol gallons is created by converting each of the three forms of alcohol to its ethanol component and adding the results. Thus, ethanol equals .045 per gallon of beer, plus .129 per gallon of wine, plus .411 per gallon of liquor (U.S. Department of Health and Human Services 1990:21). Therefore, alcohol will be analyzed by four measures: total beer sales per capita; total wine sales per capita; total liquor sales per capita; and total ethanol sales (all forms of pure alcohol) per capita.

This measure is different from Parker’s measure of alcohol availability, which he measured as the number of liquor stores per 1,000 population. Because sales are
more directly linked to consumption than the presence of a liquor store, this is a more complete measure of alcohol consumption than Parker's measure.

**Interaction Terms**

Two interactions are tested using eight interaction terms (each term repeated four times, once with each of the four measures of alcohol consumption). These terms are constructed to represent the combined effects of two variables (by multiplying the two variables together). The terms are only used in the state-level analysis because of the limited number of cases in the national-level analysis.

**Youth and Alcohol Consumption**

The youth/alcohol consumption interaction term is created for each case by multiplying percent 18-34 by per capita consumption of beer, wine, liquor, and ethanol. Thus, four interaction terms are created, one for each measure of alcohol consumption.

**Poverty and Alcohol Consumption**

The poverty/alcohol consumption interaction term is created for each case by multiplying percent living in poverty by per capita consumption of beer, wine, liquor, and ethanol. Here also, four interaction terms are created, one for each measure of alcohol consumption.
Research Methods

In this section, the methods used for the analysis are described. The state-level analysis is discussed first, and then the national-level analysis is discussed. In each section, I first describe the model structure. Second, I discuss the preliminary analysis, the problems encountered such as linearity and autocorrelation, and the methods for correcting these problems. Third, I discuss the method of model estimation. Finally, I summarize how the models will be presented in anticipation of the results of the analysis in the next two chapters.

State-Level Analysis

Model Structure at the State-Level

The state-level model is estimated using pooled time series analysis. Pooling the data allows for increased sample size to conduct the analysis. By combining cross-sections (50 states) and time series (1970, 1980, and 1990), the model can capture variation across different units (states) in space and variation that emerges over time (Sayrs 1989). As a result of pooling the data, 150 cases are available for analysis.

The multivariate model is constructed based on the model presented in Robert Nash Parker’s work, Alcohol and Homicide (1995b), with some modifications. The control variables, southern region, percent urban, and executions, will be presented first. Then the core variables, economic deprivation (poverty), race composition (percent black), and age structure (young adult population), will be added to the
model. Third, Parker’s additional variables, representing routine activities, social bonds, and economic deprivation, will be added. Fourth, the study variable, alcohol consumption, will be included in the model (control, core, and Parker variables). Finally, the interaction terms, youth/alcohol consumption and poverty/alcohol consumption, will be added to the full model.12

**Preliminary Analysis at the State-Level**

Basic linear regression models contain five assumptions which are likely to be violated in pooled times series analysis. These assumptions are: (1) linearity - the dependent variable exhibits a linear relationship with the independent variables; (2) nonbiased intercept - the mean of the error term is zero; (3) homoskedasticity and no autocorrelation - the variance of the disturbance terms is constant and the disturbance terms are not correlated with each other; (4) no measurement errors - it is possible to repeat the sample with the same independent variables; and (5) no collinearity - there are no exact linear relationships between the independent variables and there are more observations than independent variables (Kennedy 1992:43-45). Thus, tests for these

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12 As mentioned in Chapter 2, the social bond index used by Parker is not included in this study. Parker constructed a social bond index which consisted of adding together the z-scores for three measures: percent of the population aged 5-24 enrolled in school, percent of the population living in households having two or more members, and percent of the population employed (1995b:74). Parker did not indicate the reliability of his index measure. Initially in this analysis, I created a social bond index variable using the same process as Parker, however, factor analysis of the index indicated that it was not a reliable measure (alpha = .54). In addition, other variables from Parker’s analysis are not included (retail eating activity, school enrollment, unemployment, and households of two or more persons) because of severe collinearity problems (see Appendix A).
errors, and corrections for those errors that are violated, were undertaken in the preliminary analysis. The preliminary state-level analysis revealed that the assumption of no collinearity between the independent variables was violated. Collinearity resulted in eliminating variables from the analysis and this process is discussed in Appendix A. In addition, several of the variables exhibited skewed distributions and this was corrected as discussed below.

**Skewness**

Ten state-level variables exhibited skewed distributions at a level of 1.0 or greater. These variables are: poverty, percent black, mobility, wine consumption, liquor consumption, ethanol consumption, youth/wine consumption, youth/liquor consumption, youth/ethanol consumption, and poverty/beer consumption. I therefore calculated the natural log of each of these variables (for a similar approach see Jacobs and Helms 1997). By using the natural log values of these variables, the effects of outliers are reduced and the likelihood of bivariate normality is increased (Fox 1991).

**Model Estimation at the State-Level**

In pooled cross-sectional analysis, the errors may be dependent on time, on units (states), or on how both time and unit together interact. In addition, the error effects may be fixed or random. If the effects are fixed, the error disturbance is unchangeable and unique. If the effects are random, some random process is causing
random variation in the outcomes. If the correct model is a random effects model, Ordinary Least Squares (OLS) estimation should not be used because: "(1) OLS will produce consistent estimates of \( \beta \) but the standard errors will be understated; (2) OLS is not efficient compared to a feasible generalized least-squares (GLS) procedure" (Johnston and DiNardo 1997:391).

In this model, the dummy variable for southern region is invariant across the states over the three time periods, thus a fixed effects model for states is not possible. No variable is invariant across the time periods, thus either a fixed effects or a random effects model for time is possible. Therefore, the model could be a one-way random effects model for states, a one-way random effects model for time, a one-way fixed effects model for time, a two-way random effects model for both states and time, or a random effects for states and a fixed effects for time.

The LaGrange Multiplier test was used to determine which model to estimate. The LaGrange Multiplier statistic tests the null hypothesis that OLS estimation without group effects is the appropriate model (Judge et al. 1985:526). If the test is significant, the null hypothesis is rejected and group effects exist such that the model should be estimated with either fixed or random effects. In this case, because fixed effects are not possible for states, if the LaGrange Multiplier test is significant for states, a random effects model for states should be estimated. However, because fixed effects are possible for time, if the LaGrange Multiplier test is significant for time, a Hausmann test would be needed to determine whether to use fixed or random effects.
From a one-way random effects model for states, the LaGrange Multiplier was significant at the .05 level, thus indicating the need for the random effects model for states. From a one-way random effects model for time, the LaGrange Multiplier was not significant for the model with the control variables or for the model with the control plus core variables, thus indicating that the null hypothesis that OLS is the appropriate model for time could be accepted. For the other time models (control, core, Parker, and alcohol variables), LIMDEP was unable to estimate the random effects model for time and indicated that OLS was appropriate, thus neither random nor fixed effects of time are necessary for the time model. As a result, the pooled cross-sectional model was estimated using a one-way random effects model for states.

Summary of the State-Level Analysis

The final models for the state-level analysis, which are presented in Chapter 4, are estimated using: a one-way random effects model for states and the natural log values of ten variables (poverty, percent black, mobility, wine consumption, liquor consumption, ethanol consumption, youth/wine consumption, youth/liquor consumption, youth/ethanol consumption, and poverty/beer consumption).

Ten models are presented in the analysis. The first model consists of the control variables, southern region, percent urban, and executions. The second model adds the core variables, economic deprivation (poverty), race composition (percent black), and age structure (young adult population). The third model adds the variables
from Parker’s analysis, female labor force participation, mobility, and female-headed
households. The fourth, fifth, sixth, and seventh models include all the variables in
model three plus the study variable, alcohol consumption, with a separate analysis for
each form of alcohol consumption (beer, wine, liquor, and ethanol). Finally, models
eight, nine, and ten present the significant interaction terms. The analysis is based on
150 cases, pooled from the 50 states over 3 time periods (1970, 1980, and 1990), with
never more than eleven variables in any single model (Kennedy 1992:176).

National-Level Analysis

Model Structure at the National-Level

The national-level data are analyzed using two longitudinal model designs
covering the years 1950 to 1995 (one analysis examines 1950-1995 and a second
analysis examines 1960-1995). As noted, the data start and end in these years because
all the variables were available back to 1950 and up to 1995 (although some variables
were available prior to 1950 and some were available after 1995).

A longitudinal national-level analysis is undertaken, in addition to the state-
level analysis, because good measures of alcohol consumption are available at both
levels. In addition, if the effect of alcohol on homicide is real, it should be visible at
both levels of analysis. Finally, the national-level analysis provides a strict test of the
alcohol/homicide connection because of the small number of cases involved and the
use of second differenced variables (discussed below).
In addition, the national-level analysis will be examined over two different time periods, 1950-1995 and 1960-1995, to control for the lower UCR population coverage in the 1950s which may affect the reliability of the dependent variable. For example, from 1950 to 1995, percent UCR coverage averages 68% of the population but ranges from a low of 23% (1957) to a high of 93% (1981). However, between 1960 and 1995, percent UCR coverage averages 77% of the population, and has a smaller range of variation from a low of 60% (1960) to a high of 93% (1981). In the 1960-1995 analysis, percent UCR coverage is not included to lower the number of variables in the model. If percent UCR coverage is included, autocorrelation problematic because of the small number of cases (N = 36). Eliminating the control variable in this time period is not troublesome because of the higher UCR population coverage during these years, 1960-1995.

Because the number of cases is small in both analyses (N = 46 in 1950-1995, N = 36 in 1960-1995), model structure at the national-level is limited, such that no model contains more than five independent variables in the 1950-1995 analysis and no more than four variables in the 1960-1995 analysis. The inclusion of more variables results in severe autocorrelation problems. The included variables were chosen for their importance to the analysis. Percent UCR coverage is included as a control for

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13 When more than five variables are used in the 1950-1995 analysis, the Durbin-Watson statistic does not go above the upper limit of significance. This indicates that autocorrelation exists in the models and is problematic. In the 1960-1995 analysis, if more than four variables are used the Durbin-Watson statistic fails to go above the upper limit of significance.
variation in the dependent variable (this is used only in the 1950-1995 analysis). The
three core variables (unemployment, percent black, and young adult population) are
included because of their importance in the homicide literature. Finally, the four
measures of alcohol consumption are included as the focus of this study.

Also, using a limited number of variables ensures that each model avoids
perfect collinearity, which occurs if there are as many observations as independent
variables (Kennedy 1992:176). This is an obviously important approach. Sociologists
routinely severely limit the number of independent variables when the number of cases
is small. As Cohen and Cohen state: "an important general principle in research
inference is succinctly stated, 'less is more' - more statistical test validity, more power,
and more clarity in the meaning of results" (1983:171).

Thus, in the analysis covering 1950 to 1995, six models are presented. The
first model consists of one control variable, percent Uniform Crime Reports coverage.
The second model adds the core variables, unemployment, percent black, and young
adult population. The remaining four models add the study variable, alcohol, with a
separate analysis for each form of alcohol consumption (beer, wine, liquor, and
ethanol).

In the analysis covering 1960 to 1995, five models are presented. The first
model contains the core variables, unemployment, percent black, and young adult
population. Models two through five add the study variable, alcohol, with a separate
analysis for each form of alcohol consumption (beer, wine, liquor, and ethanol).
Preliminary Analysis at the National-Level

In the national-level analysis, the nonstationarity of the data, a problem resulting from the dynamic structure of the time series, needed to be addressed. Also, one of the assumptions of basic linear regression was violated and had to be corrected, autocorrelation.¹⁴

Nonstationarity

In analyzing time series data, trending is a potential problem that must be tested for and corrected if necessary. If the data are trending, the data are nonstationary. Time series analysis is based on the assumption that the data are stationary. Thus, the model must be estimated in a manner that corrects the trend and makes the data stationary.

Kennedy (1992:254-258) points out several fundamental differences between stationary and nonstationary data:

A stationary series has a mean and there is a tendency for the series to return to that mean, whereas an integrated [nonstationary] series tends to wander widely. Stationary series tend to be erratic, whereas integrated series tend to exhibit smooth behavior. A stationary series has a finite variance, shocks are transitory, and its autocorrelations...die out [over time], whereas an integrated series has an infinite variance (it grows over time), shocks are permanent and its autocorrelations tend to one.

¹⁴ In addition, the models were tested for heteroskedasticity and collinearity. Heteroskedasticity can occur if the variance of the error terms is not constant. The Breusch-Pagan test for heteroskedasticity was performed (Kennedy 1992:118) and the results indicated that heteroskedasticity was not a problem. Collinearity exists if the independent variables are correlated with each other. The standard errors of the independent variables were examined and none exhibited the effects of collinearity.
If the trending data are not corrected, the regression results will be spurious, as indicated by such things as an invalid Durbin-Watson statistic, a high R-squared value, and inflated $t$ statistics (Kennedy 1992:265).

To test for trending, the dependent variable was tested for unit roots using the Phillips-Perron unit root test (Kennedy 1992:266). The Phillips-Perron test was not significant, thus indicating that the null hypothesis in favor of a unit root could not be rejected. When the dependent variable was first-differenced, the Phillips-Perron test was significant at the .05 level, indicating that the null hypothesis in favor of an additional unit root could be rejected. As a result of these tests, the national-level data were first-differenced to correct the trend or nonstationarity of the data. First differencing results in the loss of one case (the first case) in the analysis.

**Autocorrelation**

The data were also tested for autocorrelation using the Durbin-Watson statistic (Kennedy 1992:121). Autocorrelation can result when the assumption that the disturbances have uniform variance and are uncorrelated is violated.

In Model 3 of the 1950-1995 analysis, which includes the control variable, the core variables and beer consumption, the initial Durbin-Watson statistic was 1.039, which is below the lower limits of significance (1.287). This indicates that autocorrelation exists. When the model was corrected for autocorrelation, using the Prais-Winsten correction, the Durbin-Watson statistic is 1.718, which is close to but
not above the upper limit of 1.776. The other alcohol consumption models were even further from the critical Durbin-Watson value after correcting for autocorrelation, thereby indicating the continuing existence of autocorrelation in the models.

To fully correct the autocorrelation exhibited by the models in the 1950-1995 analysis, the data were second differenced (the data were first differenced to correct for trending; for a similar approach see Jacobs and Helms 1997), which results in the loss of one additional case. After second differencing, the Durbin-Watson statistic is above the critical value for all models except those containing wine consumption and liquor consumption. The Prais-Winsten correction was added to those models, and the Durbin-Watson statistic was then above the critical value, indicating that autocorrelation is no longer problematic in the 1950-1995 analysis.

In the 1960-1995 analysis, autocorrelation was also a problem. The data were second differenced, but this did not solve the problem. In part, the autocorrelation was a result of the number of variables in the analysis, five variables (control, core, and alcohol) on only 34 cases (after second differencing). Thus, the control variable, percent UCR coverage, was removed from the analysis. This variable is not needed for the analysis covering 1960-1995 because there is less variation in population coverage during this time period which might affect the reliability of the dependent variable. Finally, the Prais-Winsten correction was added to every model except Model 2 (beer consumption). After these corrections, the Durbin-Watson statistic was above the critical value for all models and autocorrelation was no longer problematic.
Model Estimation at the National-Level

In the 1950-1995 analysis, the model is estimated using Ordinary Least Squares regression on second-differenced variables, to correct for a unit root and autocorrelation. In addition, the Prais-Winsten correction is added to two models, wine consumption and liquor consumption, resulting in those models being estimated by Generalized Least Squares regression. The number of cases is reduced from 46 to 44 as a result of second-differencing the variables, which uses the first two cases. The Prais-Winsten correction for autocorrelation does not result in the loss of any cases.

For the 1960-1995 analysis, one model (containing beer consumption) is estimated using Ordinary Least Squares regression on second-differenced variables, to correct for a unit root and autocorrelation. The Prais-Winsten correction is added to the other four models (core variables, wine consumption, liquor consumption, and ethanol consumption) resulting in those models being estimated by Generalized Least Squares regression. These models also use second-differenced variables to correct for a unit root and autocorrelation. The number of cases is reduced from 36 to 34 as a result of second-differencing the variables. The Prais-Winsten correction for autocorrelation does not result in the loss of any cases.

Although differencing to correct nonstationarity is a severe remedy, "as long as both the dependent variable and the regressors are differenced by the same amount, a significant coefficient on an explanatory variable has the same interpretation as it would if the data were in level form" (Jacobs and Helms 1997:1372, emphasis in the
original). In addition, "results based on second-differenced variables are far less likely to be spurious because joint time-related movements in variables are eliminated" (Jacobs and Helms 1997:1372).

**Summary of the National-Level Analysis**

The final national-level models, which are presented in Chapter 5, are estimated by: first-differencing the variables to correct for trending; and then second-differencing the variables to correct for autocorrelation. Collinearity and heteroskedasticity are not problematic in this analysis. Ordinary Least Squares regression techniques are used to estimate some of the models, other models use Generalized Least Squares regression as a result of adding the Prais-Winsten correction for autocorrelation to these models.

In the analysis covering 1950-1995, six models are used to analyze the data and present the results. The first model consists of one control variable, percent Uniform Crime Reports coverage. Model two adds the core variables, unemployment, percent black, and young adult population. Models three through six each add one of the measures of alcohol consumption (beer, wine, liquor, and ethanol).

In the analysis covering 1960-1995, five models are used to analyze the data and present the results. The first model consists of the core variables, unemployment, percent black, and young adult population. Models two through five each add one of the measures of alcohol consumption (beer, wine, liquor, and ethanol).
Chapter Summary

In this chapter, I described the levels of analysis, the units of analysis and cases, and the operationalization of the variables. Also, I presented the research methods that will be used in the analysis.

In this dissertation, I seek answers to one question. Does alcohol have a significant and independent effect on homicide, net of other important structural variables? This question is answered at two levels of analysis: a pooled cross-sectional analysis at the state-level covering the years 1970, 1980, and 1990; and a longitudinal analysis at the national-level covering 1950 to 1995 (with one analysis examining 1950-1995 and another examining 1960-1995). The models present the effects of the control variables (which are not included in the 1960-1995 analysis), the core variables (economic deprivation, race composition, and age structure), and Parker's variables (in the state-level analysis only) on homicide. Then, alcohol consumption is added to the model to determine whether alcohol has a significant and independent effect on homicide.

The answer to this question at the state-level is presented in Chapter Four. At the state-level, in addition to the direct effect of alcohol on homicide, interaction effects of alcohol are examined. The answer to this question at the national-level is presented is Chapter Five.
<table>
<thead>
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<th>INDEPENDENT VARIABLES</th>
<th>OPERATIONALIZATION</th>
<th>DIRECTION OF EFFECT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Control</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Southern Region</td>
<td>1 for confederate/southern state; 0 for all other states</td>
<td>+</td>
</tr>
<tr>
<td>Percent Urban</td>
<td>Percent of the population living in urban areas (2500 persons or more)</td>
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</tr>
<tr>
<td>Executions</td>
<td>Actual number of executions carried out during the year</td>
<td>-</td>
</tr>
<tr>
<td>Percent UCR Coverage</td>
<td>Nation only: Percent of the total U.S. population covered by the Uniform Crime Reports</td>
<td>-</td>
</tr>
<tr>
<td><strong>Core</strong></td>
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<tr>
<td>Economic Deprivation</td>
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</tr>
<tr>
<td>Poverty</td>
<td>State only: Percent of the population living below the poverty level</td>
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</tr>
<tr>
<td>Unemployment</td>
<td>Nation only: Percent of the population in the civilian labor force that is unemployed</td>
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<tr>
<td>Race Composition</td>
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<tr>
<td>Percent Black</td>
<td>Percent of the population that is African-American</td>
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<tr>
<td>Age Structure</td>
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<tr>
<td>Young Adult Population</td>
<td>Percent of the population between 18-34 years of age</td>
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</table>

Table 2. Operationalization of Independent Variables and Expected Direction of Effects

(continued on next page)
Table 2 (continued)

<table>
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<th>INDEPENDENT VARIABLES</th>
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<th>DIRECTION OF EFFECT</th>
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<td><strong>Parker</strong></td>
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<td><em>Routine Activities</em></td>
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<tr>
<td>Female Labor Force Participation</td>
<td>Percent of the female population 16 years old and older who are employed in the civilian labor force</td>
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<td><strong>Social Bonds</strong></td>
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<tr>
<td>Mobility</td>
<td>Percent of the population 5 years old and older who have moved to a new county in the last 5 years</td>
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<tr>
<td><strong>Economic Deprivation</strong></td>
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<tr>
<td>Female-Headed Households</td>
<td>Percent of the children 18 years old and younger living in female-headed households (no spouse present)</td>
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<td><strong>Alcohol Consumption</strong></td>
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<tr>
<td>Beer Consumption</td>
<td>Per capita gallons of beer sold</td>
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</tr>
<tr>
<td>Wine Consumption</td>
<td>Per capita gallons of wine sold</td>
<td>+</td>
</tr>
<tr>
<td>Liquor Consumption</td>
<td>Per capita gallons of liquor sold</td>
<td>+</td>
</tr>
<tr>
<td>Ethanol Consumption</td>
<td>Per capita gallons of ethanol sold</td>
<td>+</td>
</tr>
<tr>
<td><strong>Interaction Terms</strong></td>
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<tr>
<td>Youth/Alcohol Consumption</td>
<td>Youth multiplied by alcohol consumption (separately for beer, wine, liquor, ethanol)</td>
<td>+</td>
</tr>
<tr>
<td>Poverty/Alcohol Consumption</td>
<td>Poverty multiplied by alcohol consumption (separately for beer, wine, liquor, ethanol)</td>
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CHAPTER 4

RESULTS OF THE STATE-LEVEL ANALYSIS

In this chapter, I present the results of the state-level analysis. The state-level data are pooled across 1970, 1980, and 1990. The unit of analysis is the state year. Because I examine the 50 states at three points in time, the analysis involves 150 cases. As described in Chapter 3, the multivariate models are estimated using a one-way random effects model for states.

The key question in this analysis is whether alcohol has a significant and independent effect on homicide, net of the effects of other factors previous research has demonstrated are central to homicide - economic deprivation, race composition, and age structure of the population. The results presented in this chapter provide answers to this question.

In presenting the results, the bivariate analysis is discussed first and then the multivariate analysis. Ten multivariate models are included in this analysis. Model 1 consists of the control variables, southern region, percent urban, and executions. Model 2 adds the core variables, economic deprivation (poverty), race composition
(percent black), and age structure (young adult population). Model 3 adds variables from Parker’s analysis, female labor force participation, mobility, and female-headed households. Models 4, 5, 6, and 7 add the four measures of alcohol (beer, wine, liquor, and ethanol). Finally, Models 8, 9, and 10 present the interaction terms youth/alcohol consumption and poverty/alcohol consumption. For each model, I discuss the findings of the analysis and, for the models containing Parker’s variables (Models 3 to 10), I compare these results to his findings.

**Bivariate Analysis**

**Descriptive Statistics**

Table 3 contains the means and standard deviations for the variables used in this study. These data show that on average there were 7.35 murders per 100,000 state population across the three time periods measured, 1970, 1980, and 1990. The lowest murder rate was .5 in North Dakota in 1970. The highest murder rate was 20 in Nevada in 1980.

Among the core variables, the average size of the population living below the poverty level was 13.45% per state, ranging from a low of 6.4% (New Hampshire 1990) to a high of 35.4% (Mississippi 1970). The average size of the African-American population per state was 9.15%, ranging from a low of .2% (South Dakota 1970) to 36.8% (Mississippi 1970). Also, the average size of the population between 18-34 years of age was 27.13% per state.
Other characteristics include: 11 of the 50 states (22%) are southern states; 67.06% of the population lived in urban areas; 49.84% of the female population 16 years old and older participated in the labor force; 20.29% of the population 5 years old and older had moved to a new county in the previous 5 years; and 12.86% of the children 18 years old and younger lived in female-headed households.

Finally, the alcohol measures indicate that across the three time periods there was an average of 22.33 gallons of beer sold per person. The lowest amount of beer consumption was 9.6 gallons, in Alabama in 1970. The high for beer consumption was 40.2 in Nevada in 1990. On average, 1.6 gallons of wine was sold per person, ranging from .28 gallons (Iowa 1970), to 5.01 (Nevada 1980). Also, there was an average of 1.83 gallons of liquor sold per person, ranging from .81 gallons (Utah 1990), to 5.71 gallons (Nevada 1980). Finally, there was an average of 1.96 gallons of ethanol sold per person, ranging from a low of .95 gallons (Alabama 1970) to a high of 4.65 gallons (Nevada 1980).

Correlations Between the Variables

The correlation matrix in Table 4 indicates the bivariate relationships among all of the variables. On the bivariate level, homicide rates are significantly correlated with eleven of the twenty-one variables in the analysis. Among the control variables, homicide rates are significantly correlated with all three of the variables, southern region, percent urban, and executions. Also, homicide rates are significantly
correlated on the bivariate level with all three of the core variables, poverty, percent black, and young adult population. Of the three variables from Parker’s analysis, homicide rates are only significantly correlated with one variable, female-headed households.

In addition, homicide rates are not significantly correlated with any of the four measures of alcohol. Although an interesting result, the bivariate relationship does not clearly indicate whether a variable will be significant in the multivariate analysis because no controls are present. Finally, homicide rates are significantly correlated with four of the eight interaction terms at the bivariate level. Homicide rates are correlated with the four poverty/alcohol interaction terms, but not correlated with the four youth/alcohol interaction terms.

**Multivariate Analysis**

The multivariate models are constructed by adding variables to the analysis in the following order: (1) the control variables are presented first, then (2) the core variables are added to the model, (3) the additional variables from Parker’s analysis are added, (4) the four measures of alcohol consumption are added, and finally (5) the interactions terms are added to the full model (control, core, Parker, and alcohol).
Control Variables

Model 1 in Table 5 presents the results of regressing the control variables, southern region, percent urban, and executions, on homicide rates. This initial model indicates that southern region and percent urban are positive and significant in explaining homicide rates. Executions is negative, as expected, but it is not significant. With respect to the Buse’s R-square, this initial model explains 43% of the variance in homicide rates. These findings suggest that location in the South and population density are among the factors that explain homicide.

Core Variables

Model 2 in Table 5 adds the core variables, economic deprivation (poverty), race composition (percent black), and age structure (young adult population), to the control variables. All three of the core variables are significant in explaining homicide rates. Further, the amount of explained variance significantly increases as well (Buse’s R-square = .73). Model 2, therefore, confirms previous research (see especially Land, McCall and Cohen 1990) that economic deprivation, race composition, and age structure are significant multivariate predictors of homicide, net of the control variables, all of which behave as they did in Model 1.
Variables from Parker’s Analysis

Model 3 in Table 5 adds the three variables from Parker’s analysis, female labor force participation, mobility, and female-headed households. All three are significant in explaining homicide rates. As expected female labor force participation negatively affects homicide, whereas mobility and female-headed households positively affect homicide rates. In addition, the core variables remain significant. Among the control variables, southern region is no longer significant. Overall, a total of seven variables are significant in this model: percent urban, poverty, percent black, young adult population, female labor force participation, mobility, and female-headed households. Also, the amount of variation in homicide rates has increased, as indicated by the Buse’s R-square value (.78).

I want to pause to underscore two observations grounded in the findings in Model 3 of Table 5. First, southern region is no longer significant when the additional variables replicating Parker’s analysis are added to the model. Thus, southern region has no independent effect on homicide when these other factors are controlled for; the effect of southern region is mediated by the other variables in the model. This result is supported by the literature which fails to find a consistent significant effect of southern region (Bailey 1984; Gastil 1971; Jackson 1984; Land, McCall and Cohen 1990; Loftin and Hill 1974; Messner 1982, 1983; Parker 1995b; Parker and Smith 1979; Simpson 1985; Smith and Parker 1980).
Second, the significance of female-headed households in this model suggests the importance of economic disadvantage in explaining homicide rates. Female-headed households are more economically disadvantaged than other types of households, whether male-headed households or married-couple households (U.S. Bureau of the Census 1992:413). Thus, female-headed households represent economic disadvantage which, as also indicated by the significance of poverty, results in increased homicide rates.

**Comparison to Parker's Results**

Model 3 in Table 5 confirms some of Parker's findings (1995b). These results support Parker's finding that when women work outside of the home, homicide rates decrease. As suggested by Parker (1995b:82-83), this may be related to the lowered exposure of working women to potential offenders (their intimate associates) and the financial resources that working women have to protect or remove themselves from dangerous situations. However, this supposition cannot be confirmed by these data as the homicides are not disaggregated by sex. As this study is concerned with the effects of alcohol on homicide, disaggregation was not undertaken. Future research on routine activities theory should examine the causes of this finding.

Equally important, the significance of mobility, which was also found by Parker (1995b:80) supports the hypothesis from social bonds theory that as people are
less connected to a community, there is less social control. The clear consequence is significantly higher homicide rates.

There are also a handful of differences between my findings and those of Parker (1995b). Parker found southern region to be significant, but only in 1960. In this analysis, southern region is not significant when the variables replicating Parker’s analysis are added to the model. Also, female-headed households is positive and significant in this study, but family structure was not significant in Parker’s analysis. Importantly, of the core variables, Parker did not find significant effects for economic deprivation or age structure of the population, yet these variables are significant in this study.¹⁵

Thus, the results of the analysis, to this point, support some of Parker’s findings yet are clearly different from Parker’s results. For instance, more of the independent variables are significant in this analysis. Specifically percent urban, poverty, young adult population, mobility, and female-headed households are significant in this study but were not significant in Parker’s study. Also, all of the core variables are significant, as expected, whereas Parker only found percent black to be significant.

¹⁵ Parker referred to percent black as an indicator of economic deprivation in his study, and this was significant in all time periods.
Alcohol Consumption

The uniquely important contribution of Parker’s research was that alcohol matters when it comes to homicide (1995b:100). Parker writes (1995b:100):

The results of these tests ... provide reasonable empirical support for the notion that alcohol plays a significant role in the generation of homicide.... These results show that between 1960 and 1980 in the United States alcohol contributed in an important way to the increase in homicide rates experienced by the country as a whole and the 256 cities examined here.

However, Parker’s results did not reveal a uniformly significant alcohol effect. Parker only found a significant direct effect of alcohol in one of the three time periods he studied, 1970. Parker suggests that this is a result of his measure of alcohol availability, the number of liquor stores per 1,000 population, which measured mostly liquor rather than the other forms of alcohol, beer or wine (Parker 1995b:83-84)

The key question of this study is whether alcohol has a significant and independent effect on homicide, net of the effects of other important structural factors. To more fully answer this question, the measure of alcohol used here, and the time period covered address the limitations of Parker’s findings. In this study, the measure of alcohol includes all forms of alcohol - beer, wine, liquor, and ethanol. In addition, this study addresses the lack of uniformity in Parker’s findings by using a pooled cross-sectional analysis to determine if alcohol has a significant effect on homicide over time. Finally, this study looks at more recent time periods than Parker, with the state-level analysis examining data from 1970, 1980, and 1990.
**Beer**

Model 4 in Table 6 provides an initial answer. Beer has a significant and independent effect on homicide rates, net of the effects of the other variables. Beer is significant at the .05 level and positively affects homicide rates. However, the explained variance of homicide rates only slightly increases with this model (Buse’s R-square = .784). Yet, this finding supports the hypothesis that increased alcohol consumption, specifically beer consumption, results in increased homicide rates.

Also in this model, six of the seven variables that were significant in Model 3 are also significant and the direction of effect for each variable is the same. These six variables are: percent urban, poverty, percent black, young adult population, female labor force participation, and mobility. Female-headed households, which was significant in Model 3, is not significant here. Also, southern region and executions are not significant in this model and they were not significant in Model 3. These results for the non-alcohol variables are the same in each of the alcohol models.

**Wine**

However, not all alcohol matters in the context of homicide. Model 5 in Table 6 shows that when alcohol is measured by wine sales, the parameter estimate is positive, but not significant. Beer sales and wine sales are, therefore, not equally important in explaining homicide. On the contrary, of these two measures, only beer
sales makes a positive and significant explanatory contribution when examined using state-level homicide rates.

**Liquor**

Model 6 in Table 6 presents the results for liquor consumption. Like beer, liquor sales positively and significantly affect state-level homicide rates. Further, the findings for the other variables remain as they were in the earlier alcohol models (Models 4 and 5).

**Ethanol**

Ethanol is first beer alcohol (51.2% average over the three years - 1970, 1980 and 1990) and second, liquor alcohol (38.3%). Therefore, wine accounts for only 10.5% of per capita ethanol sales.

Because beer and liquor make-up most per capita ethanol sales, the data presented in Model 7 in Table 6 come as no surprise. Ethanol sales also are positive and significant. Further, the other variables in Model 7 behave as they did in the previous alcohol models (Models 4, 5, and 6).

**Overall Results of the Alcohol Models**

The addition of alcohol consumption to the model containing the control variables, the core variables, and additional variables from Parker's analysis (Model 3,
Table 5), indicates that alcohol is an important explanatory variable that has been left out of most previous analyses of homicide. Three forms of alcohol consumption were found to be significant in explaining homicide rates, beer consumption, liquor consumption, and ethanol consumption. However, wine consumption was not significant.

These findings indicate that it is important to fully operationalize alcohol consumption. If the variable is not specified to include all forms of alcohol, the results of the analysis could be misleading. For instance, wine was not significant. Thus, if a measure of alcohol was used which primarily measured wine consumption, the results might indicate that alcohol was not causally related to homicide. This finding would mask the effects of the other forms of alcohol on homicide.

Also, the addition of alcohol consumption does little to change the effects of the significant variables from Model 3 where alcohol is not included. Only one change occurs. In all four alcohol models, female-headed households is not significant although it was significant when alcohol was not in the model. Thus, female-headed households has no independent effect on homicide when alcohol consumption is controlled for in the model. Therefore, the effect of female-headed households is mediated by alcohol consumption. This result is supported by the literature which fails to find a consistent significant effect of female-headed households on homicide (see review in LaFree et al. (1992) which discusses the inconsistency of female-headed households in the literature; see also Chamlin (1989) and LaFree et al. (1992) for two
studies that did not find a significant effect of female-headed households on homicide; and see Sampson (1987) and Messner and Sampson (1991) for two studies that did find a significant and positive effect of female-headed households on homicide).

Finally, the other six variables (percent urban, poverty, percent black, young adult population, female labor force participation, and mobility) that are significant in Model 3 have consistent effects with the addition of alcohol. These findings demonstrate that alcohol consumption, specifically beer and liquor consumption, have significant independent effects on homicide, net of the effects of these other variables which remain stable with the addition of alcohol.

Comparison to Parker’s Results

The results of the alcohol consumption models are important. These findings indicate that not all forms of alcohol are causally related to homicide. Specifically, beer and liquor consumption are causally related to homicide but wine consumption is not. In addition, ethanol consumption is causally related to homicide, but that is largely a reflection of beer and, to a lesser extent, liquor consumption. It is important to note that the major component of ethanol consumption is beer. As indicated in the descriptive statistics, average beer sales are much greater than either wine or liquor sales: 22 gallons of beer versus 1.6 gallons of wine and 1.8 gallons of liquor sold per
person. Thus, although there is less pure alcohol in beer compared to wine or liquor, the amount of beer that is consumed causes it to be the largest component of ethanol.\textsuperscript{10}

This information is important in comparing these results to the findings of Parker's study. Parker's study found that alcohol was significant in explaining homicide rates, but only in 1970. His finding is caused by his measure of alcohol availability as the number of liquor stores per 1,000 population. By focusing on liquor stores, Parker fails to account for all forms of alcohol. Specifically, beer and wine are underrepresented by his measure of alcohol because liquor stores mostly sell liquor, although in some states beer and wine may be available. Parker's measure also misses other outlets for beer and wine sales.

The results of this study indicate that overlooking or underrepresenting the measurement of beer consumption could change the outcome of a study on alcohol. By separating alcohol into its four forms, beer, wine, liquor, and ethanol, this study indicates that although liquor is significant in explaining homicide rates, beer is also significant and is the major component of ethanol. Also, this study indicates that wine is not significant in explaining homicide. Thus, Parker's results appear limited by his measure of alcohol. If his measure had included beer, he might have found a significant effect of alcohol in more than one time period.

\textsuperscript{10} For example, if alcohol sales in one state consisted of 23.9 gallons of beer, 1.33 gallons of wine, and 1.03 gallons of liquor (Ohio 1990), total ethanol would be equal to: (23.9 x 0.045) + (1.33 x 0.129) + (1.03 x 0.411) = 1.0755 (beer) + 0.17157 (wine) + 0.42333 (liquor) = 1.6704 gallons ethanol. Thus, in this example, nearly two-thirds of the ethanol value is from beer (formula from U.S. Dept. of Health and Human Services 1990:21).
The Interaction Terms

Parker also analyzed interaction effects of alcohol. Parker’s interaction terms combined alcohol with a variable from each of the three theories examined in his study, routine activities, social bonds, and economic deprivation. He constructed his interaction terms by multiplying dummy variables that represented the extremes of the components. For example, he combined dummies for high poverty (measured as 1 if the percentage of single-parent households was more than one standard deviation above the mean) with high alcohol consumption (measured as 1 if the number of liquor stores per 1,000 population was more that one standard deviation above the mean for all the cities). He used this same formula to construct interaction terms for high young adult population/high alcohol (high young adult population was measured as 1 if the median age of a city was more than one standard deviation from the mean) and low social bonds/high alcohol (low social bonds was measured as 1 if the value of the social bonds index was more than one standard deviation below the mean).

Like his findings for a main effect of alcohol, Parker’s findings for interaction effects were less than conclusive. Parker found a significant and positive effect for high poverty/high alcohol only in 1970, for high young adult population/high alcohol only in 1960, and for low social bonds/high alcohol only in 1960.

In this study, interaction terms are created using traditional methods of multiplying the main effects of the variables. Two interaction terms are created to replicate Parker’s analysis. These terms are: poverty/alcohol consumption (created by
multiplying the four alcohol measures each by the poverty measure), and youth/alcohol consumption (created by multiplying the four alcohol measures each by young adult population). Thus, eight interaction terms are analyzed.17

Table 7 presents the results when the interaction terms are added to the variables in Models 4, 5, 6, and 7 (control, core, Parker, and alcohol variables). There are three models in Table 7, representing the three interaction terms which were significant in this analysis. The significant interaction terms are poverty/wine consumption, poverty/liquor consumption, and poverty/ethanol consumption.

**Poverty/Wine Consumption**

Model 8 in Table 7 presents the results of the analysis with the interaction term, poverty/wine consumption, added to Model 5 (control, core, Parker, and wine consumption). As in the model with the main effects of wine consumption, percent black, young adult population, female labor force participation, and mobility are significant. However, percent urban, which was significant in all previous models, is not significant in this model.

The poverty/wine consumption interaction term is significant at the .001 level and positively effects homicide rates. Thus, the combined effect of poverty and wine consumption significantly increases the homicide rate. This finding supports the hypothesis presented in Chapter 2.

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17 A social bond interaction term is not presented because Parker's social bond index was not used in this study.
**Poverty/Liquor Consumption**

Model 9 in Table 7 presents the results of the analysis in which poverty/liquor consumption is added to Model 6 (control, core, Parker, and liquor consumption). As in the model with the main effects, percent urban, percent black, young adult population, female labor force participation, and mobility are significant in explaining homicide rates and the direction of effects remains the same. One change has occurred: female-headed households is now significant and positively related to homicide rates.

The poverty/liquor consumption interaction term is significant at the .01 level and positively effects homicide rates. Thus, the combined effect of poverty and liquor consumption significantly increases the homicide rate. This supports the hypothesis presented in Chapter 2.

**Poverty/Ethanol Consumption**

Model 10 in Table 7 presents the results of the analysis in which poverty/ethanol consumption is added to Model 7 (control, core, Parker, and ethanol consumption). As in the the main effects model, percent urban, percent black, young adult population, female labor force participation, and mobility are significant in explaining homicide rates and the direction of effects is the same. Thus, no changes have occurred between the model with the main effect of ethanol and this model.
The poverty/ethanol consumption interaction term is significant at the .01 level and positively affects homicide rates. Thus, the combined effect of poverty and ethanol consumption significantly increases the homicide rate. This supports the hypothesis in Chapter 2.

**Other Interaction Terms**

Five other interaction terms were also analyzed, but none of these were significant. These other terms were: poverty/beer consumption; youth/beer consumption; youth/wine consumption; youth/liquor consumption; and youth/ethanol consumption. Thus, none of the interaction terms with beer consumption were significant, and none of the youth/alcohol interaction terms were significant. Beer, then has a main effect on homicide but it does not significantly interact with youth or poverty to effect homicide. The results of these findings are presented in Table 15 in Appendix B.

**Overall Results of the Interaction Term Models**

Three interaction terms were found to have significant independent and positive effects on homicide rates, net of the effects of the other variables in the model, including the main effect components of the interaction terms. The significant interaction terms were poverty/wine consumption, poverty/liquor consumption, and poverty/ethanol consumption. Thus, the combined effect of poverty and three forms
of alcohol consumption (wine, liquor and ethanol) significantly increase the homicide rate. These results indicate that alcohol consumption has interaction effects on homicide as well as main effects.

Also, the interaction terms which included poverty exhibit fairly consistent effects. Thus, poverty interacts with three forms of alcohol consumption (wine, liquor, and ethanol). However, poverty does not interact with beer consumption. This indicates that the form of alcohol consumed is important in specifying the interaction effects, because not all forms of alcohol interact in the same way with other variables which are significant in explaining homicide. Therefore, if a study of alcohol on homicide used a measure of beer consumption only, it is possible that the study would fail to find interaction effects of alcohol that exist but are specific to other forms of alcohol consumption. Clearly, operationalization of alcohol is important in fully determining the effects of alcohol on homicide, whether considering main or interaction effects.

Finally, the five variables, excluding the components of the interaction terms, that are significant in the main alcohol models have generally consistent effects with the addition of the interaction terms. Four of the five variables - percent black, young adult population, female labor force participation, and mobility - were significant in all three interaction models, and percent urban was significant in two of the three models. Also, one variable which was not significant in the main effect alcohol models was significant in one of the interaction models, female-headed households.
Comparison to Parker’s Results

A significant problem in Parker’s study is his measure of alcohol availability, which captured mostly liquor and not beer or wine availability. My data demonstrate that if alcohol is not fully measured, the results of a study may be misleading.

More specifically, in the analysis of the main effects, beer, liquor, and ethanol were significant, but wine was not. However, in the interaction models, wine was significant in its interaction with poverty, but none of the interaction terms with beer was significant. Thus, even if a main effect of one form of alcohol does not exist, an interaction effect with that form may exist, and vice versa. These results clearly indicate the need to fully specify the form of alcohol consumption in both the main effects model and the interaction effects models. Put differently, Parker’s measure of the effects of alcohol yielded inconsistent results because he did not fully measure alcohol consumption.

Chapter Summary

In this chapter, I presented my state-level analysis of the effect of alcohol on homicide. The results indicate that alcohol has both main and interaction effects on homicide. Beer, liquor, and ethanol consumption have significant and positive main effects on homicide, but wine consumption does not have a main effect. Also, interaction effects were found. Specifically, three types of interaction with poverty were found to be significant and to positively affect homicide rates: poverty/wine
consumption, poverty/liquor consumption, and poverty/ethanol consumption. Thus, the combined effect of poverty and three forms of alcohol consumption (wine, liquor and ethanol) significantly increase the homicide rate.

These findings differ somewhat from Parker's results. Parker found a main effect of alcohol on homicide, but only in 1970. Also, Parker found inconsistent interaction effects of alcohol: poverty/alcohol was significant in 1970, youth/alcohol was significant in 1960, and social bonds/alcohol was significant in 1960.18

I believe the differences are mainly attributable to Parker's measure of alcohol. Parker's measure, liquor stores per 1,000 population, is not as specific as the measure in this study, which permits a more complete analysis of the effects of alcohol. Also, Parker's finding of an interaction effect between youth and alcohol in 1960 may result from the combination of two trends: high liquor consumption (sales peaked in the 1970s) and high young adult population (as a result of the "baby-boom" generation).

Other possible explanations for the different findings in the two studies come from Land, McCall and Cohen (1990) who suggest that many of the different findings in homicide research can be attributed to different time periods and different levels of analysis. Parker's study and my study cover different time periods: Parker looked at 1960, 1970, and 1980, and my analysis involves 1970, 1980, and 1990. Also, the

18 Again, no comparison has been made to Parker's finding of a significant interaction effect between social bonds and alcohol as no similar social bonds index was used in this study.
studies involve different levels of analysis, Parker examined alcohol and homicide at the city-level and this analysis examines alcohol and homicide at the state-level.

In addition to the findings on alcohol and homicide, the results of the other variables in the analysis were presented and discussed. Importantly, the core variables, representing economic deprivation, race composition, and age structure of the population, were significant in all of the models presented. This is consistent with the literature on homicide which indicates the importance of these variables in explaining homicide (Land, McCall and Cohen 1990). Also, three other variables were found to be significant in virtually all models. These were: percent urban, female labor force participation, and mobility. Female labor force participation was the only variable negatively related to homicide.

Thus, three conclusions emerge in the wake of my state-level analysis. First, alcohol is indeed a causal factor in the context of homicide. Second, isolation of the effects of alcohol requires careful and complete operationalization. Third, beer is a uniquely important factor in explaining homicide rates, as evidenced by its main effect on homicides and by its importance as the major component of ethanol.
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N = 150

Note: The variables in this table are not logged or altered.

Table 3. Means and Standard Deviations of the Variables Used in the State-Level Analysis
### Table 4. Correlation Matrix of Variables Included in the State-Level Analysis

(continued on next page)
Table 4 (continued)

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† p < .05 ‡ p < .01 (one-tailed tests) N = 150 Note: Ten variables are presented in their logged (ln) form.
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<tr>
<th>Variable</th>
<th>Model 1 (Control)</th>
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<th>Model 3 (Parker)</th>
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† p < .05 ‡ p < .01 (one-tailed tests)  
N = 150

Note: Numbers in parentheses are standard errors.

Table 5. Unstandardized Coefficients and Standard Errors for Regression of Homicide Rates on Control, Core, and Parker Variables: 50 States in 1970, 1980, and 1990
<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 4 (Beer)</th>
<th>Model 5 (Wine)</th>
<th>Model 6 (Liquor)</th>
<th>Model 7 (Ethanol)</th>
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</table>

† p < .05 † † p < .01 (one-tailed tests)  
N = 150

Table 6. Unstandardized Coefficients and Standard Errors for Regression of Homicide Rates on Control, Core, Parker, and Alcohol Consumption Variables: 50 States in 1970, 1980, and 1990

Note: Numbers in parentheses are standard errors.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 8 (Pov/Wine)</th>
<th>Model 9 (Pov/Liq)</th>
<th>Model 10 (Pov/Eth)</th>
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<td><strong>Control</strong></td>
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</tr>
<tr>
<td>Southern Region</td>
<td>0.967 (0.797)</td>
<td>0.640 (0.795)</td>
<td>0.448 (0.791)</td>
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<td>Percent Urban</td>
<td>0.023 (0.021)</td>
<td>0.046 † (0.019)</td>
<td>0.033 † (0.019)</td>
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<td>Executions</td>
<td>-0.076 (0.378)</td>
<td>0.235 (0.370)</td>
<td>-0.304 (0.369)</td>
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<td><strong>Core</strong></td>
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</tr>
<tr>
<td>Poverty</td>
<td>0.869 (1.488)</td>
<td>-1.342 (2.524)</td>
<td>-4.223 (3.684)</td>
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<td>Percent Black</td>
<td>1.730 † (0.255)</td>
<td>1.428 † (0.242)</td>
<td>1.708 † (0.245)</td>
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<td>Young Adult Population</td>
<td>0.238 † (0.072)</td>
<td>0.255 † (0.070)</td>
<td>0.231 † (0.071)</td>
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<td><strong>Parker</strong></td>
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</tr>
<tr>
<td>Female Labor Force Participation</td>
<td>-0.099 † (0.037)</td>
<td>-0.110 † (0.038)</td>
<td>-0.935 † (0.036)</td>
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<td>2.761 † (0.991)</td>
<td>2.499 † (0.982)</td>
<td>2.544 † (0.982)</td>
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<td>Female-Headed Households</td>
<td>0.075 (0.101)</td>
<td>0.198 † (0.093)</td>
<td>0.076 (0.095)</td>
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<td><strong>Alcohol Consumption</strong></td>
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<tr>
<td>Wine Consumption</td>
<td>-2.335 † (1.096)</td>
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<td>Liquor Consumption</td>
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<td>-4.293 † (2.355)</td>
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<tr>
<td>Ethanol Consumption</td>
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<td>-6.125 † (3.542)</td>
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<tr>
<td><strong>Interaction Terms</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Poverty/Wine Consumption</td>
<td>0.191 † (0.061)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poverty/Liquor Consumption</td>
<td></td>
<td>0.259 † (0.096)</td>
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</tr>
<tr>
<td>Poverty/Ethanol Consumption</td>
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<td>0.384 † (0.145)</td>
<td></td>
</tr>
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<td>Constant Term</td>
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<td>-9.574</td>
<td>-2.602</td>
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<td>Buse's R-Square</td>
<td>0.800</td>
<td>0.799</td>
<td>0.801</td>
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</tbody>
</table>

† p < .05 † p < .01 (one-tailed tests)  N = 150

Note: Numbers in parentheses are standard errors.

Table 7. Unstandardized Coefficients and Standard Errors for Regression of Homicide Rates on Control, Core, Parker, Alcohol Consumption, and Interaction Terms: 50 States in 1970, 1980, and 1990
CHAPTER 5

RESULTS OF THE NATIONAL-LEVEL ANALYSIS

In this chapter, I present the results of the national-level analysis. Two national-level analyses are presented, both using a longitudinal model design: (1) the data are analyzed for the years 1950 to 1995; and (2) the data are reanalyzed for the years 1960 to 1995. Two analyses are used because of the limitations of the dependent variable, as indicated by the percent UCR coverage for the years under analysis. As described in Chapter 3, the UCR covers a small amount of the total U.S. population in the years prior to 1960 (with a low of 23% coverage in 1957 to a high of 40% in 1955 between 1950-1959). After 1960, the coverage improves with the lowest coverage at 60% in 1960 and the highest at 93% in 1981, and a mean of 77%. Therefore, percent UCR coverage is used in the 1950 to 1995 analysis as a control variable so that the effects of the other variables can be analyzed net of the effect of variation in population coverage in the dependent variable. The analysis is then repeated for the years 1960 to 1995 when population coverage does not vary as greatly and there is less concern with the validity of the dependent variable.
In addition, the number of independent variables is limited in each analysis because of the small number of cases and the severe autocorrelation that occurs when more variables are used. As discussed in Chapter 3, the data are second differenced to correct for nonstationarity and autocorrelation. Second differencing results in a loss of the first two cases. Thus, the 1950 to 1995 analysis is run on 44 cases, and the 1960 to 1995 analysis is run on 34 cases.

Because the number of cases is small, the models in the 1950 to 1995 analysis are structured using a maximum of five variables: a control variable (percent Uniform Crime Reports coverage), an economic deprivation variable (unemployment), a race composition variable (percent black), an age structure variable (young adult population), and an alcohol consumption variable (beer, wine, liquor, or ethanol). The core variables were chosen for inclusion because of their central importance in explaining homicide as indicated by the literature. The alcohol variables represent the key study variables. The models in the 1960 to 1995 analysis are structured using a maximum of four variables. In this analysis the models are the same as in the 1950 to 1995 analysis, except that percent UCR coverage is not included to reduce the number of variables used. Again, this is necessary because of autocorrelation problems.

Although a limited number of variables are included, the national-level analysis is still able to address the key question of this research. Does alcohol have a significant and independent effect on homicide, net of the effects of other factors previous research has demonstrated are central to homicide, specifically economic
deprivation, race composition, and age structure of the population? Thus, the results presented in this chapter provide answers to this question.

In presenting the results, the 1950 to 1995 analysis is presented first and then the 1960 to 1995 analysis. For both analyses, the bivariate analysis is discussed first and then the multivariate analysis.

1950 to 1995 Analysis

Bivariate Analysis

Descriptive Statistics

Table 8 contains the means and standard deviations for the variables used in this study. These data show that on average there were 7.3 murders per 100,000 population each year nationally for the years between 1950 and 1995. Also, on average the Uniform Crime Reports covered 68% of the population. The lowest coverage was 23% in 1957, and the highest coverage was 93% in 1981.

Of the core variables, unemployment averaged 5.77% and ranged between 2.9% and 9.7%. Also, the African-American population averaged 11.23%, and the young adult population, between the ages of 18 to 34, averaged 25.84% of the total U.S. population.

Alcohol consumption also varied during this time period. Beer consumption averaged 19.65 gallons per person, with a low of 14.86 gallons in 1958 and a high consumption of 24.59 gallons in 1981. Wine consumption ranged from .82 gallons
per person in 1951 to 2.43 gallons per person in 1986. The average wine consumption was 1.5 gallons per person. Liquor consumption varied from 1.16 gallons per person in 1952 to 1.99 gallons in 1978, with an average of 1.57 gallons consumed per person. Finally, ethanol averaged 1.72 gallons per person, and ranged from a minimum of 1.29 gallons in 1954 to a maximum of 2.19 gallons consumed per person in 1981.

Correlations Between the Variables

The correlation matrix presented in Table 9 shows the bivariate relationships among the variables in the analysis, using the second differenced values of the variables. On the bivariate level, homicide rates are significantly correlated with percent black and beer consumption. Wine, liquor, and ethanol consumption are negatively correlated to homicide rates, although they are not significant. Also, UCR coverage is significantly correlated with unemployment and wine consumption.

Of the core variables, unemployment is significantly and negatively correlated with beer, liquor, and ethanol consumption. Also, young adult population is significantly and negatively correlated with wine and ethanol consumption. Finally, of the alcohol measures, beer and wine are significantly correlated with liquor consumption, and ethanol is correlated with each of the other alcohol measures, because it is constructed using these variables.
Multivariate Analysis

The multivariate models are constructed by adding variables to the analysis in the following order: (1) the control variable is presented first, then (2) the core variables are added, and (3) the four measures of alcohol consumption are added.

Control Variable

Model 1 in Table 10 presents the results of regressing the control variable, percent UCR coverage, on homicide rates. This initial model indicates that the control variable is not significant in explaining changes in homicide rates. However, the direction of effect for percent UCR coverage is negative as expected. Thus, this initial model explains none of the variance in homicide rates (Buse’s R-square = 0.00). Percent UCR coverage clearly is not an explanatory variable in relation to homicide rates. However, the measure is still important for the following models as a control variable because of the uneven coverage of the UCR in reporting homicide rates, which might affect the results of the other variables.

Core Variables

Model 2 in Table 10 adds the core variables - economic deprivation (unemployment), race composition (percent black), and age structure (young adult population) - to the control variable, percent UCR coverage. Two of the core variables are positive and significant in explaining changes in homicide rates, percent black and
young adult population. In addition, unemployment, although not significant does exhibit a positive relationship to changes in homicide. Further, the amount of explained variance greatly increases (Buse’s R-square = .36).

Model 2 therefore confirms previous research (see especially Land, McCall and Cohen 1990) that race composition and age structure of the population are significant multivariate predictors of shifts in homicide rates, net of the control variable, which continues to behave as it did in Model 1. However, the previous research on the importance of economic deprivation is not supported by this model because unemployment is not significant.

Alcohol Consumption

The uniquely important contribution of Parker’s research was his finding that alcohol sometimes matters when it comes to homicide (Parker 1995b:100). If his finding is correct, it should be observed at different levels of analysis. Thus, the key question of this analysis, whether alcohol has a significant and independent effect on homicide, net of other important variables, is answered in part by the models presented below. This analysis has the benefit of a more complete measure of alcohol which decomposes alcohol into its three components - beer, wine, liquor - and also measures total alcohol consumption (ethanol). This measure is a more direct measure of consumption by capturing actual sales of alcohol. Models 3 through 6 in Table 10 present the results of adding alcohol consumption to the control and core variables.
**Beer**

Model 3 in Table 10 provides an initial national-level answer to the question about alcohol and homicide. Beer is significant at the .01 level and positively affects shifts in homicide rates. Also, the amount of explained variance increases from 35% to 47% (Model 3 Buse’s R-square = .47). These results indicate that beer has a significant and independent effect on changes in homicide rates, net of the other variables previous research has shown to be important. This supports the hypothesis that increased alcohol consumption, specifically beer consumption, results in increased homicide rates.

Also, the core variables that were significant in Model 2, percent black and young adult population, remain significant in this model. Unemployment, which was not significant in Model 2, is now significant at the .05 level. All three variables positively affect shifts in homicide rates. Thus, these findings give additional support to the literature which suggests that the core variables are significant explanatory factors of homicide.

**Wine**

As in the state-level analysis, not all alcohol matters in the context of national-level homicide rates. Model 4 in Table 10 shows that when wine sales are used to measure alcohol consumption, the variable is negative and not significant in explaining change in homicide rates. Interestingly, the Buse’s R-square value is .37,
which is barely above the value in Model 2 where no alcohol consumption measure was included in the model. This indicates that wine makes no explanatory contribution.

The core variables of percent black and young adult population exhibit strong and consistent effects on shifts in homicide rates. Both of these variables are significant and positively associated with the dependent variable, as they have been in every model at the national-level and in every model at the state-level. Unemployment, which was significant only in the beer consumption model, is again not significant. However, this result is supported by the literature which finds inconsistent effects of unemployment on homicide (Land, McCall and Cohen 1990).

**Liquor**

Model 5 in Table 10 presents the results for liquor consumption. Importantly, liquor is significant but it negatively effects shifts in homicide rates. When the effect of a variable is opposite the expected direction of effect, a two-tailed test should be used to determine significance. The negative effect of liquor is also significant using a two-tailed test. Thus, this indicates that liquor consumption does not fuel homicide rates at the national-level. The importance of the other variables, percent black and young adult population, remains the same in this model as in the other alcohol consumption models.
One possible explanation for the negative effect of liquor on homicides is the profile of the typical drinker of liquor: males, 45 years of age or older, unmarried, who drink liquor in a bar, before a meal, and when they feel somewhat happy or calm (Pittman and Klein 1989). This profile is clearly different from a key factor that homicide research indicates is causally related to homicide, specifically young males (Land, McCall and Cohen 1990). It is possible that the people who drink liquor and the circumstances in which they drink, influence the different causal effects for beer and liquor. However, there has been virtually no research on the differences between the various types of alcohol, who drinks which type, and the social context in which the various types are consumed.

**Ethanol**

As discussed in Chapter 4, ethanol is made up mostly of beer sales (51% for the national-level data), then liquor sales (37%), and then some contribution from wine sales (11%). The findings of Model 6 in Table 10 indicate that ethanol is not a significant factor in explaining shifts in homicide rates. This finding reflects the mixed components of ethanol, and the mixed effects of its components: beer which was significant and positive, wine which was not significant, and liquor which was significant and negative. Interestingly, the Buse’s R-square value is 0.35 which is lower than Model 2, which contains no alcohol measure. Thus, ethanol makes no explanatory contribution to changes in homicide rates.
Overall Results of the Alcohol Models

As in the state-level analysis, the addition of alcohol consumption to the model containing the control and core variables indicates that alcohol is an important explanatory variable that has been left out of most previous research on homicide. At the national-level, however, only one form of alcohol was significant in explaining positive increases in homicide rates, beer. In addition, liquor consumption was significant but was negatively related to changes in homicide rates.

These findings clearly indicate the need to include alcohol in studies of homicide and to fully operationalize alcohol consumption when it is used. Without capturing all forms of alcohol consumption, the findings of a study would be incomplete and possibly wrong. For instance, if wine was the measure used, it is likely no connection would be found between alcohol and homicide and, as indicated here, this would be incorrect. Also, if ethanol is used as the measure, no significant effect may be found, but the results would not indicate whether any specific type of alcohol is significant.

Also, when the alcohol measures were added to the model with the control and core variables, the strong findings for positive and significant effects of percent black and young adult population on shifts in homicide rates were unchanged. In addition, in the beer model, the third core variable, unemployment, was also significant and positively related to shifts in homicide rates.
These findings, therefore, clearly answer the key question of this study. Alcohol does have a significant and independent effect on homicide, net of the effects of other variables already noted in the literature as important. In addition, this study further clarifies the role of alcohol by indicating that it is beer that is positively related to shifts in national-level homicide rates, but wine and liquor are not.

**Comparison to Parker’s Results**

Parker found a direct connection between alcohol and homicide, but only in 1970. My findings extend that result by demonstrating that alcohol is significant in explaining changes in homicide rates over time, 1950 to 1995. In addition, this analysis more fully indicates what type of alcohol is causally related to increases in homicide rates, specifically beer. This is an important addition to Parker’s results, which found a connection between alcohol and homicide using a measure that mostly captured liquor sales.

In addition, this analysis found clear support for a connection between percent black, young adult population, and shifts in homicide rates. These two core variables were significant in every model, in both the national-level and state-level analyses. In addition, this strong finding is augmented by the significance of unemployment in the beer consumption model. Thus, the findings of this study support the literature which indicates that percent black and age structure of the population are causally related to homicide and result in increased homicide rates. Also, the findings provide limited
support for the literature which indicates that economic deprivation is causally related to homicide at the national-level.

Regarding the core variables, Parker also found significant findings for percent black in his study, in all three time periods (1960, 1970, and 1980). However, Parker interpreted race as a measure of economic deprivation rather than as a population composition measure, as it is used in this study. In addition, Parker did not find any significant effects for age structure of the population, for median income (one of his economic deprivation measures), or for unemployment. In his study, unemployment was part of his social bonds index, which was not significant in any time period. Thus, Parker did not find any income based economic deprivation measure to be significant in explaining homicides, and he found no connection between age structure and homicide.

1960 to 1995 Analysis

Bivariate Analysis

Descriptive Statistics

Table 11 contains the means and standard deviations for the variables used in this study. These data show that on average there were 7.97 murders per 100,000 population each year nationally for the years between 1960 and 1995. Also, on average the Uniform Crime Reports covered 77% of the population. The lowest coverage was 60% in 1960, and the highest coverage was 93% in 1981.
Of the core variables, unemployment averaged 6.11% and ranged between 3.5% and 9.7%. Also, the African-American population averaged 11.62%, and the young adult population, between the ages of 18 to 34, averaged 26.36% of the total U.S. population.

Alcohol consumption also varied during this time period. Beer consumption averaged 20.7 gallons per person, with a low of 14.97 gallons in 1961 and a high consumption of 24.59 gallons in 1981. Wine consumption ranged from .90 gallons per person in 1962 to 2.43 gallons per person in 1986. The average wine consumption was 1.68 gallons per person. Liquor consumption varied from 1.24 gallons per person in 1995 to 1.99 gallons in 1978, with an average of 1.66 gallons consumed per person. Finally, ethanol averaged 1.83 gallons per person, and ranged from a minimum of 1.33 gallons in 1960 to a maximum of 2.19 gallons consumed per person in 1981.

Correlations Between the Variables

The correlation matrix presented in Table 12 shows the bivariate relationships among the variables in the analysis, using the second differenced values of the variables. On the bivariate level, homicide rates are significant and positively correlated with percent black, young adult population and beer consumption. In addition, homicide rates are significant and negatively correlated with liquor consumption. Wine and ethanol consumption are negatively correlated to homicide rates, although they are not significant.
Of the core variables, unemployment is significant and negatively correlated with liquor, and young adult population is significant and negatively correlated with wine, liquor, and alcohol consumption. Finally, of the alcohol measures, beer and wine are significantly correlated with liquor consumption, and ethanol is correlated with each of the other alcohol measures, because it is constructed using these variables.

**Multivariate Analysis**

The multivariate models are constructed by adding variables to the analysis in the following order: (1) the core variables, unemployment, percent black, and young adult population, are presented first; (2) the four measures of alcohol consumption are added to the model separately, first beer, then wine, then liquor, and finally ethanol.

**Core Variables**

Model 1 in Table 13 presents the results of regressing the core variables - economic deprivation (unemployment), race composition (percent black), and age structure (young adult population) - on homicide rates. Two of the core variables, percent black and young adult population, are positive and significant in explaining changes in homicide rates. In addition, unemployment, although not significant does exhibit a positive relationship to changes in homicide. Further, the amount of explained variance is 40%, as indicated by the Buse's R-squared value.
Model 1 therefore confirms previous research (see especially Land, McCall and Cohen 1990) that race composition and age structure of the population are significant multivariate predictors of shifts in homicide rates. However, previous research on the importance of economic deprivation is not supported by this model because unemployment is not significant.

Alcohol Consumption

Beer

Model 2 in Table 13 provides an additional national-level answer to the research question about alcohol and homicide. Beer is significant at the .01 level and positively affects shifts in homicide rates. Also, the amount of explained variance increases from 40% to 52% (Model 2 Buse’s R-square = .52). These results indicate that beer has a significant and independent effect on changes in homicide rates, net of the other variables previous research has shown to be important. This supports the hypothesis that increased alcohol consumption, specifically beer consumption, results in increased homicide rates.

The core variables that were significant in Model 2, percent black and young adult population, remain significant in this model. Unemployment, which was not significant in Model 2, is significant at the .05 level. All three variables positively affect shifts in homicide rates. These findings give additional support to the literature which suggests that the core variables are significant explanatory factors of homicide.
Wine

As in the state-level analysis and the previous national-level analysis, not all alcohol matters in the context of homicide rates. Model 3 in Table 13 shows that when wine sales are used to measure alcohol consumption, the variable is negative and not significant in explaining change in homicide rates.

The core variables of percent black and young adult population exhibit strong and consistent effects on shifts in homicide rates. Both of these variables are significant and positively associated with the dependent variable, as they have been in every model at the national-level and in every model at the state-level. In addition, unemployment, which was significant in the beer consumption model, is also significant in this model. Thus, even though wine consumption is not significant, the Buse's R-squared value increases over the base model (Model 1) to .47, reflecting the added significance of unemployment in this model.

Liquor

Model 4 in Table 13 presents the results for liquor consumption. Using a one-tailed test, liquor is significant but it negatively affects shifts in homicide rates, just as in the 1950 to 1995 national-level analysis. However, in this model, the effect of liquor is not significant using a two-tailed test. Thus, here liquor does not have a significant effect on changes in homicide rates. The importance of percent black
remains the same in this model as in the other alcohol consumption models. However, young adult population and unemployment are not significant in this model.

**Ethanol**

The findings of Model 5 in Table 13 indicate that ethanol is not a significant factor in explaining shifts in homicide rates. As in the previous national-level analysis, this finding reflects the mixed components of ethanol, and the mixed effects of its components: beer which was significant and positive, wine which was not significant, and liquor which was not significant. Interestingly, the Buse's R-square value is 0.40 which is the same as the base model, Model 1, which contains no alcohol measure. Thus, ethanol makes no explanatory contribution to changes in homicide rates.

**Comparison of the Results for the Two National-Level Analyses**

Three differences exist in the 1960 to 1995 analysis as compared to the 1950 to 1995 analysis. First, in the 1960 to 1995 analysis, unemployment is positive and significant in explaining shifts in homicide rates in two models: beer consumption and wine consumption. In the 1950 to 1995 analysis, unemployment was only significant in the beer consumption model. Second, in the 1960 to 1995 analysis, young adult population is not significant in the liquor consumption model. In the 1950 to 1995 analysis, young adult population is significant in every model.
Third, the results of the alcohol measures change slightly between the two analyses. In both, beer consumption is the only alcohol measure that is positive and significantly related to shifts in homicide rates. In both analyses, wine and ethanol consumption are not significant. However, using a two-tailed test of significance, liquor consumption is significant but negatively related to changes in homicide rates in the 1950 to 1995 analysis whereas liquor is negative but not significant in the 1960 to 1995 analysis. Using the Chow test (Kennedy 108:1992), the liquor consumption model was tested for structural shifts that might explain the different results in the two national-level analyses. The Chow test was not significant, thus indicating that there were no structural shifts in the model and structural changes do not explain the different results for liquor consumption.

**Chapter Summary**

In this chapter, I reviewed the results of the national-level analysis. In doing this, I examined how these results answer the key question of this study. Does alcohol have a significant and independent effect on shifts in the homicide rate, net of the effects of the other variables that have been found to be important in explaining homicide? At the state-level, alcohol was clearly important. It is at the national-level as well.

The results of both national-level analyses indicate that alcohol has a direct effect on homicide and this effect exists over time. In addition, to fully determine the
effect of alcohol, it is important to fully operationalize alcohol consumption. This study indicates that beer is the specific form of alcohol that has a significant and positive effect on changes in the homicide rate, but wine and liquor do not. In fact, liquor exhibited a significant and negative relationship to changes in homicide rates in the 1950 to 1995 analysis. The measurement of alcohol was an important problem with Parker’s analysis and it has been remedied in this study.

Also, two of the core variables, percent black and young adult population, consistently had significant and positive effects on homicide. Percent black was significant in every national-level model and young adult population was significant in nine out of ten national-level models (it was not significant in the liquor model in the 1960 to 1995 analysis). Unemployment, a measure of economic deprivation, was found to be significant and positive in explaining changes in homicide rates in three models, both beer consumption models (1950 to 1995 and 1960 to 1995) and in one wine consumption model (1960 to 1995). Thus, the importance of percent black and young adult population was clearly supported by this study, and the results also indicate somewhat limited support for the importance of unemployment.

Finally, the findings of the two national-level analyses give further support to the findings of the state-level analysis. In all analyses, beer was found to be significant in explaining homicide rates. At the state-level, beer and liquor were significant and positive, but at the national-level only beer consumption was significant and positively affected changes in homicide rates. Also, all analyses...
support the importance of the core variables, although the state-level analysis found more consistent support for the importance of economic deprivation, which was measured as poverty.\(^1\)

Thus, the same three conclusions emerge from the national-level analysis as from the state-level analysis. First, alcohol is a significant causal factor in explaining homicide. Second, it is important to fully operationalize alcohol in order to better isolate and understand how it effects homicide. Third, beer consumption is a uniquely important explanatory factor when it comes to homicide.

\(^1\) As indicated previously, poverty was not used in the national-level analyses as it was not significant in any models and did not add to the explanatory power of the models. Thus, unemployment was selected as the economic deprivation variable in the national-level analyses in order to capture the effect of economic deprivation on changes in homicide rates over time.
<table>
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<th>Variable</th>
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<th>Standard Deviation</th>
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<th>Maximum Value</th>
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<td>1.29</td>
<td>2.19</td>
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N = 46
Note: The variables in this table are not altered.

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<td>0.866 ‡</td>
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† p < .05 ‡ p < .01 (one-tailed tests)  N = 44  Note: The variables are presented in second differenced form.

Table 9. Correlation Matrix of Variables Included in the National-Level Analysis: 1950-1995
<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 (Control)</th>
<th>Model 2 (Core)</th>
<th>Model 3 (Beer)</th>
<th>Model 4 (Wine)</th>
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<td>0.002 (0.005)</td>
<td>0.001 (0.005)</td>
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</tr>
<tr>
<td>Unemployment</td>
<td>0.050 (0.040)</td>
<td>0.091 (0.038)</td>
<td>0.058 (0.038)</td>
<td>0.019 (0.041)</td>
<td>0.062 (0.045)</td>
<td></td>
</tr>
<tr>
<td>Percent Black</td>
<td>2.154 ‡ (0.575)</td>
<td>2.093 ‡ (0.520)</td>
<td>2.240 ‡ (0.539)</td>
<td>2.323 ‡ (0.484)</td>
<td>2.152 ‡ (0.580)</td>
<td></td>
</tr>
<tr>
<td>Young Adult Population</td>
<td>0.645 † (0.293)</td>
<td>0.732 † (0.266)</td>
<td>0.626 † (0.319)</td>
<td>0.496 † (0.278)</td>
<td>0.699 † (0.309)</td>
<td></td>
</tr>
<tr>
<td><strong>Alcohol Consumption</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beer Consumption</td>
<td>0.431 † (0.139)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wine Consumption</td>
<td></td>
<td>-0.270 (0.941)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquor Consumption</td>
<td></td>
<td></td>
<td></td>
<td>-2.152 † (1.073)</td>
<td></td>
<td>1.0376 (1.792)</td>
</tr>
<tr>
<td>Ethanol Consumption</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant Term</td>
<td>-0.014</td>
<td>-0.007</td>
<td>-0.005</td>
<td>-0.006</td>
<td>-0.010</td>
<td>-0.007</td>
</tr>
<tr>
<td>Buse's R-Square</td>
<td>0.000</td>
<td>0.365</td>
<td>0.468</td>
<td>0.369</td>
<td>0.457</td>
<td>0.355</td>
</tr>
</tbody>
</table>

† p < .05 ‡ p < .01 (one-tailed tests)  
N = 44  Note: Number in parentheses are standard errors.

Table 10. Unstandardized Coefficients and Standard Errors for Regression of Homicide Rates on Control, Core, and Alcohol Consumption Variables With All Variables Second-Differenced: National-Level Analysis, 1950-1995
<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum Value</th>
<th>Maximum Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homicide Rates</td>
<td>7.97</td>
<td>1.76</td>
<td>4.5</td>
<td>10.2</td>
</tr>
<tr>
<td><strong>Core</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployment</td>
<td>6.11</td>
<td>1.49</td>
<td>3.5</td>
<td>9.7</td>
</tr>
<tr>
<td>Percent Black</td>
<td>11.62</td>
<td>0.63</td>
<td>10.6</td>
<td>12.6</td>
</tr>
<tr>
<td>Young Adult Population</td>
<td>26.36</td>
<td>3.03</td>
<td>21.46</td>
<td>30.20</td>
</tr>
<tr>
<td><strong>Alcohol Consumption</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beer Consumption</td>
<td>20.70</td>
<td>3.36</td>
<td>14.97</td>
<td>24.59</td>
</tr>
<tr>
<td>Wine Consumption</td>
<td>1.68</td>
<td>0.51</td>
<td>0.90</td>
<td>2.43</td>
</tr>
<tr>
<td>Liquor Consumption</td>
<td>1.66</td>
<td>0.25</td>
<td>1.24</td>
<td>1.99</td>
</tr>
<tr>
<td>Ethanol Consumption</td>
<td>1.83</td>
<td>0.27</td>
<td>1.33</td>
<td>2.19</td>
</tr>
</tbody>
</table>

N = 36

Note: The variables in this table are not altered.

<table>
<thead>
<tr>
<th>Variable</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Homicide Rates</td>
<td>----</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Unemployment</td>
<td>0.127</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) Percent Black</td>
<td>0.418 †</td>
<td>-0.030</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4) Young Adult Population</td>
<td>0.317 †</td>
<td>-0.075</td>
<td>-0.040</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5) Beer Consumption</td>
<td>0.439 †</td>
<td>-0.156</td>
<td>0.226</td>
<td>-0.115</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(6) Wine Consumption</td>
<td>-0.245</td>
<td>0.143</td>
<td>-0.014</td>
<td>-0.423 †</td>
<td>0.235</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(7) Liquor Consumption</td>
<td>-0.289 †</td>
<td>-0.344 †</td>
<td>0.066</td>
<td>-0.322 †</td>
<td>0.418 †</td>
<td>0.565 †</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(8) Ethanol Consumption</td>
<td>-0.006</td>
<td>-0.219</td>
<td>0.139</td>
<td>-0.335 †</td>
<td>0.761 †</td>
<td>0.671 †</td>
<td>0.874 †</td>
<td></td>
</tr>
</tbody>
</table>

† p < .05 † p < .01 (one-tailed tests)  N = 34

Note: The variables are presented in second differenced form.

Table 12. Correlation Matrix of Variables Included in the National-Level Analysis: 1960-1995
<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 (Core)</th>
<th>Model 2 (Beer)</th>
<th>Model 3 (Wine)</th>
<th>Model 4 (Liquor)</th>
<th>Model 5 (Ethanol)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployment</td>
<td>0.066 (0.048)</td>
<td>0.083 † (0.047)</td>
<td>0.078 † (0.047)</td>
<td>0.035 (0.049)</td>
<td>0.069 (0.051)</td>
</tr>
<tr>
<td>Percent Black</td>
<td>2.513 ‡ (0.689)</td>
<td>1.829 ‡ (0.730)</td>
<td>2.501 ‡ (0.648)</td>
<td>2.566 ‡ (0.633)</td>
<td>2.479 ‡ (0.712)</td>
</tr>
<tr>
<td>Young Adult Population</td>
<td>0.754 ‡ (0.291)</td>
<td>0.838 ‡ (0.280)</td>
<td>0.537 ‡ (0.321)</td>
<td>0.503 (0.312)</td>
<td>0.796 ‡ (0.332)</td>
</tr>
</tbody>
</table>

**Alcohol Consumption**

<table>
<thead>
<tr>
<th>Consumption</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beer</td>
<td>0.518 † (0.161)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wine</td>
<td></td>
<td>-1.267 (0.908)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquor</td>
<td></td>
<td></td>
<td>-2.357 † (1.376)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethanol</td>
<td></td>
<td></td>
<td></td>
<td>0.544 (1.876)</td>
<td></td>
</tr>
</tbody>
</table>

Constant Term        | 0.008 | 0.020 | -0.0001 | -0.008 | 0.010 |
Buse's R-Square       | 0.404 | 0.524 | 0.466   | 0.486   | 0.400 |

† p < .05 ‡ p < .01 (one-tailed tests)  
Note: Number in parentheses are standard errors.

N = 34

**Table 13.** Unstandardized Coefficients and Standard Errors for Regression of Homicide Rates on Core and Alcohol Consumption Variables With All Variables Second-Differenced: National-Level Analysis, 1960-1995
In this dissertation, I sought the answer to one question. Does alcohol have a significant and independent effect on homicide, net of the effects of other traditionally important explanatory variables? This question was answered at two levels of analysis: at the state-level using a pooled cross-sectional analysis covering the years 1970, 1980, and 1990; and at the national-level using two longitudinal time series analyses covering 1950 to 1995 and 1960 to 1995.

The results of these analyses clearly show that alcohol, and specifically beer, is an important explanatory factor that has been overlooked in most previous studies of homicide. Also, the results confirm previous research which has found economic deprivation, race composition, and age structure of the population to be important causal factors of homicide. Finally, these results replicate and extend Parker’s findings by demonstrating that alcohol is significant in explaining homicides over time. In this chapter, my research findings are summarized, the implications of these findings are discussed, and directions for future research are also explored.
Summary of the Findings

The Importance of Alcohol

Alcohol was a significant factor at both the state and national levels of analysis. Specifically, beer was the type of alcohol that was consistently significant in explaining homicide rates. Accordingly, the results indicate that not all alcohol matters in the context of homicide. At the state-level, beer, liquor, and ethanol (which is 51% beer) were significant and positively affected homicide rates, but wine was not significant. At the national-level, only beer was significant and positive, liquor was significant but negatively related to homicide rates (in the 1950 to 1995 analysis only), and neither wine nor ethanol were significant.

Therefore, the main difference between the state and national levels, in terms of alcohol consumption, is the significant and negative effect of liquor in the 1950 to 1995 national-level analysis. This finding is probably a result of who drinks liquor and in what context. As Pittman and Klein found (1989), the typical liquor drinker is a male, 45 years of age or older, unmarried, who drinks in a bar, before a meal, when he feels somewhat happy or calm. This picture is different from the typical beer drinker: male, less educated, who drinks beer in circumstances unrelated to any mealtime setting (Pittman and Klein 1989). In addition, the liquor drinker is different from a key factor in homicides, young adults. As indicated in my suggestions for future research (below), research on who drinks which types of alcohol and the context for drinking the various types, needs to be further explored.
The overall alcohol consumption findings are not surprising because, as indicated in Figure 1, beer and homicide rates follow very similar patterns over the time period 1950 to 1995. Liquor and wine, however, have different patterns, and more closely resemble each other than beer or homicide. Thus, these results indicate that beer is a uniquely important explanatory factor when it comes to homicide.

In addition, at the state-level, alcohol exhibited interaction effects with poverty. These interaction effects are interesting because more people with high incomes report drinking than people with lower incomes. In a 1994 national Gallop poll survey 85% of people with incomes of $75,000 and over reported drinking alcohol, versus 54% of those with incomes under $20,000 (Maguire and Pastore 1995:299). Thus, the combination of drinking and being poor seems to have more lethal consequences than drinking and having money. Importantly, not all types of alcohol exhibited interaction effects. Wine, liquor, and ethanol, but not beer, each interacted with poverty to have significant and positive effects on homicide rates. These results indicate that even if a form of alcohol does not have a main effect on homicide, i.e., wine, it may have an interaction effect with other variables.

These findings are important because they reveal the need to include measures of alcohol in homicide studies, and the need to fully operationalize alcohol to capture the effects of all forms of alcohol (beer, wine, liquor, and ethanol). With few exceptions (Fagan 1990; Lenke 1990; Parker 1989, 1993, 1995a, 1995b; Peranen 1991; Peterson, Krivo and Harris 1997), previous studies of homicide generally do not
include measures of alcohol in the analysis. When alcohol is included, incomplete measures are used (Parker 1995b; Peterson, Krivo and Harris 1997). This analysis clearly indicates that the results of studies that include alcohol could be misleading or misinterpreted if the measure of alcohol used is not fully operationalized to capture the effect of each form of alcohol.

The Importance of the Other Independent Variables

The results of this study support the findings of previous research that indicate the importance of economic deprivation, race composition, and age structure of the population in explaining homicide (see especially Land, McCall and Cohen 1990). Importantly, percent black and young adult population were significant and positively related to homicide rates in every model at both the state and national levels.

The significance of percent black has encountered various interpretations in the literature. Some researchers suggest the this result indicates a “subculture of violence” exists among African-Americans that promotes violent behavior (Curtis 1975; Silberman 1978; Wolfgang and Ferrracuti 1967). However, Sampson (1987) casts doubt on this interpretation and suggests that high rates of crime among African-Americans is related to the structural linkages between unemployment, economic deprivation, and family disruption in black communities. Sampson’s findings are augmented by Phillips (1997) who found that weakened social control in African-American communities, through unemployment and disrupted family structure, was
the main explanatory factor in high levels of black violence. Finally, others suggest that the link between percent black and homicide results from the anger and frustration many African-Americans feel as a result of racial discrimination (Berkowitz 1988, 1989; Blau and Blau 1982). Thus, even though most researchers find a connection between percent black and homicide, the meaning of this finding is unclear. Future research needs to continue to explore the elements and meaning of this connection.

The importance of another core variable, economic deprivation, was strongly supported at the state-level, but received limited support at the national-level. Poverty, as a measure of economic deprivation, was significant in every model in the state-level analysis. At the national-level, unemployment was used as a measure of economic deprivation, and this measure was significant in three models (both beer consumption models and the wine consumption model in the 1960 to 1995 analysis).

In addition to the importance of these variables, several other variables were included in the state-level analysis which exhibited strong and consistent findings. Percent urban was significant and positive in nine out of ten models presented. Mobility was significant and positive in all ten models, and female labor force participation was significant and negative in all ten models. Although these variables were not included in the national-level analysis, the robustness of these findings at the state-level clearly indicate the importance of these factors in explaining homicide rates.
The meaning of the negative connection between female labor force participation and homicide is not clear. Parker suggests that when women work away from the home they are away from their most likely offender - their intimate partners (1995b:82). Parker also suggests that when women work they have the financial resources to leave when they are abused at home and to buy protection from other offenders (1995b:82-83). The exact meaning of this finding cannot be known without disaggregating homicide rates by sex and comparing the differences in female labor force participation on male and female homicide victims. As the concern of this study was the connection between alcohol and homicide, disaggregation was not done. Future research on sex specific homicide rates should be undertaken to explore the potential negative effect of female labor force participation which has now been found in at least two studies, at two different levels of analysis (cities and states), covering different time periods (1960, 1970, 1980 versus 1970, 1980, 1990).

Comparison of the State and National Results

The differences between the state-level and national-level results can be explained by model specification (longitudinal analysis versus pooled cross-sectional analysis), sample size, different levels of analysis, and different time periods. Land, McCall and Cohen (1990) suggest that variation in the results of homicide studies are often caused by these factors. They found that it was possible to reduce variation in results by using large samples, standard definitions, and reducing collinearity among
the variables. In this analysis, collinearity was corrected for and standard definitions were used at both levels of analysis. However, sample size is a limitation of this analysis, especially at the national-level, which may in part explain the differences in the alcohol findings between the state and national levels.

The national-level sample size was created by collecting data for as many years as possible. This yielded a sample of 46 years for the 1950 to 1995 analysis, and 36 years for the 1960 to 1995 analysis. Also, the model estimation procedures (second differencing for nonstationarity and autocorrelation) reduced the sample size to 44 years in the 1950 to 1995 analysis, and 34 years in the 1960 to 1995 analysis. This small size limited the number of variables used in the analysis and may also have affected the strength of the results (Land, McCall and Cohen 1990). At the state-level, sample size was increased to 150 cases by pooling the 50 states over 3 time periods. The larger sample size at the state-level may explain the stronger results at that level.

In addition, level of analysis may be important in explaining the differences between the analyses. It is possible that using national-level data may result in "aggregation bias" that ignores within-unit variability (Bailey 1984; Land, McCall and Cohen 1990). Thus, the analysis at the national-level may mask important variation in the explanatory variables that is captured in the state-level of analysis. For example, between the states, there is a wide variation in the consumption of ethanol. The level of consumption ranged from a minimum of 0.95 gallons per person (Alabama 1970) to a maximum of 4.65 gallons per person (Nevada 1980). At the national-level, however,
there is much less variation in consumption levels across the years. For the 1950 to 1995 analysis, the minimum consumption at the national-level is 1.29 gallons per person (in 1954) and the maximum consumption is 2.19 gallons per person (in 1981). Thus, the effect of ethanol that was found at the state-level may be masked at the national-level because of the effects of aggregation.

Finally, the differences may also be attributable to the different time periods covered. Theoretically, statistical relationships should hold across time, yet variation has been found in numerous studies (see review in Land, McCall and Cohen 1990). If consistency does not always exist among studies that examine the same time period (for example see Crutchfield, Geerken and Gove 1982, and Messner 1982), the comparison between different time periods can also be expected to exhibit different results.

Despite the differences at the state and national levels, the important finding of this study is consistent. Beer consumption is a uniquely important explanatory factor when it comes to homicide.

**Implications of the Findings**

The implications of this research for scholarly understandings of homicide are several, with three of prime importance. First, these findings indicate Parker was right. Alcohol matters in the context of homicide. Parker's findings, however, were limited and less than conclusive. Parker only found a significant direct effect of
alcohol in 1970, and significant interaction effects in 1960 and 1970. I believe Parker’s findings are the result of his incomplete measure of alcohol, liquor stores per 1,000 population. This measure is too removed from actual alcohol consumption and fails to fully measure all forms of alcohol. By using a more complete measure of alcohol consumption, this study replicates and extends Parker’s findings and demonstrates that the connection between alcohol and homicide exists over time, and the connection exists in recent time periods.

Second, multivariate analyses of homicide that do not include a measure of alcohol are almost certainly misspecified. It is clear from both levels of analysis that alcohol, and specifically beer, is an important causal factor in explaining homicide rates. Therefore, those studies of homicide that do not include a measure of alcohol are failing to capture the effects of an important explanatory variable. If alcohol were included in these studies, the models would be better specified and this would reduce bias in the model estimates.

Third, it is important to fully operationalize alcohol in order to better isolate and understand how it affects homicide. This was one of the problems with Parker’s measure of alcohol that was corrected in this analysis. It is clear from the findings of this study that not all forms of alcohol have a main effect on homicide (i.e., wine), and not all forms have an interaction effect on homicide (i.e., beer). Therefore, failure to capture the effects of all forms of alcohol, may result in findings that are incomplete and possibly wrong.
Directions for Future Research

Two findings of the non-alcohol variables need to be explored in future research. First, the meaning of the significance of percent black on homicide rates needs to be determined. Second, future research on sex specific homicide rates should explore the negative effect of female labor force participation on homicide found in this study and in Parker’s research.

Also, two aspects of the connection between alcohol and homicide need to be explored further. First, because most homicide research is currently conducted at the city level of analysis (Land, McCall and Cohen 1990), I believe that future research on alcohol and homicide must be directed at the city level, or similar levels of analysis such as metropolitan statistical areas (MSAs) or census tracks. Research at lower levels of aggregation will require adequate measures of alcohol, and preferably measures that fully operationalize alcohol to account for all types of consumption. However, direct measures of alcohol consumption at the city level are not readily available. The measure used in this study, actual alcohol sales per capita, is available only at the state and national levels. Therefore, good alternative measures need to be developed.

Two possible measures for metropolitan statistical areas (MSAs) are available from the Census of Retail Trade, conducted every five years by the census bureau (U.S. Bureau of the Census 1994a:III) These measures are: (1) dollars spent in drinking establishments; and (2) dollars spent in liquor stores. Drinking
establishments are defined as "establishments primarily engaged in the retail sale of alcoholic drinks such as beer, ale, wine, and liquor for consumption on the premises" (U.S. Bureau of the Census 1994a:Appendix). Liquor stores are defined as "establishments primarily engaged in selling packaged alcoholic beverages such as ale, beer, wine, and liquor for consumption off the premises" (U.S. Bureau of the Census 1994a:Appendix).

There are advantages and disadvantages to each of these measures. One advantage is that both measure actual sales, which is closer to consumption than the mere presence of a liquor store. One disadvantage of both is that it is not possible to disaggregate the total sales amount into the various types of alcohol. Also, sales of other items, such as snack foods and cigarettes, would be included in the total amount of sales. Finally, sales from liquor stores consist primarily of liquor as there are usually other outlets for wine and beer sales. Thus, this measure has one of the limitations found with Parker's measure.

At lower levels of aggregation, good measures of alcohol consumption become even harder to find. At the city and census track levels, two possibilities exist: (1) the number of bars (Peterson, Krivo and Harris 1997); and (2) the number of drunk-driving arrests. These measures make it possible to include a measure of alcohol in research models of homicide. However, both measures have important limits. With these measures it is not possible to disaggregate alcohol. Also, these measures are further removed from consumption than actual sales of alcohol. Finally, drunk-driving
arrests may be an indicator of alcohol use in a community but it is also an indicator of how much emphasis is placed on arresting drunk drivers by local police.

Despite the limitations of these possible measures, they represent important starting points for adding alcohol to homicide studies at lower levels of aggregation, such as MSAs, cities, and census tracks. The results here suggest that initial studies at these levels will find that alcohol, in general, is a causal factor in homicides. Then, the next step would be to find more complete measures of alcohol consumption.

Second, the results of this study also indicate the need to examine the social context of beer consumption to see why it is uniquely important in explaining homicide. This type of research is needed because the results here suggest that something more than the physiological effect of alcohol, which is the same for all forms of alcohol, is important for explaining the different effects of beer, wine and liquor on homicide rates. Such studies should explore when, where, and why people consume beer, and the behaviors that are socially acceptable when drinking beer. These findings should then be compared to the social context of wine and liquor consumption to see what is unique about beer drinking in this society that explains why this one type of alcohol consumption is a significant causal factor of homicide. Currently, studies exist which examine the social context of drinking, generally (Clark and Hilton 1991; Cox 1990; Grant and Litvak 1998). A few studies exist which examine differences in the typical drinkers (Greenfield and Room 1997) and differences in drinkers of the various forms of alcohol (Pittman and Klein 1989). Yet,
none of these studies discuss whether there is a different social context for the different types of alcohol consumption and none fully compare the different types of alcohol.

Chapter Summary

In this chapter, I summarized the findings of my research, explored the implications of these findings, and discussed directions for future research. The results of this study replicate and extend Parker's findings by demonstrating that alcohol is significant in explaining homicides over time.

In conclusion, I want to underscore the importance of the key finding of this research, that alcohol matters. Despite the conclusions of the alcohol studies that alcohol is linked to violence (Brain 1986; Collins 1981; Pemanen 1976, 1981), there has been little empirical sociological evidence of this link. Thus, it is important to have found a causal link at the state and national levels between an activity that most people report engaging in (65% in 1993 reported in a national Gallop Poll that they use alcoholic beverages (Maguire and Pastore 1995:298)) and an event that is fairly rare (rate of 9.5 homicides per 100,000 in 1993 (FBI 1994)). Future research needs to confirm this link and further investigate the main effects and interaction effects of different types of alcohol on homicide. In addition, these findings suggest the importance of examining the social context of beer consumption and why beer may be different than other types of alcohol when it comes to homicide.
Figure 1. Beer Consumption, Liquor Consumption, Wine Consumption and Homicide Rates by Year
APPENDIX A

COLLINEARITY IN THE STATE-LEVEL ANALYSIS

As indicated in Chapter 3, several independent variables were considered for inclusion in the analysis to replicate Parker's study. However, five of these variables were collinear, which occurs when independent variables are strongly correlated with each other. The five collinear variables were: households of two or more persons, war, retail eating activity, school enrollment, and unemployment. Households of two or more persons was collinear with female labor force participation, female-headed households and war. War was collinear with young adult population, female labor force participation, and female-headed households. Retail eating activity was collinear with female labor force participation and wine consumption. School enrollment was collinear with young adult population. Unemployment was collinear with young adult population and female-headed households.

A common indicator of collinearity is when the standard error of a variable doubles when a collinear variable is included in the model. Collinearity may also
cause the direction of the regression coefficient to change, i.e., from positive to negative or vice versa. These five variables exhibited these indicators of collinearity.

A common solution to this problem is omitting one of the collinear variables (Kennedy 1992:182; see also Phillips 1997). I omitted these five variables because they exhibited the indicators of collinearity and because it was not possible to clearly distinguish the individual effects of the variables when the model contained the collinear variables. For example, when both school enrollment and young adult population were in the model, only young adult population was significant. However, if young adult population was removed, school enrollment was significant. Therefore, to be able to clearly interpret the regression results, I omitted variables which created a high level of collinearity when included in the model.

Early in the analysis, households of two or more persons, which was a part of Parker’s social bonds index, was eliminated from the study because of severe collinearity with female labor force participation. This variable was eliminated after determining that the social bonds index was not a reliable measure (alpha = .54), and I attempted to include all three parts of the index in the model: school enrollment, unemployment, and households of two or more persons. The base value for the standard error of households of two or more persons was 0.069. When this variable was included in the model with female labor force participation, its standard error inflated nearly ten times to 0.618. Because of the extreme effects of collinearity on households of two or more persons, this variable was excluded.
The models presented in this appendix indicate the process I used to determine that the collinearity was severe enough to require omitting the other four variables from the analysis. Table 14 presents the models used in determining to eliminate war, retail eating activity, school enrollment, and unemployment. Model 1 in Table 14 presents the regression results when no variables were excluded. This model includes all control, core, and Parker variables in the analysis. When all the variables are included, four have standard errors that have doubled from their base value. These variables are war, young adult population, female labor force participation, and retail eating activity. In Model 1, six variables are significant: percent urban, poverty, percent black, young adult population, mobility, and female-headed households.

To check if collinearity is masking the effects of the collinear variables, I removed from the analysis two of the four variables that exhibited inflated standard errors in Model 1, young adult population and female labor force participation. These two variables were removed because, as described above, each of the problem variables was collinear with at least one of these two variables. Model 2 in Table 14 presents the results of this analysis. In this model, seven variables are significant: percent urban, poverty, percent black, retail eating activity, school enrollment, mobility, and unemployment. This model indicates that collinearity is problematic because it is masking the effects of the variables. This is indicated because retail eating activity, school enrollment, and unemployment are significant now that part of the collinearity is removed. War is not significant, but both war and retail eating
activity are still being affected by collinearity as evidenced by inflated standard errors. Because this model did not remove all the effects of collinearity, I created another model which eliminated a different combination of variables.

Model 3 in Table 14 presents the results when the other two variables which exhibited inflated standard errors in Model 1 are removed: war and retail eating activity. Removing these variables eliminates some of the collinearity. However, the standard error for young adult population and female labor force participation is still inflated. Also, the standard error for school enrollment is high although it has not quite doubled in value. I chose to eliminate war and retail eating activity and retain young adult population and female labor force participation. Young adult population was retained because it is a core variable which the literature indicates is important in explaining homicides. Female labor force participation is retained to replicate Parker’s analysis and because it was significant in every model in Parker’s analysis.

Model 4 in Table 14 presents the results of omitting war, retail eating activity, and school enrollment from the full model. In this model, only female labor force participation continues to have a standard error which is doubled from its base values.

Model 5 in Table 14 presents the results of omitting war, retail eating activity, school enrollment, and unemployment from the model. In this model, all severe collinearity has been removed because none of the variables exhibit any of the indicators of collinearity. Therefore, this model was chosen as the final model which is presented in Chapter 4.
Operationalizations and Sources for the Omitted Variables

Households of Two or More Persons

Households of two or more persons is measured as the percent of all households that contain at least two persons. The data come from the decennial census (U.S. Bureau of the Census 1973c, 1983c, 1993c).

War

War is measured as a dummy variable, with 0 for years with no war and 1 for years with a war. I use the U.S. Bureau of the Census definitions of “major conflicts” and the time periods in which they occurred (U.S. Bureau of the Census 1992:345). Thus, war is coded as 1 in 1970 (Vietnam) and as 0 in 1980 and 1990.

Retail Eating Activity

Retail eating activity is measured as sales per capita in retail eating establishments. This measure is converted to constant 1990 dollars to make the measure comparable over time. The conversion to constant dollars is achieved using the consumer price index (U.S. Bureau of the Census 1996f). This variable is measured in 1967, 1977, and 1987 because of the dates of collection by the census bureau for the census of retail trade information (U.S. Bureau of the Census 1970b, 1980c, and 1990c).
School Enrollment

School enrollment is measured as the percent of the population ages 3-34 who are enrolled in school. The 1970 and 1980 data were compiled from the decennial census information (U.S. Bureau of the Census 1973b, 1973c, 1983b, 1983c) and the 1990 data were compiled from the decennial census information (U.S. Bureau of the Census 1993c) and from population data collected from the census bureau's web site (www.census.gov; see also U.S. Bureau of the Census 1993b).

Unemployment

Unemployment is measured as the percent of the population in the civilian labor force that is unemployed. The data are from the decennial census (U.S. Bureau of the Census 1973c, 1983c, 1993c).
<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Southern Region</td>
<td>0.898</td>
<td>1.257</td>
<td>0.876</td>
<td>0.775</td>
<td>0.772</td>
</tr>
<tr>
<td></td>
<td>(0.889) (0.880)</td>
<td>(0.831) (0.846)</td>
<td>(0.831)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent Urban</td>
<td>0.057‡</td>
<td>0.077‡</td>
<td>0.060‡</td>
<td>0.051‡</td>
<td>0.051‡</td>
</tr>
<tr>
<td></td>
<td>(0.023) (0.022)</td>
<td>(0.021) (0.020)</td>
<td>(0.020)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Executions</td>
<td>-0.024</td>
<td>-0.239</td>
<td>0.007</td>
<td>0.033</td>
<td>0.029</td>
</tr>
<tr>
<td></td>
<td>(0.363) (0.372)</td>
<td>(0.412) (0.405)</td>
<td>(0.397)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>War</td>
<td>1.035</td>
<td>0.628</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.012)</td>
<td>(0.843)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Core</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poverty</td>
<td>3.638‡</td>
<td>3.653‡</td>
<td>3.994‡</td>
<td>4.018‡</td>
<td>4.004‡</td>
</tr>
<tr>
<td></td>
<td>(0.958) (0.939)</td>
<td>(0.960) (0.969)</td>
<td>(0.966)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent Black</td>
<td>1.305‡</td>
<td>1.310‡</td>
<td>1.385‡</td>
<td>1.475‡</td>
<td>1.476‡</td>
</tr>
<tr>
<td></td>
<td>(0.290) (0.291)</td>
<td>(0.258) (0.252)</td>
<td>(0.252)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Young Adult Population</td>
<td>0.297†</td>
<td>0.189</td>
<td>0.276†</td>
<td>0.280†</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.135) (0.120)</td>
<td>(0.090)</td>
<td>(0.074)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Parker</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female Labor Force Participation</td>
<td>-0.079</td>
<td>-0.125‡</td>
<td>-0.120‡</td>
<td>-0.121‡</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.050)</td>
<td>(0.046)</td>
<td>(0.045)</td>
<td>(0.038)</td>
<td></td>
</tr>
<tr>
<td>Retail Eating Activity</td>
<td>-0.002</td>
<td>-0.004†</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.002)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School Enrollment</td>
<td>-0.091</td>
<td>-0.230‡</td>
<td>-0.101</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.094)</td>
<td>(0.080)</td>
<td>(0.094)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobility</td>
<td>2.645‡</td>
<td>2.853‡</td>
<td>2.940‡</td>
<td>3.143‡</td>
<td>3.125‡</td>
</tr>
<tr>
<td></td>
<td>(1.069)</td>
<td>(1.039)</td>
<td>(1.015)</td>
<td>(1.011)</td>
<td>(1.014)</td>
</tr>
<tr>
<td>Female-Headed Households</td>
<td>0.237†</td>
<td>0.105</td>
<td>0.166</td>
<td>0.171</td>
<td>0.172†</td>
</tr>
<tr>
<td></td>
<td>(0.120)</td>
<td>(0.110)</td>
<td>(0.110)</td>
<td>(0.110)</td>
<td>(0.096)</td>
</tr>
<tr>
<td>Unemployment</td>
<td>0.049</td>
<td>0.327‡</td>
<td>0.057</td>
<td>0.012</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.152)</td>
<td>(0.121)</td>
<td>(0.116)</td>
<td>(0.132)</td>
<td></td>
</tr>
<tr>
<td>Buse's R-Square</td>
<td>.786</td>
<td>.776</td>
<td>.783</td>
<td>.777</td>
<td>.776</td>
</tr>
</tbody>
</table>

† p < .05    ‡ p < .01 (one-tailed tests)  
N = 150

Note: Numbers in parentheses are standard errors.

APPENDIX B

NON-SIGNIFICANT INTERACTION TERMS IN THE STATE-LEVEL ANALYSIS

As noted in Chapter 4, a total of eight interaction terms were examined in the state-level analysis, four terms representing youth/alcohol consumption and four terms representing poverty/alcohol consumption. Three of these interaction terms were significant (poverty/wine consumption, poverty/liquor consumption, poverty/ethanol consumption), and the results of those models are presented in Chapter 4, Table 7.

The models containing the five terms that were not significant are shown in Table 15 of this appendix. These five terms are: poverty/beer consumption; youth/beer consumption; youth/wine consumption; youth/liquor consumption; and youth/ethanol consumption. As indicated by these models, none of the interaction terms with beer consumption was significant, and none of the youth/alcohol interaction terms was significant.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 (Pov/Beer)</th>
<th>Model 2 (Youth/Beer)</th>
<th>Model 3 (Youth/Wine)</th>
<th>Model 4 (Youth/Liq)</th>
<th>Model 5 (Youth/Eth)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Southern Region</td>
<td>0.685</td>
<td>0.833</td>
<td>0.785</td>
<td>0.699</td>
<td>0.786</td>
</tr>
<tr>
<td>(0.777)</td>
<td>(0.806)</td>
<td>(0.837)</td>
<td>(0.818)</td>
<td>(0.806)</td>
<td></td>
</tr>
<tr>
<td>Percent Urban</td>
<td>0.046 †</td>
<td>0.048 ‡</td>
<td>0.042 †</td>
<td>0.049 ‡</td>
<td>0.045 ‡</td>
</tr>
<tr>
<td>(0.018)</td>
<td>(0.019)</td>
<td>(0.021)</td>
<td>(0.019)</td>
<td>(0.019)</td>
<td></td>
</tr>
<tr>
<td>Executions</td>
<td>-0.070</td>
<td>-0.076</td>
<td>0.030</td>
<td>0.120</td>
<td>0.006</td>
</tr>
<tr>
<td>(0.407)</td>
<td>(0.398)</td>
<td>(0.378)</td>
<td>(0.376)</td>
<td>(0.372)</td>
<td></td>
</tr>
<tr>
<td>Core</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poverty</td>
<td>9.907 ‡</td>
<td>4.203 ‡</td>
<td>4.211 ‡</td>
<td>4.900 ‡</td>
<td>5.042 ‡</td>
</tr>
<tr>
<td>(3.730)</td>
<td>(0.997)</td>
<td>(0.994)</td>
<td>(0.999)</td>
<td>(1.015)</td>
<td></td>
</tr>
<tr>
<td>Percent Black</td>
<td>1.556 ‡</td>
<td>1.544 ‡</td>
<td>1.535 ‡</td>
<td>1.496 ‡</td>
<td>1.593 ‡</td>
</tr>
<tr>
<td>(0.245)</td>
<td>(0.255)</td>
<td>(0.260)</td>
<td>(0.248)</td>
<td>(0.249)</td>
<td></td>
</tr>
<tr>
<td>Young Adult Population</td>
<td>0.237 ‡</td>
<td>-0.077</td>
<td>1.193 †</td>
<td>0.362</td>
<td>0.939</td>
</tr>
<tr>
<td>(0.076)</td>
<td>(0.254)</td>
<td>(0.699)</td>
<td>(0.731)</td>
<td>(0.686)</td>
<td></td>
</tr>
<tr>
<td>Parker</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female Labor Force Participation</td>
<td>-0.137 ‡</td>
<td>-0.122 ‡</td>
<td>-0.114 ‡</td>
<td>-0.866 †</td>
<td>-0.093 ‡</td>
</tr>
<tr>
<td>(0.039)</td>
<td>(0.037)</td>
<td>(0.037)</td>
<td>(0.038)</td>
<td>(0.037)</td>
<td></td>
</tr>
<tr>
<td>Mobility</td>
<td>2.972 ‡</td>
<td>2.887 ‡</td>
<td>2.835 ‡</td>
<td>2.568 ‡</td>
<td>2.421 ‡</td>
</tr>
<tr>
<td>(0.973)</td>
<td>(0.999)</td>
<td>(1.033)</td>
<td>(1.009)</td>
<td>(1.006)</td>
<td></td>
</tr>
<tr>
<td>Female-Headed Households</td>
<td>0.180 †</td>
<td>0.159</td>
<td>0.158</td>
<td>0.146</td>
<td>0.106</td>
</tr>
<tr>
<td>(0.105)</td>
<td>(0.103)</td>
<td>(0.107)</td>
<td>(0.096)</td>
<td>(0.100)</td>
<td></td>
</tr>
<tr>
<td>Alcohol Consumption</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beer Consumption</td>
<td>0.359 †</td>
<td>-0.297</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0.181)</td>
<td>(0.298)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wine Consumption</td>
<td></td>
<td>26.328</td>
<td>(19.210)</td>
<td>4.999</td>
<td>(20.01)</td>
</tr>
<tr>
<td>Ethanol Consumption</td>
<td></td>
<td>21.942</td>
<td>(18.35)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interaction Terms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poverty/Beer Consumption</td>
<td>-5.830</td>
<td>(3.905)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Youth/Beer Consumption</td>
<td>0.014</td>
<td>(0.010)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Youth/Wine Consumption</td>
<td>-25.780</td>
<td>(19.24)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Youth/Liquor Consumption</td>
<td>-3.227</td>
<td>(20.09)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Youth/Ethanol Consumption</td>
<td></td>
<td></td>
<td>-19.290</td>
<td>(18.69)</td>
<td></td>
</tr>
<tr>
<td>Buse's R-Square</td>
<td>0.788</td>
<td>0.788</td>
<td>0.787</td>
<td>0.793</td>
<td>0.796</td>
</tr>
<tr>
<td>† p &lt; .05</td>
<td>‡ p &lt; .01</td>
<td>(one-tailed tests)</td>
<td>N = 150</td>
<td>Note: Numbers in parentheses are standard errors.</td>
<td></td>
</tr>
</tbody>
</table>

Table 15. Unstandardized Coefficients and Standard Errors for Regression of Homicide Rates on Control, Core, Parker, Alcohol Consumption, and Non-Significant Interaction Terms: 50 States in 1970, 1980, and 1990
LIST OF REFERENCES


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