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CONVICTION CELERITY, PUNISHMENT SEVERITY, AND TREATMENT COMPLIANCE AS PREDICTORS OF DUI RECIDIVISM: MEDIATION AND MODERATION MODELS OF DETERRENCE

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Dissertation

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A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in the
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By

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Lexington, Kentucky

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ABSTRACT OF DISSERTATION

CONVICTION CELERITY, PUNISHMENT SEVERITY,
AND TREATMENT COMPLIANCE AS PREDICTORS OF DUI RECIDIVISM:
MEDIATION AND MODERATION MODELS OF DETERRENCE

Driving under the influence (DUI) is one of the most frequently committed offenses in the United States and approximately one-third of DUI offenders are recidivists. Researchers have evaluated multiple DUI prevention approaches, most of which have been rooted in deterrence theory. Recently, the criminal justice system has moved away from deterrence-based approaches and begun employing various forms of rehabilitation to reduce DUI recidivism. This shift in the criminal justice system has lead researchers to begin exploring the effects of rehabilitation on DUI offenders, including an examination of offender compliance with rehabilitation programs. Although each of these areas has been investigated separately, existing studies have not incorporated deterrence-related measures, rehabilitation compliance, and offender recidivism into a single model.

Utilizing a statewide sample of Kentucky DUI offenders, the primary goal of this dissertation was to examine whether rehabilitation compliance mediates the relationship between deterrence-related variables (conviction celerity and punishment severity) and DUI offender recidivism. Second, because existing studies have produced inconclusive or mixed results regarding deterrence among DUI offenders, analyses were conducted to examine the potential moderating effects of age, gender, substance use problem severity, and location on the relationship between deterrence-related variables and DUI recidivism.

Overall, the hypothesized mediation models were unsupported. There was no direct correlation between the deterrence-related variables and DUI recidivism. In addition, while there was some evidence of moderation, the hypothesized moderation models were also largely unsupported. Despite these results, compliance was significantly related to DUI recidivism in all four models, and there was evidence of relationships between both compliance and DUI recidivism with age, gender, problem severity, and location.

Findings highlight the importance of compliance and social and environmental variables in predicting DUI recidivism, suggesting that these variables may be more accurate predictors of DUI recidivism than deterrence-based variables. Results

demonstrate a need for the criminal justice system to place more emphasis on offenders' treatment needs, treatment accessibility, and retention of DUI offenders in rehabilitation programs in order to decrease DUI recidivism.

Megan Filiatreau Dickson
December 5, 2013

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To my littlest Oliver -

this is for you, kid.

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Chapter 1: Introduction

Although driving under the influence (DUI) rates have been decreasing in recent years, the most recent Federal Bureau of Investigation (FBI) Uniform Crime Report (UCR) reveals that driving under the influence remains one of the most prevalent offenses in the United States (FBI, 2012). Approximately 1.2 million people were arrested for DUI during 2011 (FBI, 2012). Compared to other UCR arrest data, DUI was the fourth most common offense, trailing only drug abuse violations (1.53 million), larceny-theft (1.26 million), and simple assault (1.24 million), and far more frequent than the fifth most common offense, disorderly conduct (600,000).

While official arrest statistics highlight the high prevalence of DUI offenses, research indicates that these official arrests only represent a small fraction of DUI offenders. According to the 2010 National Survey of Drug Use and Health (NSDUH), approximately 11.4% of people ages 12 and older reported driving under the influence of alcohol at least once during the past year (SAMHSA, 2011), representing 28.8 million people. During the same time frame, 10.6 million people ages 12 and older reported driving under the influence of illicit drugs (SAMHSA, 2011). Thus, many DUI offenders are never caught and formally arrested.

With such a high prevalence, DUI represents a major public health concern. The National Highway Traffic Safety Administration (NHTSA; 2010$_a$) reported that in 2009, 32% of all traffic fatalities in the United States were alcohol-related, in which drivers had a blood alcohol concentration (BAC) of .08 or higher. While there are not estimates for the total number of fatalities related to drug-impaired driving, a NHTSA (2010$_b$) report

shows that among fatally-injured drivers, 18% tested positive for at least one drug, an increase from 13% in 2005. DUI recidivists pose an even greater threat to public safety.

According to the NHTSA (2004), approximately one-third of all drivers arrested for DUI have at least one previous DUI conviction. A 2009 roadside survey revealed that drivers with a blood alcohol concentration (BAC) higher than .08 were 8 times more likely to have a prior DUI conviction than drivers with no alcohol in their systems (NHTSA, 2010$_a$). Repeat DUI offenders are also more likely to be involved in fatal motor-vehicle accidents (NHTSA, 2004) and motor-vehicle accidents, overall (Nochajski & Stasiewicz, 2006; Nochajski & Wieczorek, 2000). Because of the significant threat posed by DUI recidivists, the criminal justice system has implemented a number of policies and programs designed to prevent DUI and reduce DUI recidivism. Traditionally, these policies and programs are rooted in deterrence theory. Deterrence theorists have proposed two types of deterrence: general and specific (Akers & Sellers, 2009). General deterrence refers to the deterrence that occurs among the public when a single offender is punished. The individual's punishment deters potential offenders by serving as a warning. Specific deterrence refers to when offenders are apprehended and punished, deterring them from future offenses and thus reducing recidivism rates. In order for punishment to have any type of deterrent effect, researchers argue that the punishment must be swift, certain, and severe (Akers & Sellers, 2009; Nochajski & Stasiewicz, 2006).

Several DUI studies have investigated these three main principles of deterrence, often highlighting them as factors in reducing recidivism rates. For example, Voas and Lacey (1990) examined punishment severity in DUI cases and concluded that it is an

offender's perception of the imposed sanction that matters, not the public's perception. The offender must view the sanction as severe in order for any behavioral change to occur. Yu and Williford (1995) explored celerity (swiftness) among DUI cases, finding that the likelihood of recidivating increases for DUI offenders as the time elapsed between arrest and case disposition increases. Finally, other research has concluded that the increased certainty of punishment is correlated with decreased reoffending among DUI offenders (Yu, 2000).

More recently, the criminal justice system has begun to shift some of its focus away from deterrence theory to the education and rehabilitation of DUI offenders in the hopes of initiating behavioral change. Voas and Fisher (2001) state that the rehabilitative approach to DUI offenders "is based on the assumption that for many drivers, DWI [driving while intoxicated] offenses result from personal risk factors, such as lack of knowledge about alcohol's effects or the presence of alcohol-use disorders" (p.35). Thus, the main goals of rehabilitative programs have been to inform, educate, and treat DUI offenders. Researchers have subsequently expanded the research literature by exploring the effects of education and rehabilitation on DUI recidivism. Wells-Parker and colleagues (1995) found that rehabilitation led to an 8-9% decrease in recidivism compared to no rehabilitation. Other studies have found similar results, suggesting that rehabilitation is an effective deterrent of future DUI behavior (Taxman & Piquero, 1998).

Lastly, researchers examining the deterrence and rehabilitation of DUI offenders have also sought to address compliance with both treatment recommendations and imposed deterrence-based sanctions. Studies investigating the effectiveness of license revocation, for example, have concluded that a significant number of offenders continue

to drive despite having had their license revoked (McCartt, Geary, & Nissen, 2002; Nichols & Ross, 1990; Ross & Gonzales, 1988). Similarly, compliance is also a concern with rehabilitation programs, with research indicating that noncompliant DUI offenders are at greater risk of recidivating (Nochajski, 1999; Williams, Simmons, & Thomas, 2000). Because of the relationship between compliance and recidivism, compliance among DUI offenders has also remained a topic of interest for researchers.

The Current Study

Although research has provided evidence for a relationship between both deterrence and substance abuse treatment compliance with DUI recidivism, there has been a lack of research incorporating deterrence and rehabilitation into a single model. Using a deterrence theory framework, the primary purpose of this dissertation is to explore how certain factors, including conviction celerity and punishment severity, predict future offending among a sample of Kentucky DUI offenders. However, this dissertation will go beyond the current literature by using a mediation model to analyze treatment/education compliance as a mediating variable between the deterrence variables (conviction celerity and punishment severity) and DUI recidivism. Mediation, as described by Preacher and colleagues (2007), is another term for indirect effect and refers to when "the causal effect of an independent variable (X) on a dependent variable (Y) is transmitted by a mediator (M)" (p.186). Previous DUI studies have primarily investigated direct relationships ($x \longrightarrow y$). This study, on the other hand, examines whether or not the relationships between the deterrence variables and recidivism are transmitted through a third, mediating variable (compliance).

In Kentucky, DUI offenders are required to receive a substance abuse assessment within 10 days of their conviction. Data from these assessments are collected and maintained by the University of Kentucky Center on Drug and Alcohol Research (UK-CDAR). The sample used in this dissertation is secondary data drawn from those statewide records. Chapter Four provides additional discussion of sampling and the research methods.

Research Questions

Using the existing literature and deterrence theory as the primary framework, this dissertation specifically addresses the following questions:

Q_1:   Does conviction celerity predict future recidivism among DUI offenders?

Q_2:   Does compliance with treatment and/or education referral mediate the relationship between conviction celerity and recidivism?

Q_3:   Does punishment severity predict future recidivism among DUI offenders?

Q_4:   Does compliance with treatment and/or education referral mediate the relationship between punishment severity and recidivism?

In addition to the aforementioned research questions, this dissertation examines the moderating effects of several personal and environmental variables. Moderators are variables that affect the relationship between an independent variable and dependent variable, either influencing the direction or strength of the relationship (Baron & Kenny, 1986). A recent review of the DUI literature pointed out the importance of examining recidivism using a multivariate approach (Nochajski & Stasiewicz, 2006), including exploring potential moderators. Further, Baron and Kenny (1986) argue that "moderator variables are typically introduced when there is an unexpectedly weak or inconsistent

relation between a predictor and a criterion variable" (p.1178). Much of the existing DUI

literature has produced inconclusive or mixed results regarding deterrence among DUI

offenders, which will be further discussed in Chapter Two. However, the literature

investigating potential moderators of DUI recidivism is limited. Thus, the following

questions are also addressed in this dissertation:

Q_5: Do age, gender, substance use problem severity, or location moderate the
        relationship between conviction celerity and recidivism?

Q_6: Do age, gender, substance use problem severity, or location moderate the
        relationship between punishment severity and recidivism?

In summary, this chapter provides an overview of the problems to be explored in

this dissertation, while specifically identifying the guiding research questions for the

study. This study uses a mediation model to examine the mediating effects of

treatment/education compliance on the relationship between conviction celerity and

recidivism and punishment severity and recidivism. Additionally, this dissertation

explores the influence of various moderators, including age, gender, substance use

problem severity, and location. As previously mentioned, this dissertation takes existing

research a step further by analyzing DUI recidivism using both mediating and moderating

variables, with deterrence theory as a guiding framework. By examining potential

mediators and moderators, this dissertation will potentially give researchers a clearer

understanding the relationship between various personal and environmental variables and

DUI behavior. This can improve the way the criminal justice system and treatment

providers address DUI offenders and ultimately reduce recidivism rates. The following

two chapters will delve further into the literature related to DUI behaviors, including

recidivism, and establish the theoretical framework for the current study – culminating in

the presentation of several research hypotheses at the end of Chapter Three.

Chapter 2: Theoretical Framework

The previous chapter introduced DUI and the focus and goals of this study, including the guiding research questions of the study. This chapter will provide a more thorough review of the theoretical framework informing this dissertation, deterrence theory. Beginning with an overview of classical deterrence theory, this chapter will offer a detailed look at the history of deterrence theory, including a discussion of various expansions of deterrence theory, rational decision making, and a review of studies that have used deterrence theory as a theoretical framework.

Historical Roots of Deterrence Theory

As mentioned in the introductory chapter, the response to DUI behaviors has traditionally been punishment rooted in deterrence theory. In fact, deterrence-based practices have traditionally been the response of the criminal justice system for most criminal offenses and continue to be the focus, as demonstrated by the recent movement to "get tough on crime" (Wright, Caspi, Moffitt, & Paternoster, 2004). One of the earliest theoretical perspectives presented by classical criminologists, the basic premise of deterrence theory is that we are all rational beings and decisions to violate the law are an "exercise of free will" (Akers & Sellers, 2009). Decisions to violate the law are often tied to perceptions of risk for punishment and potential offenders often consider the legal consequences of criminal behavior and the risk of being caught. Thus, early proponents of deterrence theory argued that crimes can be prevented when the costs outweigh the benefits of committing the crime, as perceived by the offender (Gibbs 1975; Zimring & Hawkins 1973). Jeremy Bentham (1830) stated, "If the apparent magnitude, or rather value of [the] pain be greater than the apparent magnitude or value of the pleasure or

good he expects to be the consequence of the act, he will be absolutely prevented from performing it," (p.396). When discussing the origins of deterrence theory, it is important to explore early theorists' ideas regarding punishment, particularly Cesare Beccaria (1764) and Jeremy Bentham's (1830) work, from which deterrence theory is derived.

Beccaria was the first theorist to devote significant attention to the concept of punishment and deterrence. In his seminal work, *On Crimes and Punishment*, Beccaria (1764) outlined the central tenets of deterrence theory, arguing that punishment should serve as an example to others, deterring potential law violators. Further, Beccaria argued that all punishments must meet four specific requirements in order to effectively deter future criminality: 1) celerity (swiftness), 2) certain, 3) severe, and 4) exposed to the public. However, Beccaria also pointed out that punishment should only be used when necessary; excessive and unnecessary use of punishment would be cruel and tyrannical. Bentham (1789), on the other hand, is credited with presenting the idea of hedonistic calculus. The main premise of hedonistic calculus is that people are rational and free-willed with the ability to weigh the potential pleasure of a particular action against the potential pain, and based on these rational calculations, individuals will choose the behavior that maximizes pleasure and minimizes pain and consequences. Bentham (1830) also later argued that all forms of punishment are evil and the only benefit of punishment is deterrence.

Classical deterrence theory also distinguishes between two main types of deterrence: general and specific (Akers & Sellers, 2009; Piquero & Paternoster, 1998; Stafford & Warr, 1993). The focus of general deterrence is the vicarious effects of punishment on an audience. The basic premise is that punishing a single offender will

serve as a warning to the general public, thereby deterring potential offenders. Beccaria (1764) specifically argued that formal punishment would serve as an example and prevent potential offenders from violating the law. Specific deterrence, on the other hand, refers to efforts to discourage an offender from committing future offenses. By apprehending and punishing an individual that violates the law, he/she will be deterred from engaging in future criminal activities, thus reducing recidivism rates. Both types of deterrence, however, involve either a direct or indirect experience with some type of formal punishment (Stafford & Warr, 1993). Within these two types of deterrence, classical criminologists again highlight the importance of punishments that are swift, certain, and severe.

Although deterrence theory dates back to the 1700s, academics have expanded upon and reconceptualized deterrence theory over the years. More recently, Stafford and Warr (1993) have presented a reconceptualized version of traditional deterrence theory. Others have moved to include discussions of the deterrent effects of informal sanctions. In the following section, the current state of deterrence theory and supporting literature will be reviewed.

Deterrence, Punishment, & Crime Today

As previously mentioned, deterrence theory was first introduced in the 1700s. While it fell out of favor with criminologists in the early 20th century, it has regained popularity and is largely the basis of the contemporary criminal justice system in the United States. Since the early 1980s, several policies have been implemented that are geared towards punishing and deterring criminal offenders, including sentencing enhancement policies and determinate sentencing practices such as the "three strikes" and

truth in sentencing laws. Because of this relatively recent shift in the criminal justice

system and the consequences of these policies (e.g. prison overcrowding), several

researchers have sought to examine the effectiveness of contemporary sanctions in

deterring [potential] offenders from committing future crimes. In addition, several

theorists have sought to expand upon classical deterrence theory in hopes of building a

theoretical model that addresses some of the oversights of the original model.

One particular expansion of deterrence theory that has received significant

attention within research is Stafford and Warr's reconceptualized deterrence theory.

Arguing that specific and general deterrence have "serious shortcomings," Stafford and

Warr (1993) point out the following problems with classical deterrence theory:

1) Assumption that general deterrence and specific deterrence affect different types of people.

2) Deterrence has traditionally focused on the effects of being punished.

3) Traditional deterrence theory has suggested that an offender's direct experience with punishment is the primary variable influencing future behavior.

In lieu of these flaws, Stafford and Warr's reconceptualized deterrence theory is a

combination of specific and general deterrence, recognizing that both general deterrence

(indirectly experiencing punishment) and specific deterrence (directly experiencing

punishment) can impact an individual's decision to engage in crime or not. In addition,

acknowledging that not all offenders are caught and subsequently punished, Stafford and

Warr (1993) address the effects of punishment avoidance and how avoiding punishment

may actually encourage criminal behavior.

Testing Stafford and Warr's (1993) reconceptualization of deterrence theory, Piquero and Paternoster (1998) explored drinking and driving attitudes and behaviors among a sample of licensed drivers. In support of Stafford and Warr's work, the authors concluded that both personal and vicarious experiences with punishment and punishment avoidance affected respondents' intentions to drive under the influence. Piquero and Paternoster (1998) found that the strongest predictor of DUI behavior was perceived certainty of punishment. Specifically, they found that respondents who believed there was a greater chance of being pulled over were more likely to report that they would not drink and drive, while successfully avoiding punishment for drinking and driving, having friends who had avoided punishment or had favorable attitudes towards drinking and driving negatively impacted individual's perceived certainty of punishment.

Borrowing from labeling theory, other researchers have expanded the concept of deterrence to investigate the effects of informal sanctions, such as disapproval of others or feelings of guilt. Labeling theorists argue that being labeled as deviant can have profound, negative impacts on an individual, including effects on the opportunities available to an offender (Becker, 1963; Lemert, 1979). Some studies have suggested that the threat of informal sanctions is more of a deterrent than formal sanctions (Nagin, 1998). Others have argued that formal punishment is most effective when it leads to informal sanctions (Andenaes, 1974; Gibbs, 1975; Zimring & Hawkins, 1973).

Recent literature has also suggested that criminal offenders may be affected by deterrence-based sanctions differently. Beyleveld (1979) argued that offenders must first be aware of existing sanctions and must also hold beliefs about a sanction that could prevent them from committing a crime. For example, returning to the early ideas of

celerity (swiftness), certainty, and severity, an offender will unlikely be deterred if he/she does not feel the sanction is severe. Under this premise, a number of academics have highlighted differences in deterrent effects between social groups. Research has shown, for example, that married offenders view prison sentences as more severe than single offenders (Petersilia & Deschenes, 1994).

Included in this resurgence of deterrence literature is an application of deterrence theory to various types of crime and punishment. Although the deterrent effect of punishment on criminal offenders has been widely debated, numerous research studies have provided support for each side of the argument. One particular topic seems to have attracted more debate than the rest - the general deterrent effects of capital punishment. Specifically researchers have sought to determine whether or not capital punishment is effective at deterring potential killers. Early empirical studies examining the effectiveness of capital punishment have largely found little deterrent effect (Radelet & Akers, 1996; Sellin, 1959). Other researchers have concluded that capital punishment actually has the opposite effect of deterrence, arguing that capital punishment can actually lead to an increase in homicides (known as brutalization) by demonstrating that it is acceptable to kill those that have caused us harm (Bowers & Pierce, 1980). Still other studies have concluded that the death penalty can prevent homicides (Dezhbakhsh, Rubin, & Shepherd, 2003; Shepherd, 2005). Despite each of these arguments, Cochran and colleagues (1994) have contended that there is generally a lack of consistent evidence indicating that capital punishment has a general deterrent or brutalization effect.

While Akers and Sellers (2009) argue that generally criminal sanctions do have deterrent effects, they follow up with a review of literature providing weak and

inconsistent results. Specifically, Akers and Sellers (2009) cited a recent meta-analysis of deterrence (Pratt et al., 2006), in which researchers concluded that oftentimes deterrence-specific measures, such as increased police force and high arrest rates, were the weakest predictors of crime. However, existing research has found support for deterrence theory. For example, a study of perceptual deterrence among active burglars (Decker, Wright, Logie, 1993) revealed that offenders were significantly more willing to commit a burglary if they believed the rewards outweighed the possible punishment. Conversely, if the burglars anticipated more severe penalties, they were less willing to offend.

Similarly, mixed results have been found in DUI offender samples. Specifically, existing studies examining deterrence-based sanctions have produced inconsistent results regarding sanction effectiveness. Research investigating incarceration has shown that jail sentences are overall ineffective specific deterrents, failing to significantly reduce DUI recidivism (Friedman, Harrington, & Higgins, 1995; Ross & Klette, 1995). Researchers looking at the deterrent effects of fines, however, have had more positive results (Nichols & Ross, 1990; Wagenaar et al., 2007). In an investigation of states implementing mandatory minimum fine policies, Wagenaar and colleagues (2007) found that mandatory fines were associated with a general deterrent effect and a reduction in fatal crash involvement by drivers with a BAC greater than 0.08 g/dl. Research on DUI offenders in other countries has also found that fines are effective in preventing DUI recidivism (Nichols & Ross, 1990). A more in-depth discussion of deterrence and DUI will be presented in Chapter Three.

In discussing the history and contemporary state of deterrence theory, it is also important to note the relationship between deterrence and rational thinking. As mentioned, deterrence theory is one of the earliest criminological theories and it is based on the idea of rational choice, assuming that people (specifically criminal offenders) are rational and will always seek to maximize benefits while minimizing costs (Akers & Sellers, 2009). The concept that offenders are rational actors has continued to play a role in criminological theory. For example, this concept also forms the foundation of rational choice theory. In the next section, rationality and rational choice theory will be reviewed as they relate to deterrence.

Rationality and Deterrence

Rational choice theory was first introduced as an economic analysis of crime and eventually evolved into an expansion of deterrence theory (Akers, 1990). As developed by Cornish and Clarke (1985, 1986), this modern rational choice perspective moves beyond the mathematical estimations of economic rational choice theory, focusing on criminality, decisions to engage or not engage in criminal behavior, and reasons for [potential] offenders' decisions. Arguing that this is a framework for thinking about crime prevention, the basic premise of Cornish and Clarke's rational choice theory is very similar to the core concepts of deterrence theory, arguing that offender's decisions are influenced by the costs and benefits of their behaviors. Offenders' behaviors are purposive, typically filling some type of need and a reflection of self-interest, and the benefits of committing the crime must outweigh the costs (including both formal and informal sanctions).

Whereas classical deterrence theory often focused on the punishment side of crime, the more contemporary rational choice perspective primarily investigates the decision-making process involved with criminal offending. Clarke and Cornish (2001) note the "theoretical importance and practical benefits of investigating…decision making" (p.23). Recognizing that decisions to become involved in crime (involvement decisions) are different from those relating to a specific criminal act (event decisions), Clarke and Cornish (2001) suggest that decision-making relating to crime must be studied longitudinally. They note that involvement decisions can be divided into three stages: 1) initiation, 2) habituation, and 3) desistance, and each stage is influenced by different variables. Event decisions on the other hand are tied to more immediate, situational factors. Building upon these ideas, Clarke and Cornish (2001) suggest that decisions to offend are influenced by offense characteristics, such as payoff and risk of being caught, previous experiences, individual offender characteristics, and background factors.

This movement towards a discussion of offense and offender characteristics led to the introduction of bounded rationality. Also introduced by the work of Cornish and Clarke (1985, 1986), bounded rationality is often referred to as limited rationality and is a theoretical look at the decision-making process of offenders and how decisions are influenced by an offender's sociocultural context. Models of bounded rationality specifically focus on "the social, physical, and situational context in which criminal decisions are made, as well as offenders' perceptions of the world around them" (Copes & Vieraitis, 2009: p.243). In other words, bounded rationality suggests that decisions to commit crimes are rational but completely subjective and can change, provided the context of the situation and the limits experienced by the individual offender.

Examining criminal behavior from a decision-making perspective, rational choice theory and bounded rationality have been used to examine various types of crime, including property crime (Carroll & Weaver, 1986; Walsh, 1986), drug use (Bennet, 1986), white collar crime (Elis & Simpson, 1995), and drunk driving (Nagin & Paternoster, 1993). As part of this dissertation, several personal and environmental variables that may potentially limit offender rationality and affect decisions to drive while impaired will be tested as moderators, providing a more subjective look at DUI recidivism and offering possible explanations for reoffending. Chapter Three will provide a review the literature that has previously examined how these personal and environmental variables relate to DUI and DUI recidivism.

In summary, this chapter reviewed the history of deterrence theory, including a discussion of rational choice theory and an overview of studies that have investigated the utility of deterrence-driven sanctions with criminal offenders. As mentioned, sanctions used by the criminal justice system have historically been rooted in deterrence theory, assuming that offenders are rational actors. However, a review of the literature revealed that deterrence-based measures have not always proven effective at preventing crime and reducing recidivism. In the following chapter, literature pertaining specifically to deterrence among DUI offenders will be reviewed. In addition, the recent movement towards rehabilitating DUI offenders will be addressed.

Chapter 3: Literature Review

The previous chapter provided an overview of the theoretical framework guiding the current study. This chapter will present a review of the DUI literature, primarily DUI recidivism, in four main sections. In the first section, approaches to reducing and preventing DUI recidivism will be detailed – with an emphasis on deterrence-based methods and rehabilitation. The second section will examine both punishment and treatment compliance among DUI offenders. The third section reviews various correlates of DUI behaviors, including age, gender, problem severity, and location. Finally, this chapter will conclude with the hypotheses that were tested in this dissertation.

DUI recidivism is typically defined as having more than one DUI conviction. In the United States, approximately one-third of all DUI offenders are recidivists (NHTSA, 2004). Whereas DUI offenders, in general, are viewed as a public health threat, research has demonstrated that DUI recidivists are an even greater threat to public health and safety. For example, repeat DUI offenders are more likely to be involved in fatal motor-vehicle accidents than first-time offenders (NHTSA, 2004). Recent crash data has specifically revealed that drivers involved in a fatal crash with a blood alcohol concentration (BAC) exceeding .08 were at least 8 times more likely to have a prior DUI conviction than drivers with no alcohol in their system, while those with a BAC of .01 or higher were at least four times more likely to have a prior DUI conviction (NHTSA, 2010$_a$). Thus, DUI recidivists have regularly been the focus of various intervention programs aiming to reduce DUI recidivism.

Approaches to Reducing DUI Recidivism

The previous section highlighted the DUI recidivism literature and the public health threat posed by DUI recidivists. This section of the chapter presents the various methods that have been used to reduce and prevent DUI recidivism. Specifically, deterrence and rehabilitation efforts will be discussed in detail.

Deterring DUI Offenders

In the criminal justice system, there have been two primary methods for reducing and preventing DUI recidivism: punishment and rehabilitation. However, the traditional approach to DUI prevention is based on a punitive model rooted in deterrence theory. Within the DUI literature, numerous researchers have examined DUI using a deterrence framework. Over the years, there has been an increase in the use of formal sanctions for DUI offenders (Yu, 2000). Sanctions primarily designed to deter future offenses include punishments such as fines, incarceration, and license revocation. As introduced in Chapter One, a significant portion of the literature studying the deterrent effects of DUI punishments includes a discussion of severity, certainty, and celerity (swiftness) of punishment as factors in reducing DUI recidivism rates.

Regarding punishment severity, empirical investigations of the relationship between punishment severity and deterrence has produced mixed results. For example, research has found overall that fines alone are an ineffective deterrent (Taxman & Piquero, 1998; Yu & Williford, 1995). Voas and Fisher (2001) specifically suggest that fines are ineffective in the United States because offenders are often allowed to make smaller payments over an extended period of time or fines are waived for a variety of other reasons. Because there is no financial burden on the offender, the punishment is

not perceived as severe and any deterrent effect is lost. In a sample of alcohol-impaired

drivers in Australia, Weatherburn and Moffatt (2011) found that higher fines did not have

a more deterrent effect. Yu (1994), however, found that when license suspension is

mandatory, an increase in fines significantly reduced the chances of DUI recidivism. In

addition, Wagenaar and colleagues (2007) found that mandatory fines were associated

with a general deterrent effect; a reduction in fatal crash involvement by drivers with a

BAC greater than 0.08 g/dl. Research from other countries has also found that fines are

effective in preventing DUI recidivism (Nichols & Ross, 1990).

Research on the deterrent effect of incarceration and sentence severity has also

produced mixed results. While there is some evidence that incarceration can deter DUI

behavior, this evidence comes from older studies and suggests that mandatory jail

sentences have more of a deterrent effect in the community (general deterrence), as

opposed to any specific deterrent effect (Cleary & Rodgers, 1986; Zador, Lund, Fields, &

Weinberg, 1988). However, more recently, Lapham and Todd (2012) concluded that

incarceration severity has a specific deterrent effect. Specifically, they found that at the

15-year follow-up, DUI offenders initially receiving less jail time continued to drive

impaired at rates similar to their baseline interview, while a similar pattern was not found

among those DUI offenders receiving longer jail sentences. Lapham and Todd (2012)

thus concluded that jail incarceration may act as a specific deterrent for DUI offenders.

However, other studies have found that incarceration does not result in a significant

reduction of DUI recidivism or DUI-related crashes (Friedman, Harrington, & Higgins,

1995; Ross & Klette, 1995). Wagenaar et al. (2007) found that mandatory minimum jail

sentences were less effective than mandatory fine policies in reducing alcohol-involved crashes.

The relationship between punishment certainty and recidivism has also been widely addressed in the literature, with some research suggesting that punishment certainty may be the most important and relevant component of the deterrence model (Nagin, 1998). Extant research has often found that the increased certainty of punishment is correlated with decreased reoffending among DUI offenders (Yu, 2000). In another study investigating the general deterrent effects of DUI sanctions, Nagin and Pogarsky (2001) presented a sample of undergraduates with a scenario in which they had to choose to drive intoxicated a short distance (10 miles) home or find another way home and pick their vehicle up early the next morning. Nagin and Pogarsky found that certainty and severity of punishment significantly reduced the students' hypothetical impaired driving.

Despite being largely neglected in the earlier DUI literature (Bouffard & Bouffard, 2011), research studies have also investigated the relationship between deterrence and the celerity of punishment. Specifically, existing research has shown a stronger deterrent effect for DUI offenders who had their license revoked at time of arrest or arraignment, rather than at time of conviction (McArthur & Kraus, 1999). A relatively common practice, police officers and other law-enforcing administrative personnel are allowed to revoke/suspend the licenses of suspected DUI offenders before conviction under administrative per se laws (McArthur & Kraus, 1999). Research has indicated that offenders arrested under such laws are less likely to recidivate during the year following initial license suspension (McArthur & Kraus, 1999). Stewart, Gruenewald, and Parker

(1992) found that following the enactment of administrative per se laws in North Dakota, there was a significant reduction in recidivism during the three-year follow-up period. While research has also shown that many DUI offenders continue to drive while their license is revoked or suspended (McCartt, Geary, & Nissen, 2002; Nichols & Ross, 1990; Ross & Gonzales, 1988), Ross and Gonzales (1988) note that these drivers tend to drive less and are more careful, resulting in fewer accidents and violations. Regardless, there is clear evidence in the literature that swiftly applied sanctions have deterrent effects. As concluded by Wagenaar and Maldonado-Molina (2007), "penalties applied immediately, even if more modest, have clear deterrence effects" (p.1404).

While a bulk of the literature pertaining to celerity and deterrence of DUI offenders has centered on administrative per se laws, other studies have moved beyond this focus. For example, various studies (Voas & Fisher, 2001; Voas & Lacey, 1990) have demonstrated that DUI cases move slowly through the court system because of the high volume of DUI cases often handled in the lower courts and that as the time between arrest and case disposition increases, likelihood of recidivating also increases (Yu, 2000; Yu & Williford, 1995). A recent study by Bouffard and Bouffard (2011) tested the effectiveness of expedited court procedures on reducing DUI recidivism. Although the study was unable to conclusively support the hypothesis that increased swiftness in DUI cases was an important deterrent for DUI offenders, they encouraged future researchers to continue to explore the correlation between sanction swiftness and deterrence since swift sanctions have the potential to deter DUI.

Although the criminal justice system has taken steps to help reduce and prevent DUI by using a variety of sanctions, these deterrence-driven efforts have not always been

effective. More recently, the criminal justice system has recognized that sanctions alone are not adequate and that rehabilitation may also be important when dealing with DUI offenders since offenders that exhibit substance-related problems are significantly more likely to recidivate (Nochajski & Stasiewicz, 2006). Thus, it has become much more common for DUI offenders to receive a combination of punitive sanctions and rehabilitation.

Rehabilitating DUI Offenders

As the criminal justice system has increasingly focused on the rehabilitation of DUI offenders, researchers have similarly shifted their attention. In more recent years, the number of studies investigating the effectiveness of rehabilitation efforts directed towards DUI offenders have increased. Historically, the primary goal of rehabilitation programs has been to institute behavioral change by informing, educating, and treating DUI offenders. Voas and Fisher (2001) specifically argue that efforts to rehabilitate DUI offenders are "based on the assumption that for many drivers, DWI [driving while intoxicated] offenses result from personal risk factors, such as lack of knowledge about alcohol's effects or the presence of alcohol-use disorders" (p.35). To date, a variety of rehabilitative programs have been used with DUI offenders and their effectiveness tested, including education programs (Nichols et al., 1978), drug and/or alcohol abuse treatment (Moore et al., 2008; Nichols et al., 1978), and victim impact panels (Fors & Rojek, 1999; Rojek, Coverdill, & Fors, 2003).

The primary form of rehabilitation often court-mandated for DUI offenders is education. Typically directed towards first-time DUI offenders, the goal of DUI education programs has been to provide offenders with basic information related to DUI

behavior. As discussed by Voas and Fisher (2001), "Education programs provide

information on important alcohol-related issues, such as alcohol's effects on driving

performance, the relationship between rate of consumption and BACs, and the nature of

DWI laws" (p.35). These programs are used primarily with offenders who can be

classified as social drinkers since early studies have indicated that such education

programs lead to more of a reduction in the recidivism of social drinkers than problem

drinkers (Nichols et al., 1978). The typical education program is delivered in a classroom

setting (Voas & Fisher, 2001) and incorporates group activities, films, and presentations

(Wells-Parker, Kenne, Spratke, & Williams, 2000).

A specific example of a regularly-used rehabilitation program, victim impact

panels (VIPs) are conducted to expose DUI offenders to and educate them on the dangers

of drunk driving by having victims of drunk driving accidents come and describe their

injuries and how the accident affected their life. Nochajski and Stasiewicz (2006) argue

that the guilt and remorse produced by such panels act as a deterrent to future DUI

behaviors. Wheeler and colleagues (2004) also note that "Such panels may be a valuable

tool as part of an overall drunk driving prevention and education program aimed at

educating those who do not have an alcohol problem" (p.34). First introduced by Mothers

Against Drunk Driving in the 1980s, several studies have concluded that VIPs are

effective in reducing recidivism (Fors & Rojeck, 1999; Rojeck, Coverdill, & Fors, 2003).

Rojeck, Coverdill, and Fors (2003) reported that VIPs are correlated with a 55.7%

decrease in rearrest. Other studies, however, have found little support for VIPs (C'de

Baca, Lapham, Liang, & Skipper, 2001; Polacsek, et al., 2001; Wheeler, Rogers,

Tonigan, & Woodall, 2004).

For those offenders who exhibit substance abuse or dependence, a more intensive treatment program may be needed. According to Voas and Lacey (1990), it was not until the 1968 Alcohol and Highway Safety Report that people began to look at the role of problem drinkers in alcohol-related crashes. Early studies, in fact, reported that around one-third of DUI offenders could be labeled problem drinkers (Nichols et al., 1978). Programs available to such DUI offenders can range from outpatient counseling to long-term inpatient treatment, with the goal of such therapeutic programs being to reduce DUI recidivism by attacking the underlying substance use problem. In a recent study of repeat DUI offenders, Moore and colleagues (2008) delivered a cognitive therapy treatment program to repeat DUI offenders and found that a majority of the program graduates reported being ready to change their DUI behaviors and only 13% had recidivated at the 21-month follow-up.

While researchers have found the use of rehabilitation with DUI offenders to be overall effective (Moore et al., 2008; Nichols et al., 1978; Wells-Parker et al., 1995), they have also noted that it is problematic because it is court-mandated. As described by Dill and Wells-Parker (2006), court-mandated treatment "requires offenders convicted of alcohol or other drug-related crimes to participate in treatment for their substance abuse problems or face legal consequences" (p.41). Past studies have indicated that even court-mandated treatment is somewhat effective at reducing DUI recidivism, but only for offenders who actually comply with treatment orders (Dill & Wells-Parker, 2006). Additionally, researchers have also argued that many offenders view these court-mandated rehabilitation efforts as a form of punishment (Nochajski & Stasiewicz, 2006), yet few researchers have treated the rehabilitation of DUI offenders as sanctions. While

the literature has regularly used a deterrence framework when looking at more traditional legal sanctions, researchers have failed to explore how deterrence theory translates to rehabilitation efforts.

Compliance among DUI Offenders

Within this breadth of literature exploring efforts to deter and rehabilitate DUI offenders, researchers have also highlighted the issue of compliance. Generally speaking, compliance refers to an offender's adherence to sanctions or completion of recommended treatment programs. As previously mentioned, several studies have addressed the effectiveness of administrative per se laws (McArthur & Kraus, 1999; Stewart, Gruenewald, and Parker, 1992). While studies have shown that license revocation is effective, the research has also concluded that that many offenders continue to drive despite having had their license revoked. Some studies have indicated that as many as 88% of suspended drivers continued to drive without their license (McCartt, Geary, & Nissen, 2002; Nichols & Ross, 1990; Ross & Gonzales, 1988).

Another regularly used sanction with which compliance becomes a central issue is ignition interlock systems. In some states, offenders are mandated to install an ignition interlock system in their vehicle following a DUI conviction. As described by Voas and Fisher (2001), ignition interlocks "require the driver to take a breath test before starting the car and will prevent vehicle ignition if the operator has a BAC higher than 0.025 percent" (p.37). A review of studies investigating the effectiveness of ignition interlock systems (Elder et al., 2011) revealed that ignition interlock devices were overall more effective in reducing DUI recidivism than license revocation. However, studies have also pointed out high rates of noncompliance among offenders ordered to install ignition

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interlock devices; estimates reveal that approximately 10% of individuals actually

comply (Voas & Marques, 2004). Voas et al. (2002) note that reasons for failure to

enroll and comply with ignition interlock device programs are unclear, but research

suggests one possible reason could be that the fees associated with these devices,

including installation and monthly maintenance fees, are cost-prohibitive (Schonfeld &

Sheehan, 2004).

With rehabilitation programs – including both educational classes and substance

abuse treatment programs – compliance (or noncompliance) has also proven to be a

concern. Research has found that noncompliant DUI offenders are at greater risk of

recidivating (Nochajski, 1999; Robertson, Gardner, Xu, & Costello, 2009; Williams,

Simmons, & Thomas, 2000). In their review of DUI recidivism research, Nochajski and

Stasiewicz (2006) commented that "interventions that attempt to engage and retain the

DUI offender in treatment may have benefit," (p.189). However, DUI offenders'

perceptions of their own drinking behavior often do not align with the criminal justice

system's view, resulting in those who fail to recognize that they have a problem being

resistant to and less likely to comply with any type of therapeutic treatment mandated by

the courts (Nochajski & Stasiewicz, 2006). Similar to ignition interlock, another reason

often linked to treatment noncompliance is the cost associated with such programs

(Brown et al, 2008; Lapham & England-Kennedy, 2012). Brown et al. (2008) found that

the cost of participation involved in mandatory intervention programs was one of the

most often cited reasons for delaying relicensing following a DUI conviction.

Demonstrating the importance of completing recommended treatment programs,

research has regularly concluded that rehabilitation is more effective at reducing DUI

recidivism for DUI offenders who are compliant and complete the entire treatment program than for noncompliant offenders who may only receive part of the treatment program. Recently, Robertson and colleagues (2009) studied the impact of the Mississippi Alcohol Safety Education Program and found that offenders who completed the program had significantly lower recidivism rates the 3 years following program completion, than both non-completers and individuals failing to enroll. Moore et al. (2008) delivered a cognitive therapy treatment program to repeat DUI offenders and found that a majority of the program graduates reported being ready to change their DUI behaviors and only 13% of treatment completers had recidivated at the 21-month follow-up, while 75% of non-completers had recidivated.

Correlates of DUI, Recidivism, & Compliance

Within the DUI literature, researchers have also highlighted a number of demographic variables that correlate with substance-impaired driving, recidivism, and compliance. For example, according to the most recent NHTSA roadside survey, males were much more likely to have an illegal blood alcohol concentration (BAC; > 0.08 g/dL) than females (NHTSA, 2009). Males are also more likely to be involved in fatal alcohol-related automobile accidents (NHTSA, 2010$_a$). However, recent reports have revealed that DUI arrest rates for females are increasing (FBI, 2012). In fact, the DUI arrest rate for females increased approximately 37% between 2001 and 2010. Despite this dramatic increase, males are still significantly more likely to be arrested for DUI (FBI, 2012) and are at greater risk of recidivating (C'de Baca, Miller, & Lapham, 2001; Nochajski & Stasiewicz, 2006). Unlike gender and recidivism, studies have found that compliance of

DUI offenders is similar across males and females (Maxwell & Freeman, 2007; Peck, Arstein-Kerslake, & Herlander, 1994).

Research studies have also found significant relationships between age and DUI. Specifically, the literature has concluded that substance-impaired drivers are younger. The 2010 NSDUH found that individuals ages 21 to 25 were more likely to report driving under the influence of alcohol or drugs in the past year than any other age group (SAMHSA, 2011). However, DUI recidivists are typically older compared to first-time offenders (Nochajski & Stasiewicz, 2006). Research has specifically indicated that first-time offenders younger than 30 are more likely to commit additional DUI offenses as they get older than first-time offenders who are older than 30 (C'de Baca, Miller, & Lapham, 2001). Finally, age is also correlated with compliance. Research has indicated that noncompliant DUI offenders are significantly younger than individuals who were compliant (Peck, Arstein-Kerslake, & Herlander, 1994; Webster, Colwell, Cook, Duvall, & Dickson, 2011).

Other variables, such as substance use problem severity, have also been identified as correlates of DUI and compliance. Past studies have suggested that substance use disorders, including both abuse and dependence, are common among DUI offenders (Caetano & Raspberry, 2000; C'de Baca et al., 2004). Recently, Matthews and colleagues (2009) examined DUI behaviors in a sample of drug users and found that frequency of substance use was the strongest correlate of substance-impaired driving. Other studies have shown that substance use disorders are even more prevalent among repeat DUI offenders (Lapham, C'de Baca, McMillan, & Lapidus, 2006). Regarding compliance, Nochajski and Stasiewicz, (2006) argued that, "although many DUI

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offenders endorse alcohol-related problems, the majority do not meet diagnostic criteria

for a current alcohol use disorder as determined by a structured clinical interview" and

thus, may be less likely to comply with court-mandated education or treatment programs.

Similarly, offenders who fail to recognize that they have a substance use problem may be

resistant to formal treatment (Nochajski & Stasiewicz, 2006).

Finally, DUI behaviors and recidivism rates vary geographically. Rural

communities have higher arrest rates for DUI than urban communities (721.6 per 100,000

v. 520.8 per 100,000; FBI, 2012). Lambert and colleagues (2008) found that rural youth

were more likely than urban youth to drive under the influence of either alcohol or illicit

drugs. Other studies examining differences between rural and urban DUI offenders have

found that when compared to their urban counterparts, rural DUI offenders are more

likely to have multiple DUI offenses, meet DSM-IV criteria for substance abuse and

dependence, and be noncompliant with treatment and education referrals (Webster,

Pimental, Harp, Clark, & Staton-Tindall, 2009; Webster, Dickson, Duvall, & Clark,

2010).

Study Hypotheses

The final section of this chapter is a restatement of the specific research questions

addressed in the current study and an outline of the corresponding hypotheses that were

tested. After a review of previous research pertaining to DUI and deterrence theory, the

following hypotheses were formed in response to the respective research questions:

Q_1:   Does conviction celerity predict future recidivism among DUI offenders?

    H_1:   Weak conviction celerity (swiftness) will be positively associated with
            future recidivism. As the time between arrest and conviction increases,
            the odds of recidivating will also increase.

Q$_2$:   Does compliance with treatment and/or education referral mediate the relationship between conviction celerity and recidivism?

        H$_2$:   Although weak conviction celerity will predict future recidivism, treatment compliance will mediate this relationship. Specifically, compliance will at least partially mediate the positive relationship, reducing the effects of conviction celerity on future recidivism.

Q$_3$:   Does punishment severity predict future recidivism among DUI offenders?

        H$_3$:   Punishment severity will be negatively associated with future recidivism. As punishment severity increases, the odds of recidivating will decrease.

Q$_4$:   Does compliance with treatment and/or education referral mediate the relationship between punishment severity and recidivism?

        H$_4$:   Although punishment severity will predict future recidivism, treatment compliance will mediate this relationship. Specifically, compliance will at least partially mediate the negative relationship, reducing the effects of punishment severity on future recidivism.

Q$_5$:   Do age, gender, problem severity, or location moderate the relationship between conviction celerity and recidivism?

        H$_5$:   Location will moderate the relationship between conviction celerity and recidivism. The positive relationship between weak conviction celerity and recidivism will be weaker for non-metropolitan urban and rural offenders compared to metropolitan offenders.

        H$_6$:   Problem severity will moderate the relationship between conviction celerity and recidivism. For individuals demonstrating lower problem severity, the positive relationship between weak conviction celerity and recidivism will be stronger.

        H$_7$:   Age will moderate the relationship between conviction celerity and recidivism. The positive relationship between weak conviction celerity and recidivism will be stronger for older offenders.

        H$_8$:   Gender will moderate the relationship between conviction celerity and recidivism. The positive relationship between weak conviction celerity and recidivism will be stronger for females.

Q$_6$:   Do age, gender, problem severity, or location moderate the relationship between punishment severity and recidivism?

H₉: Location will moderate the relationship between punishment severity and recidivism. The negative relationship between punishment severity and recidivism will be weaker for non-metropolitan urban and rural offenders compared to metropolitan offenders.

H₁₀: Problem severity will moderate the relationship between punishment severity and recidivism. For individuals demonstrating lower problem severity, the negative relationship between punishment severity and recidivism will be stronger.

H₁₁: Age will moderate the relationship between punishment severity and recidivism. The negative relationship between punishment severity and recidivism will be stronger for older offenders.

H₁₂: Gender will moderate the relationship between punishment severity and recidivism. The negative relationship between conviction celerity and recidivism will be stronger for females.

Chapter 4: Research Methods

The preceding two chapters reviewed the existing literature pertaining to DUI –

including overviews of deterrence theory and its application to DUI offenders, the

relatively new rehabilitation approach being used with DUI offenders, and DUI

recidivism. At the end of Chapter Three, the hypotheses for this dissertation were

presented. This chapter will detail the methods that were used to answer the research

questions identified in the introductory chapter, beginning with a discussion of the study

sample.

Sample

The sample for this study comes from the state of Kentucky. In Kentucky,

convicted DUI offenders are court-mandated to submit themselves for a substance abuse

assessment within 10 days of their conviction. Certified DUI assessors conduct the

assessments at state-licensed and certified DUI programs across the state. There are

approximately 115 DUI programs and 300 certified DUI assessors statewide.

When offenders are assessed, DUI program staff members enter the assessment

information into a desktop software program (*DUI 2.4.2*), which was developed and

provided by the University of Kentucky Center on Drug and Alcohol Research (UK-

CDAR) through a contract with the Kentucky Division of Behavioral Health. State

regulation (908 KAR 1:310) requires DUI programs to download and submit the

assessment data to UK-CDAR once a month. Data are encrypted and are downloaded

onto removable media (floppy diskette, CD, or USB drive) and mailed through the

United States Postal Service or sent through email. All assessment data are maintained

by UK-CDAR and housed in a master database as part of the Kentucky DUI Project.

Separate IRB approval was received from the University of Kentucky IRB and the

Kentucky Cabinet for Health and Family Services IRB, to use these data for this dissertation.

The sample for this research is a secondary dataset, drawn from the database at UK-CDAR. To arrive at the final sample, the data had to be cleaned. Initially, the dataset containing all first-time offenders from 2006 (n=8,028) was screened for invalid (too short or too long) or missing social security numbers. Because social security numbers offer the only way to identify offenders who eventually recidivated, cases with invalid or missing social security numbers were eliminated from the sample (n=476). The remaining social security numbers were next used to identify those individuals who appeared again in the database through the end of December 2010. In addition to identifying DUI recidivists, this search also found records that were duplicates and cases in which an offender was assessed multiple times for a single offense due to noncompliance – meaning the offender failed to meet treatment/education referral requirements after his/her assessment and later had to be reassessed for a new referral. As a result, the dataset was cleaned by hand to eliminate any duplicate records and ensure that the same offender was not represented in the dataset multiple times for the same offense. All duplicate records were deleted from the dataset (n=196). In addition, offenders with multiple assessments for the same offense due to noncompliance (n=229) were condensed into a single assessment record (see the next section for additional information on the compliance measure). Finally, the dataset was sorted in SPSS v.20 to identify offenders who resided out of state. The database only contains information on offenses that occur in the state of Kentucky and because these offenders lived out of state it would be difficult to track their recidivism. As a result, 191 out of state offenders were

removed from the final sample. Social security numbers and other identifying

information were deleted from the final analytic file.

The final sample consisted of 6,936 persons convicted of a first-time DUI

between January 1, 2006 and December 31, 2006. At conviction, the average age was 35

years old, most were male (78.3%), more than a third were assessed as having a drug

and/or alcohol problem (43.8%) based on DSM-IV criteria, and more than half lived in a

metropolitan area (58.9%) of the state.

Measures

As discussed in the beginning of this chapter, the measures used in this study are

part of a larger statewide database that contains substance abuse assessment information

for DUI offenders across the state of Kentucky. The mediation analyses that were

conducted were comprised of independent, dependent, covariate, and mediator variables.

The moderation analyses were comprised of independent, dependent, and moderator

variables. Each variable is described in the following sections. Table 4.1 provides

descriptive information for each of the measures.

Independent Variables

Conviction Celerity. The celerity or "swiftness" of offenders' DUI convictions is

a key independent variable in this study. To determine celerity, the number of days

between DUI offenders' date of arrest and the date of conviction was calculated.

Preliminary analyses revealed that there was a wide range of days (0-7337 days) and was

heavily skewed. There was a mean of 115.1 days, a median of 50 days, and a standard

deviation of 261.9 days. Because of this wide variation, several diagnostic tests were run

to identify outliers and influential variables, including Cook's D and standardized

residuals. Cook's D did not reveal any outliers; however, because it is calculated using

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sample size, it is possible that the large sample masked the effects of any outliers. On the

other hand, the standardized residuals revealed that there were a number of influential

cases (n=269) but the influence was caused by the recidivism variable. Removing these

influential cases from the dataset would have dramatically reduced the already limited

number of recidivists, so these cases were not removed from the final dataset.

While the aforementioned diagnostic tests produced few significant findings, the

celerity variable remained positively skewed and had the potential to influence the results

of the analyses. In order to minimize the potential effects of these outliers, the conviction

celerity variable was top-coded to eliminate outliers. Specifically, the celerity variable

was top-coded at 239 days. This was chosen as the cutoff because 90% of the offenders

in the study sample were convicted between 0 and 239 days or within approximately 34

weeks. A review of the literature revealed that this conviction timeframe for first-time

offenders is similar to the conviction timeframe for first-time offenders in other samples.

For example, Yu (1994) found that first-time DUI offenders in his study were convicted

within 31 weeks (217 days).

Lastly, for final analyses the scale of the celerity variable was recalculated to be

number of months to conviction instead of days to conviction. Changing the scale of the

variable made the interpretation of study results clearer.

Punishment Severity. As discussed in Chapter Three, many offenders view

rehabilitation efforts as a form of punishment (Nochajski & Stasiewicz, 2006),

particularly cases in which rehabilitation is court-mandated. As a result, punishment

severity in this study was measured by the level of education and/or treatment to which

DUI offenders were referred. DUI offenders can be referred to four different levels of

treatment and/or education: 20-hour education program, outpatient treatment, intensive outpatient treatment, or residential treatment. In the dataset, level of treatment was coded according to intensity, with a higher code indicating a more intensive treatment referral. Specifically, the levels of treatment were coded as follows: 20-hour education class = 0, outpatient and intensive outpatient treatment = 1, and residential treatment = 2. Intensive outpatient treatment and outpatient treatment were combined into a single category (outpatient treatment) because only 50 cases were referred to intensive outpatient treatment and both share similarities in how treatment is delivered. For both the mediation and moderation analyses, the 20-hour education category served as the reference group while the other categories (outpatient and residential treatment) were dummy variables.

In some cases DUI offenders are referred to more than one level of treatment care. For the purposes of this dissertation, these cases were coded according to the most intensive level of care to which the offender was referred. For example, if an offender was referred to both a 20-hour education program and an outpatient treatment program, the case was coded as '1' for outpatient treatment.

Although using level of recommended treatment as the only measure of punishment severity presents a major limitation, there were no other measures of punishment severity in the original dataset and such information would be difficult to obtain through official Kentucky state records because past court case information (specifically sentence components) is only available to the public through the courthouse in the county of conviction. The potential limitations of this variable and other

methodological concerns are discussed in the last section of this chapter and in Chapter

Six.

Dependent Variable

   DUI Recidivism. In this study, recidivism is the dependent variable. As

previously mentioned, social security numbers were initially used to identify recidivists.

Social security numbers of offenders who were convicted of a first-time DUI in 2006

were screened against the master database to identify any individuals who appeared again

for a new DUI conviction through December 31, 2010. A five-year window was the

cutoff for identifying DUI offenders, because in the state of Kentucky DUI offenses are

cleared from offenders' official driving record five years after the offense.

   After identifying DUI recidivists, a dichotomous variable was created to indicate

recidivism, where 1 = recidivists and 0 = single DUI offenders. Offenders who were

convicted for a first-time DUI in 2006 and reappeared in the database before December

31, 2010 for an additional DUI offense were coded as recidivists. On the other hand,

those offenders who only appeared once through the end of 2010 were coded as single

DUI offenders. Approximately 10% (n= 699) of offenders were identified as DUI

recidivists.

Mediating Variable

   Compliance. In this dissertation, compliance served as the mediating variable,

and thus, served as both an independent and dependent variable. Offenders are

recommended to education and/or treatment programs based on their individual substance

use problem severity. DUI offenders who successfully complete their recommended

programs are labeled as compliant. In Kentucky, offenders must comply with

recommended education and/or treatment programs in order to remain in compliance

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with the court and get their licenses reinstated. Although the dataset does not contain the specific reason for noncompliance, an offender is deemed noncompliant in Kentucky if he/she fails to meet treatment goals, has poor attendance, fails to pay program fees, or fails to meet the established rules of conduct. In the dataset, compliance is coded as a dichotomous variable where 1 = compliant and 0 = noncompliant. Slightly more than two-thirds (69.5%) of offenders complied with treatment/education recommendations.

Moderating Variables & Covariates

Demographics. Existing literature has highlighted a number of personal and environmental variables correlated with DUI recidivism. Based on this research, potential covariates and moderators were identified. To begin, age and gender are used as covariates and potential moderators since the literature has often demonstrated a relationship between these two variables and DUI recidivism (C'de Baca, Miller, & Lapham, 2001; Nochajski & Stasiewicz, 2006; Taxman & Piquero, 1998; Yu & Williford, 1995). For this study, offenders' age at time of conviction serves as the age variable and gender is dichotomized, where 0 = male and 1 = female.

Problem Severity. Substance use problem severity is also included in the mediation analyses as a covariate and explored as a possible moderator since research has indicated that DUI offenders meeting diagnostic criteria for substance use disorders are at higher risk of recidivating than those offenders who do not (Nochajski & Stasiewicz, 2006). In this study, the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition Text Revision (DSM-IV-TR; American Psychiatric Association, 2000) criteria are used to determine problem severity. The DSM-IV-TR is a diagnostic tool for identifying substance use disorders, including substance abuse and dependence. Under DSM-IV-TR guidelines, individuals are diagnosed with a substance use disorder if they

meet 1 or more of the abuse criteria and are diagnosed as dependent if they meet 3 or more of the dependence criteria.

For this study, problem severity was dichotomized. Offenders who met criteria for substance abuse or dependence according to DSM-IV-TR guidelines were coded as '1'. Remaining offenders, or those not meeting substance use disorder criteria, were coded as '0'.

Location. Finally, location was included as a covariate and investigated as a possible moderator. The research literature has often associated rurality with limited and insufficient substance use treatment options (Booth et al., 2000; Fortney et al., 1995; Fortney & Booth, 2001; Sexton et al., 2008). In addition, multiple studies have found that rural DUI offenders are more likely to be noncompliant with treatment and/or education referrals than their metropolitan counterparts (Webster et al., 2009).

In this study, rurality is measured using Beale Codes, or Rural-Urban Continuum Codes. Beale codes have been used in previous DUI research (Webster et al., 2010) to measure rurality. Beale codes range from 1 to 9 and are assigned based on a county's population and its proximity to a metropolitan area (United States Department of Agriculture Economic Research Service, 2007). The 9 Beale codes and corresponding definitions are as follows: 1) Metropolitan counties of 1 million population or more, 2) Metropolitan counties of 250,000 to 1 million, 3) Metropolitan counties of fewer than 250,000, 4) Non-metropolitan urban counties, adjacent to a metropolitan area, with a population of 20,000 or more, 5) Non-metropolitan urban counties, not adjacent to a metropolitan area, with a population of 20,000 or more, 6) Non-metropolitan urban counties, adjacent to a metropolitan area, with a population of 2,500 to 19,999, 7) Non-

metropolitan urban counties, not adjacent to a metropolitan area, with a population of 2,500 to 19,999, 8) Non-metro areas, adjacent to a metropolitan area, that are completely rural or have less than 2,500 urban population, and 9) Non-metro areas, not adjacent to a metropolitan area, that are completely rural or have less than 2,500 urban population.

For this study, the codes were collapsed into three groups: Beale codes 1 through 3 were combined into a metropolitan county category, codes 4 through 7 were combined into a non-metropolitan urban category, and codes 8 and 9 were combined into a rural category. Metropolitan served as the reference category, while non-metropolitan urban and rural were dummy coded.

TABLE 4.1. Descriptive Statistics for Study Variables (N = 6936)

	Range/%	Mean	Standard Deviation
Independent Variables			
Conviction Celerity (# of months to conviction)	0-7.97	2.52	2.48
Punishment Severity	1-3	1.37	.501
% Education	63.9%	-	-
% Outpatient	35.1%	-	-
% Residential	0.9%	-	-
Dependent Variable			
DUI Recidivism (% Recidivists)	10.1%	-	-
Hypothesized Mediator			
Tx/Edu. Compliance (% Compliant)	69.5%	-	-
Hypothesized Moderators			
Age at Conviction	16-85	35.0	12.3
Gender (% Female)	21.7%	-	-
Problem Severity (% Abuse/Dependence)	43.8%	-	-
Location	1-3	1.51	.673
% Metro	58.9%	-	-
% Non-metro urban	31.0%	-	-
% Rural	10.2%	-	-

Analytic Strategy

As discussed in previous chapters, this dissertation adds to the literature in two

primary ways: 1) It explores the relationship between deterrence-related variables,

rehabilitation compliance, and recidivism using a mediation model and, 2) it examines

the potential moderating effects of various personal and environmental variables. In

addition to the mediation and moderation analyses, bivariate comparisons were

conducted to examine the differences between single and repeat DUI offenders. This

section describes the 3 types of analyses that were conducted as a part of this dissertation,

beginning with the bivariate analyses. All bivariate, mediation, and moderation analyses

were performed using SPSS v.20. Results were considered significant at the level $p \leq$

.05.

Bivariate Analyses

Using the final sample (n=6936), a series of bivariate analyses were conducted to

examine the differences between single and repeat DUI offenders. Specifically, cross-

tabulation and chi-square analyses were used to identify differences in dichotomous and

categorical variables, including punishment severity, gender, problem severity, and

location, while t-tests were used to examine differences in conviction celerity (months to

conviction) and ages between the two offender groups. These analyses are important for

describing the sample and identifying any significant differences that may impact the

mediation models.

Mediation Analyses

To address the previously identified research questions (Q_1-Q_4) and hypotheses

(H_1-H_4), two mediation models were tested – one model using conviction celerity as the

predictor variable and the other model using punishment severity as the predictor. In

both models, treatment/education compliance served as the mediating variable. Baron

and Kenny (1986) noted that mediation has long been used as an analytical tool to

identify indirect effects between two variables – effects that can be attributed to a third

variable. In a basic mediation model, although there is a direct relationship between the

independent variable and the dependent variable, the independent variable is

hypothesized to be correlated to a mediating variable and that mediator is then related to

the dependent variable. The following diagrams, derived from Baron and Kenny (1986) show the differences between a direct effects model and a basic mediation model.

Figure 4.1. Direct Effects Model

Predictor Variable (X) $\xrightarrow{\quad\quad\quad c\quad\quad\quad}$ Outcome Variable (Y)
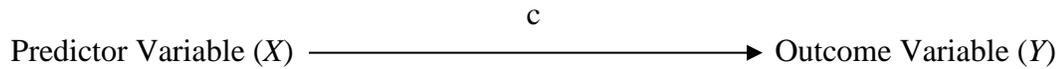
Figure 4.2. Basic Mediation Model

Mediator Variable (M)

a   b

Predictor Variable (X) $\xrightarrow{\hspace{4cm}}$ Outcome

Variable (Y)

c'
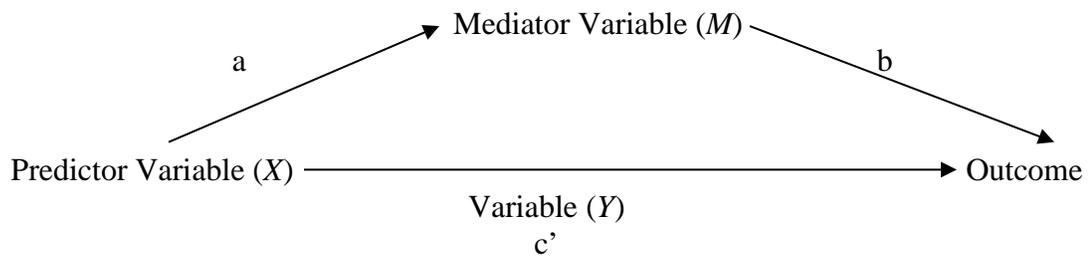
Mediation models are tested through a series of regression analyses. Baron and Kenny (1986) argue that mediation can be established through the following 4 steps, which require 3 separate regression analyses:

1) Demonstrate that the independent variable (IV) is related to the dependent variable (DV) through a basic regression analysis (Path c).

2) Demonstrate that the IV is related to the hypothesized mediator (Path a). This is accomplished by regressing the mediator on the IV.

3) Demonstrate that the mediator is correlated with the DV while controlling for the independent variable (Path b). This is accomplished through a regression model in

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which the DV is regressed on both the IV and the mediator.

4) To establish that the mediator completely mediates the relationship between the IV and DV, the effect of the IV on the DV should be zero when controlling for the mediator (Path c'). This step is tested in the same regression analysis as Step 3.

When Steps 1 through 4 are met, the model demonstrates complete mediation. However, Baron and Kenny (1986) note that partial mediation is also possible. Specifically, when Steps 1 through 3 are met and c' is smaller in absolute value than c, the model exhibits partial mediation. Although Baron and Kenny's (1986) procedure is most commonly used in psychological studies, it has been utilized in other social science research, including sociological and criminological studies (Baron, 2009; Chapple, Vaske, & Hope, 2010; Cantillon, Davidson, & Schweitzer, 2003; Miller, Jennings, Alvarez-Rivera, & Lanza-Kaduce, 2009).

As mentioned, the mediation models tested in this dissertation examine the relationship between two deterrence-related variables (conviction celerity and punishment severity) and DUI recidivism, as mediated by treatment/education compliance. In addition to these primary variables, four additional variables are included as covariates in the meditation models. Specifically, the literature has identified gender (C'de Baca, Miller, & Lapham, 2001; Nochajski & Stasiewicz, 2006), age (C'de Baca, Miller, & Lapham, 2001; Peck, Arstein-Kerslake, & Herlander, 1994; Webster et al., 2011), problem severity (Lapham, C'de Baca, McMillan, & Lapidus, 2006), and location

(Webster et al., 2009; Webster et al., 2010) as correlates of compliance and recidivism, so they are included in the models.

The following diagrams (Figures 4.3 and 4.4) depict the conceptual mediation models tested as part of this dissertation.

Figure 4.3. Hypothesized mediation model including covariates and weak conviction celerity as the independent variable.
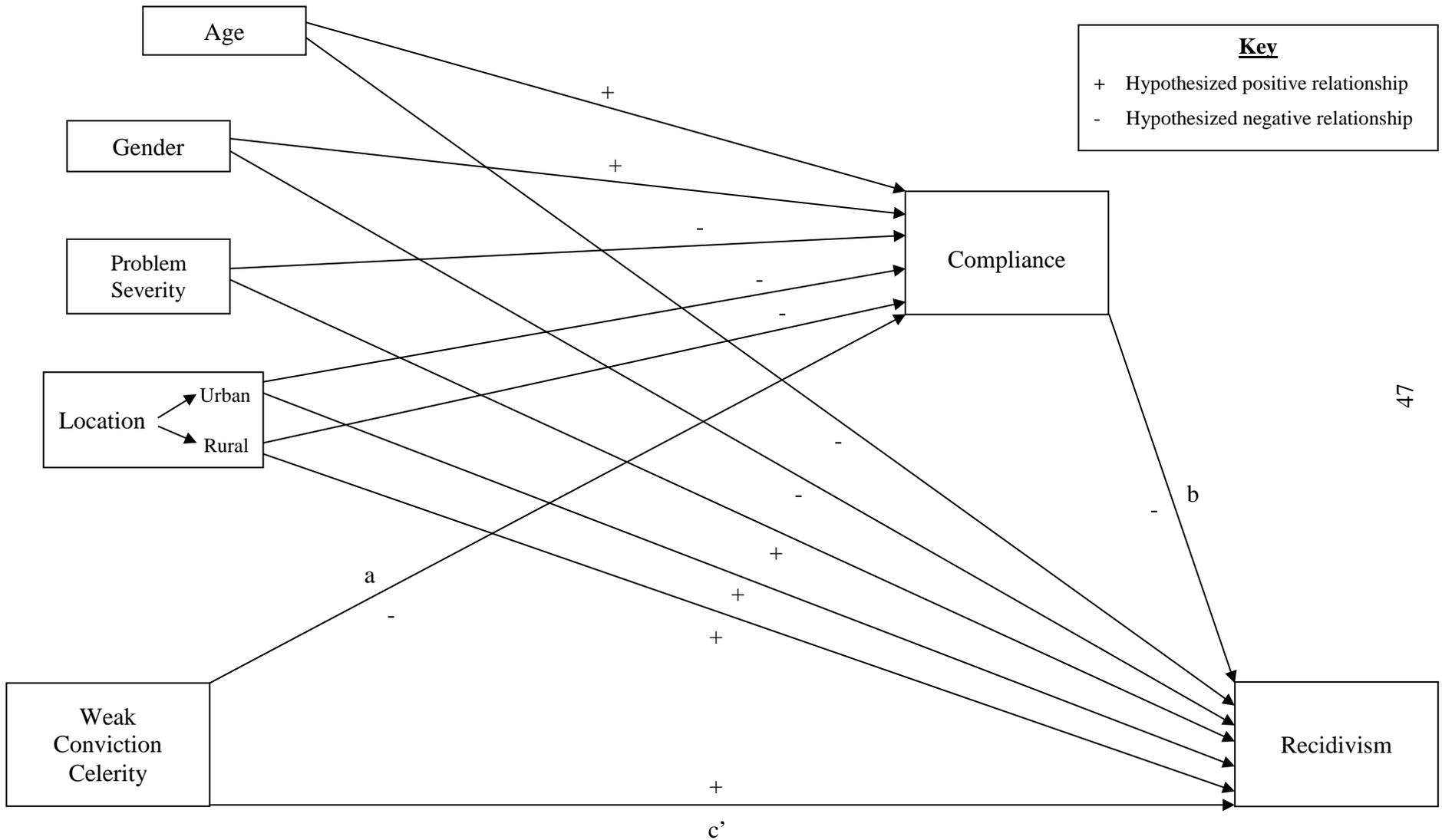
Figure 4.4. Hypothesized mediation model including covariates and punishment severity as the independent variable.
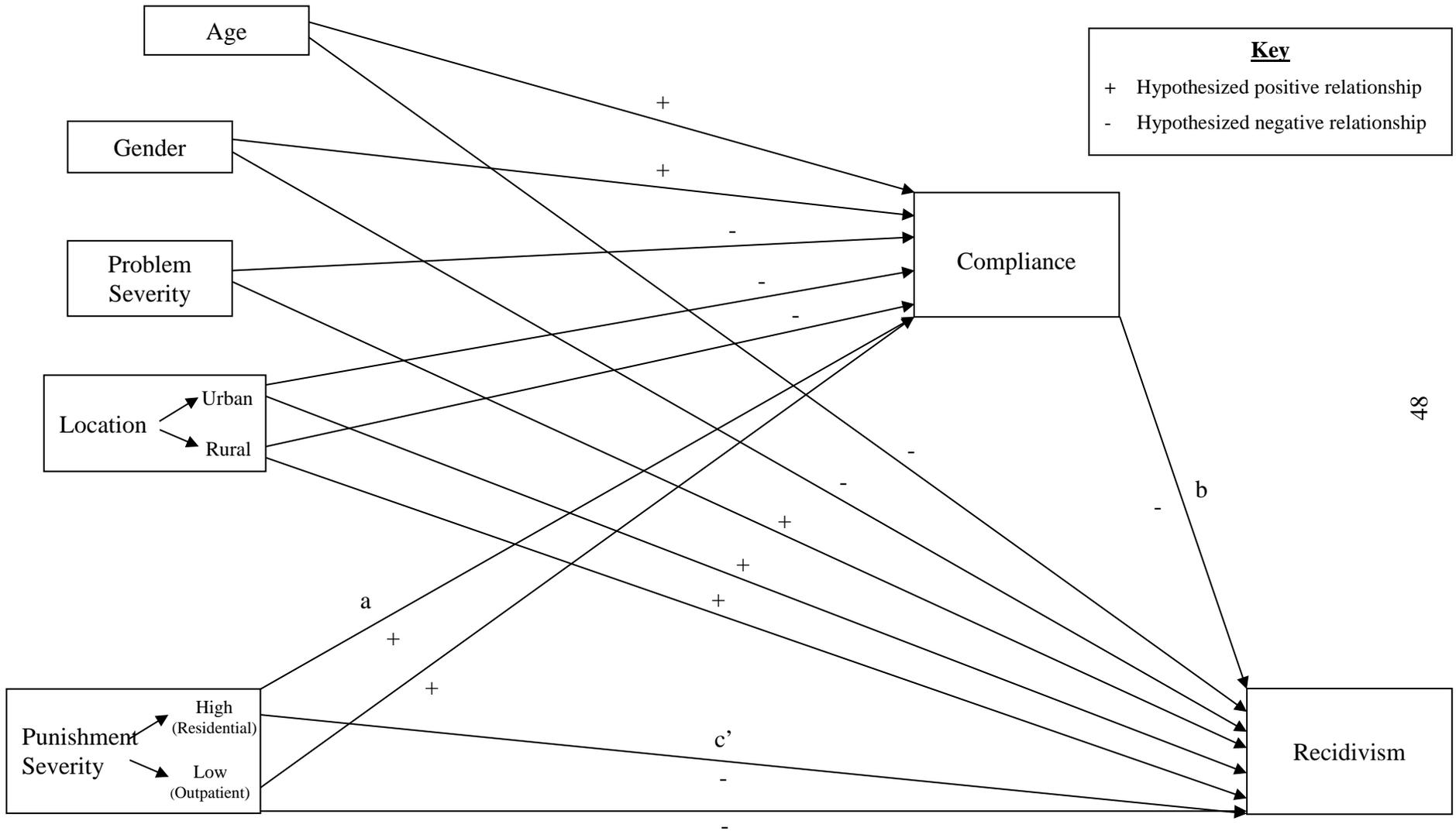
Following Baron and Kenny's (1986) procedures, both mediation models require

a total of three regression analyses. However, because this dissertation tested a

hypothesized mediator (compliance) and outcome (recidivism) variable that are both

dichotomous, logistic regression analyses were used. Using logistic regression to test

mediation presents a number of challenges, as described by MacKinnon and Dwyer

(1993). Primarily, logistic regression analyses produce coefficients that are in different

scales and, thus, difficult to compare. For example, the mediator (M) in a mediation

model acts both as a predictor and outcome variable and will be in a different scale

depending on the step in the model that is being tested. The following diagram (Figure

4.5), adapted from Nathaniel Herr (n.d.) and MacKinnon & Dwyer (1993) shows how the

variables in logistic regression mediation analyses differ when they are predictors

compared to when they are outcomes.

Figure 4.5. Mediation Model with Dichotomous Outcomes
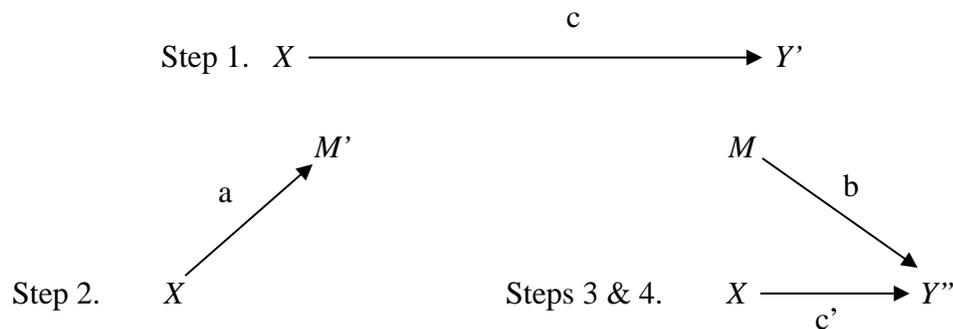
Note 1. The steps correspond to Baron and Kenny's procedure for testing mediation. Refer to Figures 4.1
and 4.2 and the steps outlined on pp.44-45.
Note 2. Primes indicate that variables are on different metrics (e.g., Y and Y'').

To solve the problem presented by logistic regression analyses, MacKinnon and

Dwyer (1993) recommend that the coefficients from these analyses be transformed and

standardized. More precisely, MacKinnon and Dwyer suggest standardizing the

coefficients by multiplying each coefficient by the standard deviation of the predictor

variable and then dividing by the standard deviation of the outcome variable. Because

the hypothesized mediation models in this dissertation were tested using logistic

regression analyses, MacKinnon and Dwyer's procedure for standardizing the

coefficients was utilized to ensure the coefficients across the model were comparable.

Moderation Analyses

Although testing the mediating effects of compliance was the primary goal of this

dissertation, the secondary goal was to test the moderating effects of several personal and

environmental variables on the relationship between the independent variables

(conviction celerity and punishment severity) and recidivism (Research questions 5 & 6).

As described in Chapter One, moderators are variables that influence the direction or

strength of the relationship between an independent and dependent variable and are often

introduced into a direct effects model (refer to Figure 4.1) when the relationship is weak

or inconsistent (Baron & Kenny, 1986). The following diagram (Figure 4.6) depicts a

basic moderation model.

Figure 4.6. Moderator Effects Model

Predictor Variable (X) ⟶ Outcome Variable (Y)

Moderator Variable (M)
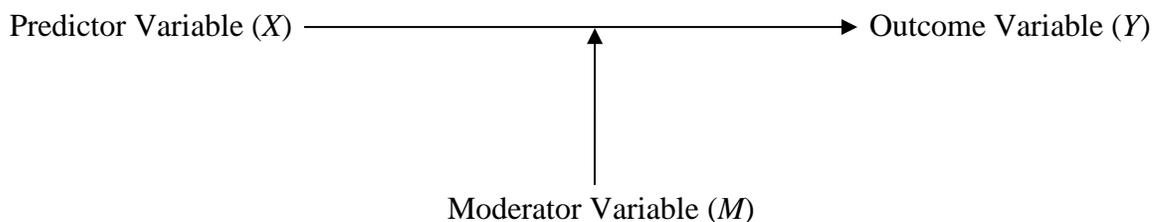
One procedure for testing moderation, as discussed by Baron and Kenny (1986),

is to create an interaction term using the predictor variable (X) and the hypothesized

moderator (M) by multiplying the two terms together ($X*M$). This interaction term is

then included in the regression analysis. As shown in Figure 4.7, Baron and Kenny

(1986) specifically argue that there are three causal paths potentially affecting the

outcome variable. The first path (Path *a*) is the influence of the predictor. The second

path (Path *b*) is the influence of the hypothesized moderator. Finally, the third path (Path

c) is the interaction of the two previous paths. Using this procedure, the hypothesized

moderation is supported if the interaction term (Path *c*) is significant.

Figure 4.7. Baron & Kenny's (1986) Moderation Model

Predictor Variable (*X*) ⟶ a

Moderator Variable (*M*) ⟶ b ⟶ Outcome Variable (*Y*)

Predictor X Moderator (*X*M*) ⟶ c
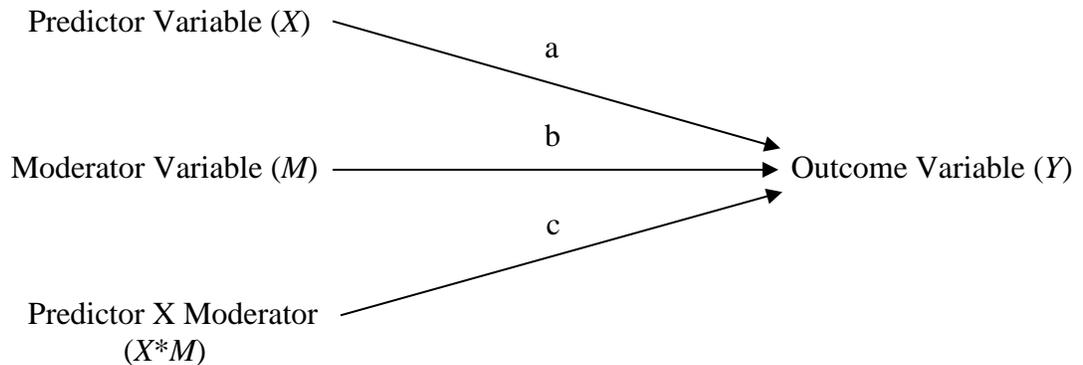
The moderation models tested in this dissertation examine whether gender, age,

problem severity, and location moderate the relationship between the deterrence-related

variables (conviction celerity and punishment severity) and DUI recidivism. As

discussed previously, the literature exploring DUI has regularly cited gender (C'de Baca,

Miller, & Lapham, 2001; Nochajski & Stasiewicz, 2006), age (C'de Baca, Miller, &

Lapham, 2001; Peck, Arstein-Kerslake, & Herlander, 1994; Webster et al., 2011),

substance use problem severity (Lapham, C'de Baca, McMillan, & Lapidus, 2006), and

location (Webster et al., 2009; Webster et al., 2010) as correlates of recidivism. Thus,

they were hypothesized to act as moderators.

The following figures (4.8 and 4.9) depict the conceptual moderation models that were tested as part of this dissertation project.

Figure 4.8. Hypothesized moderation model using weak conviction celerity as a covariate.
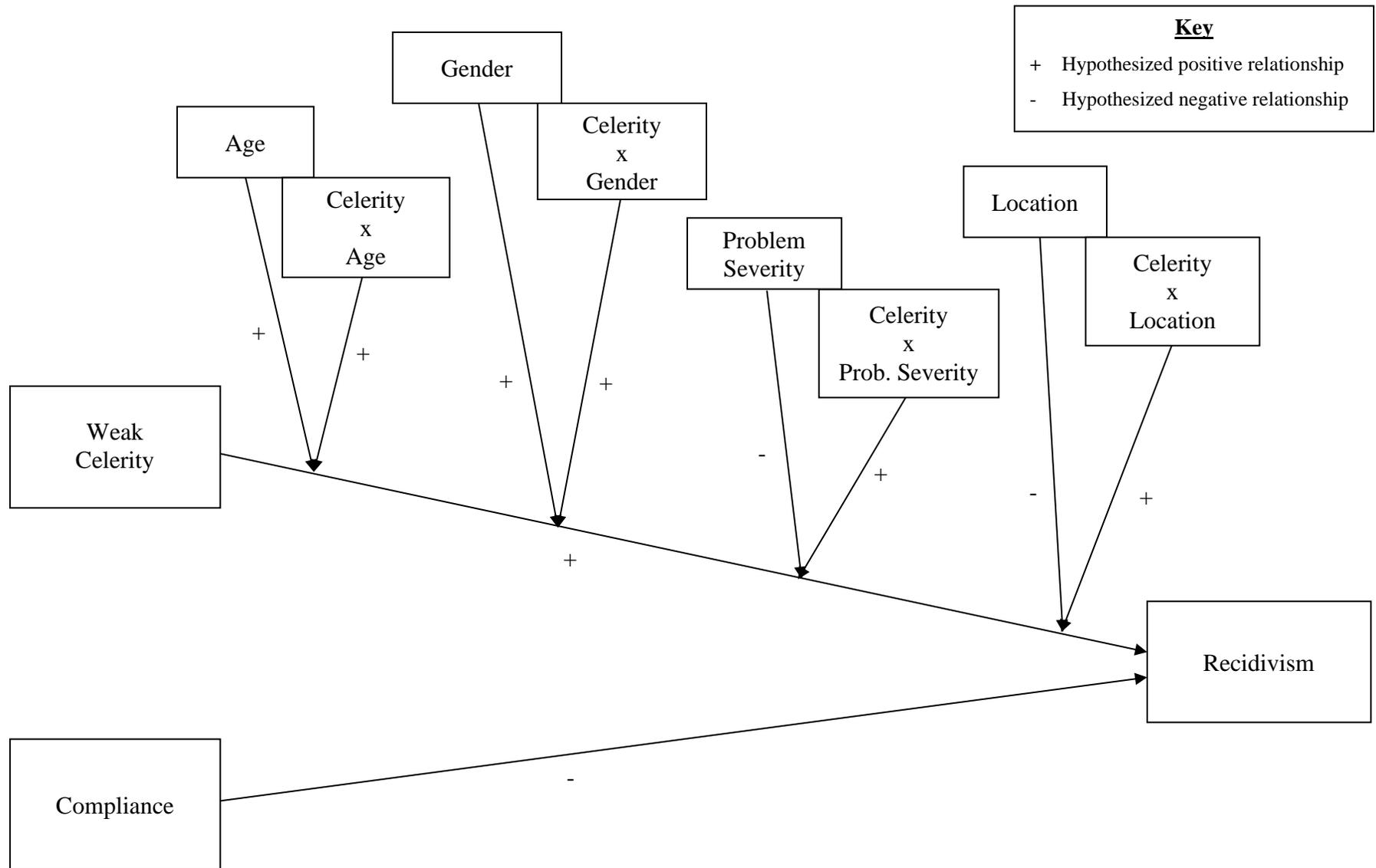
Figure 4.9. Hypothesized moderation model using punishment severity as a covariate.

Key

+   Hypothesized positive relationship

-     Hypothesized negative relationship

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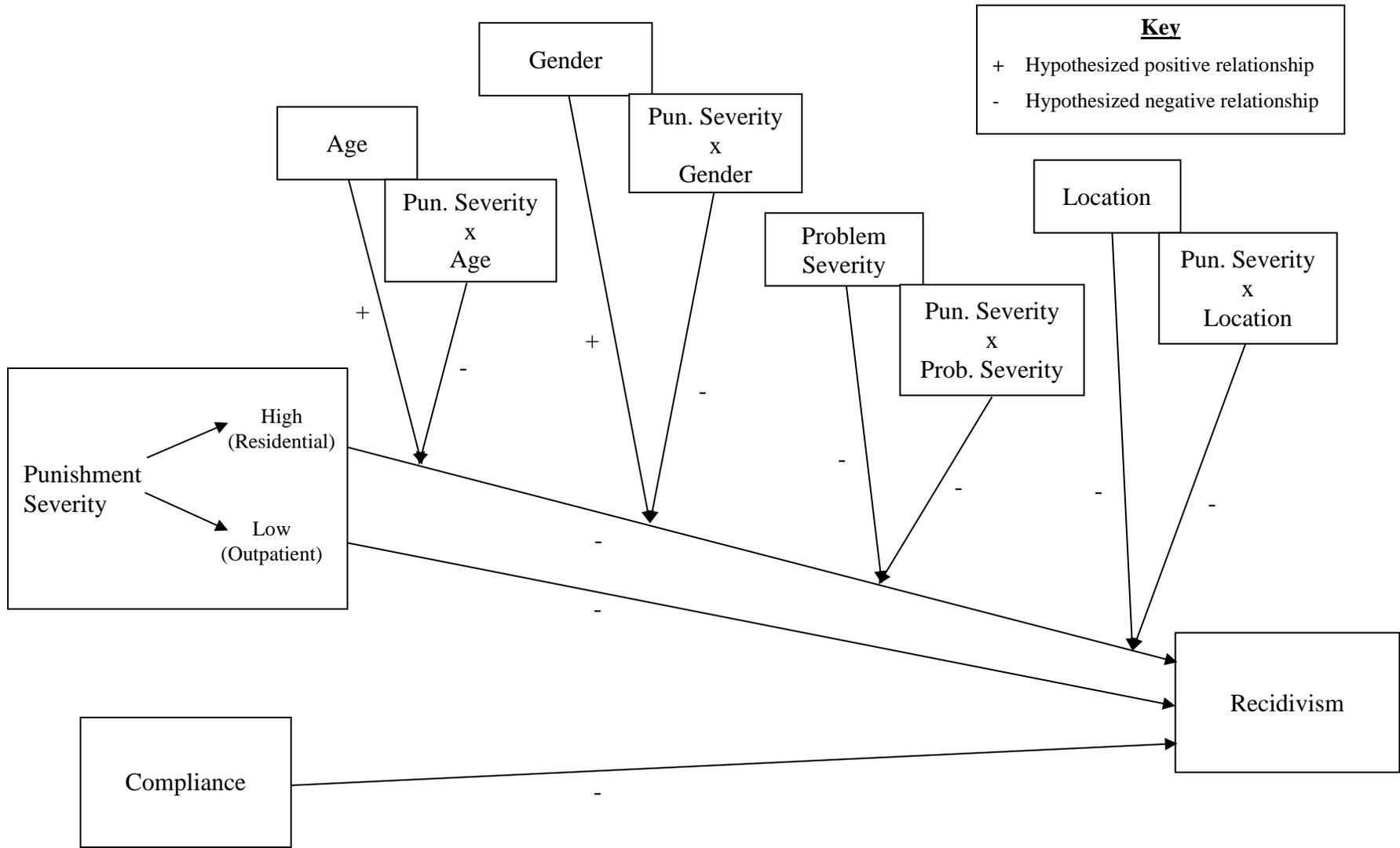
Following Baron and Kenny's (1986) procedure, single-step logistic regression analyses were conducted to analyze the moderating effects of the hypothesized moderators on the relationship between the independent variables (conviction celerity and punishment severity) and recidivism, with moderation tested using interaction terms. The interaction terms consisted of the independent variable (conviction celerity or punishment severity) and the hypothesized moderators (Predictor x Moderator). As shown in Figures 4.8 and 4.9, each of the hypothesized moderators were also included in the analyses as a potential covariate. Furthermore, to reduce the chances of multicollinearity, continuous variables (e.g., age and celerity) were centered by subtracting the mean score. Also, despite the significance of each interaction term, they were all included in the final models. While some researchers choose to remove nonsignificant interaction terms, Aiken and West (1991) recommend keeping nonsignificant terms in the model if there are strong theoretical reasons for expecting interaction. In this dissertation, past research provided strong rationale for expecting some degree of moderation caused by the hypothesized variables (age, gender, substance use problems severity, and location. Finally, for each of the moderation models, the predicted probabilities were calculated using Stata v.12 and then graphed for each of the significant interaction terms. Graphing the predicted probabilities illustrates how the moderators affect the relationship between the independent and dependent variables.

Methodological Issues and Data Limitations

This dissertation has several limitations that should be noted when interpreting the results. To begin, assessment data were collected by many different DUI assessors at approximately 115 DUI programs across the state of Kentucky. Although all DUI assessors receive similar certification training, data accuracy may vary across programs

and/or assessors. Further, despite state regulation mandating that each program must submit completed records to UK-CDAR on a monthly basis, there is no way to ensure that all assessment data are submitted. While there is no reason to believe that there is a significant amount of missing data, it should be taken into consideration when interpreting study results.

Additional limitations are presented by using a secondary dataset. Specifically, this secondary dataset is missing important potential moderators. For example, the DUI literature has regularly investigated race as it relates to DUI (Caetano, & Raspberry, 2000; C'de Baca et al., 2004), but the Kentucky DUI dataset does not contain a race variable. The deterrence measures in the Kentucky DUI dataset are also limited. Deterrence theorists have long argued the importance of punishment severity, celerity, and certainty in deterring offenders. However, this dissertation only examines the severity and celerity components of deterrence theory, because the Kentucky DUI dataset does not have a measure of punishment certainty.

Lastly, the celerity and severity deterrence measures in this dissertation present further potential limitations. First, top-coding the celerity variable can potentially bias the results of both the mediation and moderation analyses. However, as mentioned, preliminary analyses revealed conviction celerity to have a highly right-skewed, non-normal distribution. Rather than categorizing the celerity variable, statistical diagnostic tests were run and existing research (Yu, 1994) was used to identify a reasonable cut-off point – as described previously in this chapter. A histogram of the top-coded celerity variable revealed a more normal distribution, with an average of 75.7 days elapsed between arrest and conviction, with a standard deviation of 74.5 days (See Table 4.1).

The appendix contains the histograms of the original celerity variable and the recoded celerity variable capped at 239 days.

As mentioned earlier in this chapter, the measurement of punishment severity also presents limitations because it is measured using level of treatment referral. In Kentucky, treatment is only one component of DUI offenders' punishment. As part of their sentence, first-time DUI offenders are also subject to license suspension, fines, and possible incarceration. However, because the data used for this dissertation were all drawn from first-time DUI offender cases during 2006, other measures of punishment do not likely vary significantly from case to case (refer to Kentucky Revised Statutes (KRS) 189A.010). Specifically, first-time offenders in the state of Kentucky have their license revoked for a period of 30 to 120 days, and are fined a minimum of $200 (not to exceed $500) or incarcerated for a minimum of 48 hours (not to exceed 30 days) (KRS 189A.010). While there may be additional concern about using treatment as an indicator of punishment severity when it is intended as rehabilitation for DUI offenders and not punishment, the literature has suggested that when rehabilitation efforts are court-mandated, offenders view the treatment as part of their sanction (Nochajski & Stasiewicz, 2006). Because existing research has not adequately explored this perspective, this dissertation provides an important update to the literature.

While these limitations should be taken into consideration when interpreting the results of this study, it is important to point out the strengths of the secondary dataset. The sample being used for this study is a statewide sample. Not only does a statewide sample provide a large sample size, but it allows for the inclusion of a variety of offenders with differing personal and environmental backgrounds. For example, many

existing DUI studies have restricted their focus to metropolitan samples. This statewide

sample includes people from both metropolitan areas and very rural locations, including

several rural Appalachian counties. Thus, the results of this research study are potentially

more generalizable than other existing research that utilizes a smaller, more specific

study sample.

Chapter 5: Results

In the previous chapter, the research methods for this dissertation were presented, including a discussion of the study sample, the utilized measures, and the analytic strategies. Chapter Five presents the results of this dissertation, including results from the bivariate comparisons of single and repeat DUI offenders, the hypothesized mediation models, and the hypothesized moderation models.

Bivariate Analyses

Single (n = 6237) and repeat DUI (n = 699) offenders were compared using a series of crosstabulations and t-tests. Analyses revealed that repeat DUI offenders in the study sample were significantly more likely than single DUI offenders to be male (χ^2 (6928) = 6.25, p = .012), to report a substance use problem (χ^2 (6936) = 4.42, p = .036), to comply with treatment/education recommendations (χ^2 (6936) = 7.33, p = .007), and to be referred to a residential treatment program (χ^2 (6703) = 6.65, p = .010). However, conviction celerity, age, location, and education and outpatient treatment referrals did not vary significantly between single and repeat DUI offenders. Table 5.1 presents the full results of bivariate comparisons.

TABLE 5.1. Bivariate Comparisons by Offender Type (N = 6936)

	Single DUI Offenders (n = 6237)	Repeat DUI Offenders (n = 699)
Independent Variables		
Conviction Celerity (# of months to conviction)	2.5	2.4
Punishment Severity		
% Education	64.2%	62.0%
% Outpatient Treatment	35.0%	36.3%
% Residential Treatment[**]	0.8%	1.8%
Hypothesized Mediator		
% Compliant[**]	69.0%	74.0%
Hypothesized Moderators/Covariates		
Age at Conviction (First DUI)	35.1	34.3
% Female[*]	22.1%	18.0%
Problem Severity (% Positive for Abuse/Dependence)[*]	43.3%	47.5%
Location		
% Metro	58.8%	59.7%
% Non-metro urban	31.1%	29.3%
% Rural	10.1%	11.0%

[*] $p \leq .05$; [**] $p \leq .01$

Mediation Analyses

As described in the previous chapter, the hypothesized mediation models in this

dissertation were conducted using a combination of Baron and Kenny's (1986) procedure

for testing mediation and MacKinnnon and Dwyer's (1993) methods for testing

mediation because the hypothesized mediator and/or outcome variables are dichotomous

and thus, required logistic regression analyses. More specifically, the mediation models

in this dissertation were tested through a series of three logistic regression analyses. The

next two subsections discuss the results of those analyses for each of the hypothesized

models.

Mediation Model 1

The first mediation model hypothesized that there would be a direct relationship

between weak conviction celerity, or months to conviction, and DUI recidivism, but that

this relationship would be at least partially mediated by a third variable –

treatment/education compliance.

Testing the Direct Relationship in Model 1. The first step in testing mediation is

to establish a direct relationship between the hypothesized predictor and outcome

variable. In the first mediation model, this direct relationship is the subject of Research

Question 1: Does conviction celerity predict future recidivism among DUI offenders?

Research Question 1 corresponds with step 1 of Baron and Kenny's procedure,

addressing the direct relationship between conviction celerity (swiftness) and DUI

recidivism. It was hypothesized that there would be a positive relationship between weak

conviction celerity and DUI recidivism, or more specifically, weak conviction celerity, or

a greater number of months between arrest and conviction, would significantly increase

the odds of recidivating. However, analyses did not provide support this hypothesis.

Instead, results revealed that conviction celerity was negatively correlated with

recidivism but that the relationship was not statistically significant, failing to support the

hypothesis. Refer to Table 5.2 for full results of the regression for path *c*, including the

covariates that were part of the hypothesized model.

TABLE 5.2. Logistic Regression of DUI Recidivism on Conviction Celerity (with standardized coefficients & *SE*): Path *c* (N = 6936)

	B	*SE*	Wald	*df*	OR	CI(95)	*p*
Conviction Celerity (# of months to conviction)	-0.040	.023	2.724	1	.972	.939 – 1.005	.099
Age at Conviction	-.043	.023	3.419	1	.938	.877 – 1.004	.064
Female	-.063	.024	6.781	1	.757	.614 – .934	.009[**]
Problem Severity	.045	.023	3.923	1	1.179	1.002 – 1.387	.048[*]
Location	-	-	1.702	2	-	-	.427
Non-metro urban	-.023	.024	.903	1	.915	.762 – 1.099	.342
Rural	.014	.022	.421	1	1.090	.839 – 1.416	.517

[*] $p \leq .05$; [**] $p \leq .01$; [***] $p \leq .001$

Testing Mediation in Model 1. Following Baron and Kenny's (1986) procedure, mediation is tested after establishing a significant relationship in step 1. This part of the model is the subject of Research Question 2: Does compliance with treatment and/or education referral mediate the relationship between conviction celerity and recidivism?

Research Question 2 corresponds to Baron and Kenny's steps 2-4, testing the mediating effects of treatment/education compliance on the direct relationship between conviction celerity and recidivism. It was hypothesized that compliance would at least partially mediate the positive relationship between weak conviction celerity and recidivism. According to Baron and Kenny, however, before claims of a mediating relationship can be made, there needs to be evidence of a direct, significant relationship between the predictor (X) and outcome (Y) variable. Since the first logistic regression conducted as part of this model failed to establish a direct relationship between conviction celerity and recidivism, mediation could not be argued and the hypothesis was not supported.

Despite results failing to support the hypothesized model, the logistic regression analyses that would have tested the mediating effects of compliance (Paths *a*, *b*, and *c'*) were still conducted. These analyses revealed that although the direct relationship between conviction celerity and DUI recidivism failed, conviction celerity was negatively correlated with treatment/education compliance (Path *a*; B = -.034, OR = .975, CI (95) = .954 – .996) and compliance was a significant, positive predictor of DUI recidivism (Path *b*; B = .067, OR = 1.305, CI (95) = 1.084 – 1.571). However, path *c'*, the logistic regression testing the relationship between conviction celerity and recidivism while controlling for treatment/education compliance, was not significant.

In addition, several covariates included in the model were also significantly related to both treatment/education compliance and recidivism. Specifically, age positively predicted compliance (B = .078, OR = 1.122, CI (95) = 1.073 – 1.173) and negatively predicted recidivism (B = -.047, OR = .993, CI (95) = .872 – .998). Being female was negatively correlated with recidivism (B = -.063, OR = .755, CI (95) = .613 – .931). Substance use problem severity was negatively related to compliance (B = -.041, OR = .860, CI (95) = 0.772 – .958) and positively related to recidivism (B = .047, OR = 1.189, CI (95) = 1.010 – 1.399). Lastly, compared to being from a metropolitan area, being from a rural location was a significant, positive predictor of compliance (B = -.040, OR = .786, CI (95) = .660 – .935).

Figure 5.1 provides a diagram of the hypothesized model including the direction and significance of paths *a*, *b*, and *c'* and the covariates. The full results of the regression analyses, including covariate information, can be found in Table 5.3 on page 66 (Paths *b* and *c'* are tested in the same logistic regression). All coefficients and standard errors have been standardized so they are comparable across all analyses.

Figure 5.1. Mediation model including covariates and conviction celerity as the independent variable.
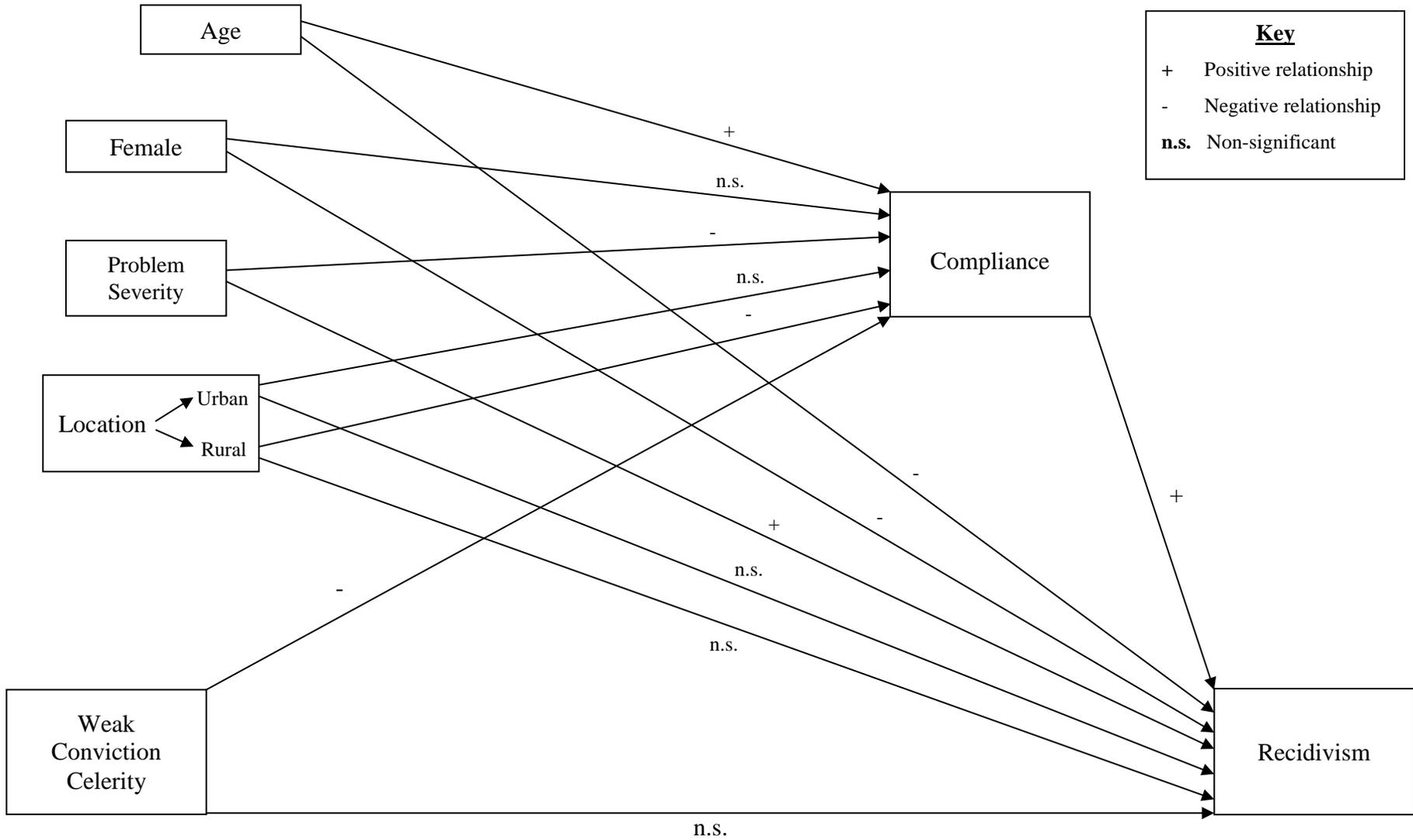
TABLE 5.3. Mediation Model 1 Results (with standardized coefficients & *SE*): Paths *a*, *b*, and *c'* (N = 6936)

	B	*SE*	Wald	*df*	*OR*	CI(95)	*p*
Path *a* (Celerity → Compliance)							
Conviction Celerity (# of months to conviction)	-.034	.015	5.364	1	.975	.954-.996	.021[*]
Age at Conviction	.078	.016	25.256	1	1.122	1.073-1.173	.000[***]
Female	.008	.015	.320	1	1.038	.912-1.182	.572
Problem Severity	-.041	.015	7.522	1	.860	.772-.958	.006[**]
Location	-	-	8.247	2	-	-	.016[*]
Non-metro urban	-.024	.015	2.462	1	.909	.808-1.024	.117
Rural	-.040	.015	7.363	1	.786	.660-.935	.007[**]
Paths *b* & *c'* (Celerity → Recidivism controlling for Compliance)							
Conviction Celerity (# of months to conviction)	-.037	.023	2.500	1	.973	.940-1.007	.114
Compliance	.067	.024	7.882	1	1.305	1.084-1.571	.005[**]
Age at Conviction	-.047	.024	4.070	1	.933	.872-.998	.044[*]
Female	-.063	.024	6.899	1	.755	.613-.931	.009[**]
Problem Severity	.047	.023	4.327	1	1.189	1.010-1.399	.038[*]
Location	-	-	1.796	2	-	-	.407
Non-metro urban	-.021	.024	.801	1	.920	.766-1.105	.371
Rural	.017	.022	.579	1	1.107	.852-1.439	.447

[*] $p \leq .05$; [**] $p \leq .01$; [***] $p \leq .001$

Mediation Model 2

The second mediation model hypothesized that there would be a direct

relationship between punishment severity, or level of recommended treatment, and DUI

recidivism, but that this relationship would also be mediated by treatment/education

compliance. The following research questions were explored as part of the second

hypothesized mediation model:

Q_3:   Does punishment severity predict future recidivism among DUI offenders?

Q_4:   Does compliance with treatment and/or education referral mediate the relationship
        between punishment severity and recidivism?

Testing the Direct Relationship in Model 2. Similar to the first mediation model

the direct relationship of the hypothesized model is the subject of the first research

question. Following step 1 of Baron and Kenny's procedure, this direct relationship

between punishment severity and DUI recidivism was tested using a logistic regression

analysis. Because punishment severity is categorical and comprised of three categories:

education, outpatient treatment, and residential treatment, the analytic models for this

hypothesized mediation had two dummy variables included as the primary predictors.

Thus, there were two paths for *a* and *c'*: one for outpatient treatment and one for

residential treatment. Education served as the reference category.

It was hypothesized that there would be a negative relationship between

punishment severity and DUI recidivism, or more specifically, as the intensity of

treatment (punishment) increased, the odds of recidivating would significantly decrease.

This hypothesis was not supported. Results revealed that compared to offenders who

were referred to education as their most intensive level of care, offenders referred to

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residential treatment had significantly higher odds of recidivating (B = .043, OR = 2.273, CI (95) = 1.194 – 4.330). However, the odds of recidivating were not significantly different between offenders receiving outpatient treatment and those receiving residential treatment as their most intensive level of care. Refer to Table 5.4 for the full results of the regression for path *c*, including the covariates.

TABLE 5.4. Logistic Regression of DUI Recidivism on Punishment Severity (with standardized coefficients & *SE*): Path *c* (N = 6936)

	B	SE	Wald	df	OR	CI(95)	p
Punishment Severity	-	-	6.456	2	-	-	.040[*]
Outpatient Treatment	.016	.023	.497	1	1.063	.897 – 1.261	.481
Residential Treatment	.043	.017	6.242	1	2.273	1.194 – 4.330	.012[*]
Age at Conviction	.068	.016	2.681	1	.994	.988 – 1.001	.102
Female	.012	.015	7.148	1	2.273	.605 – .926	.008[**]
Problem Severity	-.043	.015	4.156	1	1.185	1.007 – 1.396	.041[*]
Location	-	-	1.681	2	-	-	.431
Non-metro urban	-.023	.016	.597	1	.930	.773 – 1.118	.440
Rural	-.039	.015	.699	1	1.119	.860 – 1.456	.403

[*] $p \le .05$; [**] $p \le .01$; [***] $p \le .001$

Testing Mediation in Model 2. In Mediation Model 2, the hypothesized mediation

was the subject of Research Question 4: Does compliance with treatment and/or

education referral mediate the relationship between punishment severity and recidivism?

It was hypothesized that compliance would at least partially mediate the negative

relationship between punishment severity and recidivism. However, as previously

mentioned, Baron and Kenny (1986) argue that before mediation can be tested, there

needs to be evidence of a direct, significant relationship between the predictor (*X*) and

outcome (*Y*) variable and further, that this relationship must be in the hypothesized

direction. Since the first logistic regression conducted as part of this model failed to

establish a direct relationship between outpatient treatment and recidivism and the

significant relationship between residential treatment and recidivism was positive

(opposite the hypothesized direction), mediation could not be argued and the hypothesis

was not supported.

Although results failed to provide support for the hypothesized mediation model,

the logistic regression analyses that would have tested the mediating effects of

compliance (Paths *a*, *b*, and *c'*) were still conducted for both levels of punishment

severity. As presented in the previous subsection, receiving residential treatment as the

most intensive level of care was positively correlated with recidivism. However, there

was not a significant relationship between residential treatment and compliance (Path *a*).

Similarly, outpatient treatment also failed to predict compliance (Path *a*). Results did

reveal, however, that compliance was a significant, positive predictor of DUI recidivism

(Path *b*; B = .069, OR = 1.311, CI (95) = 1.088 – 1.580). Path *c'*, the logistic regression

testing the relationship between punishment severity and recidivism while controlling for

compliance was also significant. Specifically, the relationship between residential treatment and DUI recidivism was positive and significant; DUI offenders receiving residential treatment were significantly more likely to recidivate than offenders receiving education as their highest level of care.

Similar to the first hypothesized mediation model, several covariates included in the model were significantly correlated to both treatment/education compliance and recidivism. Age positively predicted compliance (B = .068, OR = 1.107, CI (95) = 1.059 – 1.157), being female was negatively correlated with recidivism (B = -.066, OR = .746, CI (95) = .603 – .923), and substance use problem severity was negatively related to compliance (B = -.043, OR = .853, CI (95) = 0.765 – .950) and positively related to recidivism (B = .049, OR = 1.196, CI (95) = 1.015 – 1.409). Lastly, compared those from a metropolitan area, offenders from a rural location had significantly lower odds of complying with treatment/education recommendations (B = -.039, OR = .791, CI (95) = .663 – .943).

Figure 5.2 on the following page provides a diagram of the hypothesized model including the direction and significance of paths *a*, *b*, and *c'* and the covariates. Table 5.5 on pages 73-74 provides the standardized coefficients and more in-depth results from the logistic regression analyses.

Figure 5.2. Mediation model including covariates and punishment severity as the independent variable.
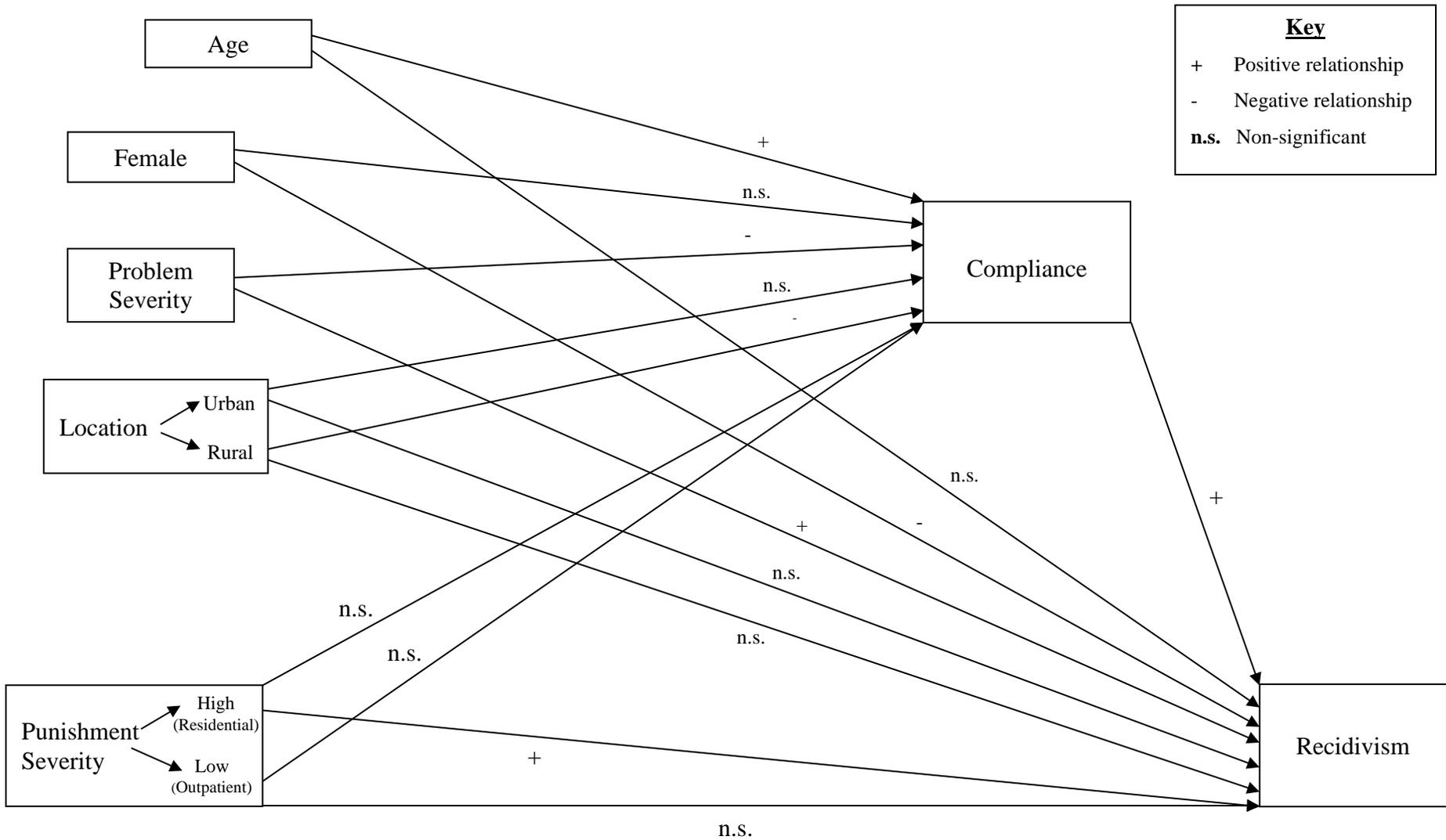
TABLE 5.5. Mediation Model 2 Results (with standardized coefficients & *SE*): Paths *a*, *b*, and *c'* (N = 6936)

	B	*SE*	Wald	*df*	OR	CI(95)	*p*
Path *a* (Pun. Severity → Compliance)							
Punishment Severity	-	-	.275	2	-	-	.872
Outpatient Treatment	.003	.012	.047	1	1.013	.905-1.134	.828
Residential Treatment	.008	.015	.241	1	1.156	.648-2.063	.623
Age at Conviction	.068	.016	19.907	1	1.107	1.059-1.157	.000***
Female	.012	.015	.586	1	1.053	.923-1.200	.444
Problem Severity	-.043	.015	8.354	1	.853	.765-.950	.004**
Location	-	-	7.677	2	-	-	.022*
Non-metro urban	-.023	.016	2.273	1	.912	.809-1.028	.132
Rural	-.039	.015	6.841	1	.791	.663-.943	.009**
Paths *b* & *c'* (Pun. Severity → Recidivism when controlling for Compliance)							
Punishment Severity	-	-	6.304	2	-	-	.043*
Outpatient Treatment	.016	.023	.493	1	1.063	.896-1.261	.483
Residential Treatment	.042	.017	6.091	1	2.254	1.182-4.298	.014*
Compliance	.069	.024	8.082	1	1.311	1.088-1.580	.004**
Age at Conviction	-.041	.023	3.201	1	.940	.879-1.006	.074
Female	-.066	.024	7.300	1	.746	.603-.923	.007**
Problem Severity	.049	.023	4.578	1	1.196	1.015-1.409	.032*

TABLE 5.5 (continued)

Location		-	-	1.814	2	-	-	.404
	Non-metro urban	-.017	.024	.514	1	.935	.777-1.124	.474
	Rural	.021	.022	.894	1	1.136	.872-1.478	.345

$^{*}p \le .05; \;^{**}p \le .01; \;^{***}p \le .001$

Moderation Analyses

The remaining research questions (Q_5 & Q_6) and hypotheses (H_5-H_{12}) suggested that the relationship between the deterrence-related variables (conviction celerity and punishment severity) and DUI recidivism would be moderated by a number of personal and environmental variables, including age, gender, substance use problem severity, and location. As detailed in Chapter Four, the moderation analyses in this study followed Baron and Kenny's (1986) procedure and were conducted using interaction terms and logistic regression analyses.

Moderation Model 1

The first moderation analysis was conducted to answer Research Question 5, which asks whether age, gender, problem severity, or location moderate the relationship between conviction celerity and recidivism. As discussed in the Methods chapter (Chapter Four), a single model was constructed to answer this research question (see Figure 4.8 on p.53). The model included the primary predictor variable (conviction celerity), the outcome variable (recidivism), treatment/education compliance as a potential covariate, and each hypothesized moderator as a predictor and an interaction term (e.g., age*conviction celerity). The following hypotheses were formed in response to the research question:

H_5: Location will moderate the relationship between conviction celerity and recidivism. The positive relationship between weak conviction celerity and recidivism will be weaker for non-metropolitan urban and rural offenders compared to metropolitan offenders.

H_6: Problem severity will moderate the relationship between conviction celerity and recidivism. For individuals demonstrating lower problem severity, the positive relationship between weak conviction celerity and recidivism will be stronger.

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H₇: Age will moderate the relationship between conviction celerity and recidivism. The positive relationship between weak conviction celerity and recidivism will be stronger for older offenders.

H₈: Gender will moderate the relationship between conviction celerity and recidivism. The positive relationship between weak conviction celerity and recidivism will be stronger for females.

With all variables considered together in a single model, results revealed that although conviction celerity did not significantly predict DUI recidivism, treatment/education compliance was a positive significant predictor of recidivism (B = .262, OR = 1.300, CI (95) = 1.079 – 1.566). Age at time of conviction (B = -.077, OR = .926, CI (95) = .864 – .991) and being female (B = -.278, OR = .757, CI (95) = 1.079 – 1.566) were both significant and negatively related to recidivism. Substance use problem severity was positively correlated with DUI recidivism (B = .172, OR = 1.188, CI (95) = 1.008 – 1.399).

Age and location were the only significant hypothesized moderators. The interaction between age and conviction celerity was negatively correlated with DUI recidivism (B = -.033, OR = .968, CI (95) = .939 – .998), revealing that, contrary to Hypothesis 7, as time between arrest and conviction increased, older offenders had decreased odds of recidivating. Figure 5.3 on page 79 demonstrates the effects of age on the relationship between conviction celerity and DUI recidivism.

The interaction between location and conviction celerity was also significant overall. Specifically, the interaction of non-metropolitan urban location and conviction celerity was a negative significant predictor of DUI recidivism (B = -.104, OR = .901, CI (95) = .831 – .977). In other words, non-metropolitan urban offenders were significantly less likely to recidivate as time between arrest and conviction increased while there was

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no relationship between conviction celerity and DUI recidivism for metropolitan

offenders. The negative relationship between conviction celerity and recidivism for non-

metropolitan urban offenders refutes Hypothesis 5. Figure 5.4 on page 79 illustrates how

the interaction between location and conviction celerity affects DUI recidivism.

Refer to Table 5.6 for the full results of Moderation Model 1.

TABLE 5.6. Moderation Model 1 Results (N = 6443)

	B	*SE*	Wald	*df*	OR	CI(95)	*p*
Conviction Celerity (# of months to conviction)	-.022	.029	.551	1	.979	.924 – 1.036	.458
Compliance	.262	.095	7.635	1	1.300	1.079 – 1.566	.006**
Age at Conviction	-.077	.035	4.933	1	.926	.864 – .991	.026*
Female	-.278	.107	6.721	1	.757	.613 – .934	.010**
Problem Severity	.172	.083	4.249	1	1.188	1.008 – 1.399	.039*
Location	-	-	2.664	2	-	-	.264
Non-metro urban	-.116	.096	1.463	1	.891	.739 – 1.074	.226
Rural	.106	.134	.626	1	1.112	.855 – 1.446	.429
Celerity*Age	-.033	.015	4.456	1	.968	.939 – .998	.035*
Celerity* Female	.002	.046	.002	1	1.002	.915 – 1.097	.966
Celerity*Prob Severity	.029	.035	.670	1	1.029	.961 – 1.102	.413
Celerity*Location	-	-	9.984	2	-	-	.007**
Celerity*Non-metro urban	-.104	.041	6.308	1	.901	.831 – .977	.012*
Celerity*Rural	.068	.053	1.677	1	1.071	.966 – 1.187	.195
Constant	-2.383	-	556.128	1	-	-	.000***

*$p \leq .05$; **$p \leq .01$; ***$p \leq .001$

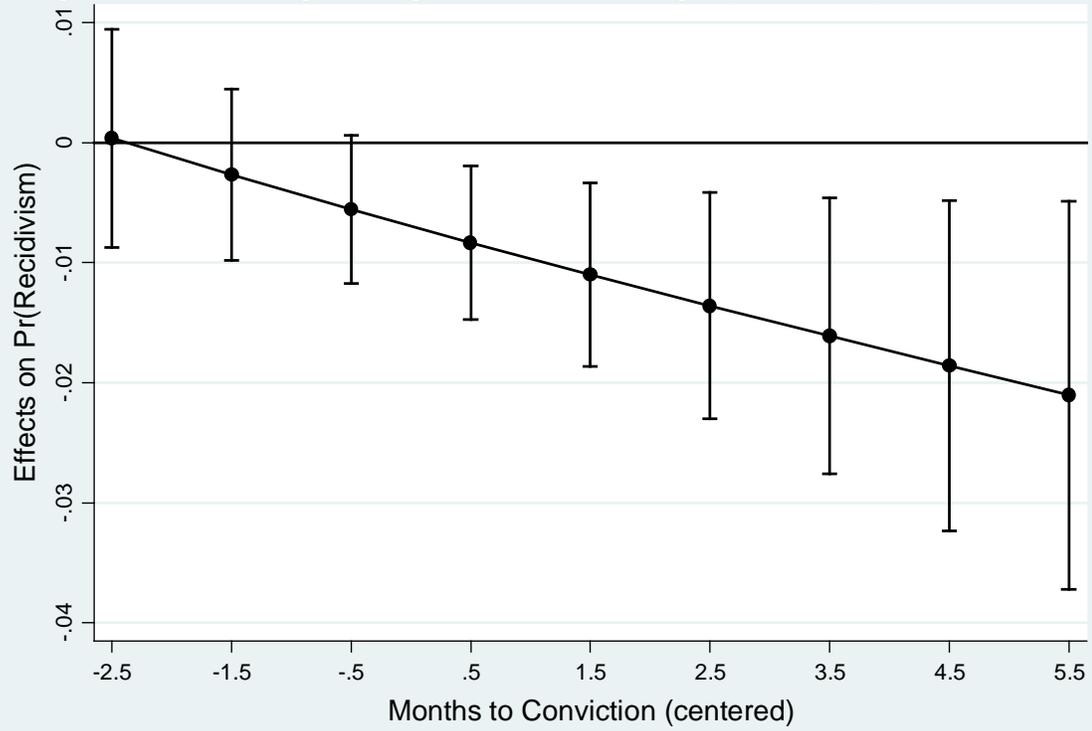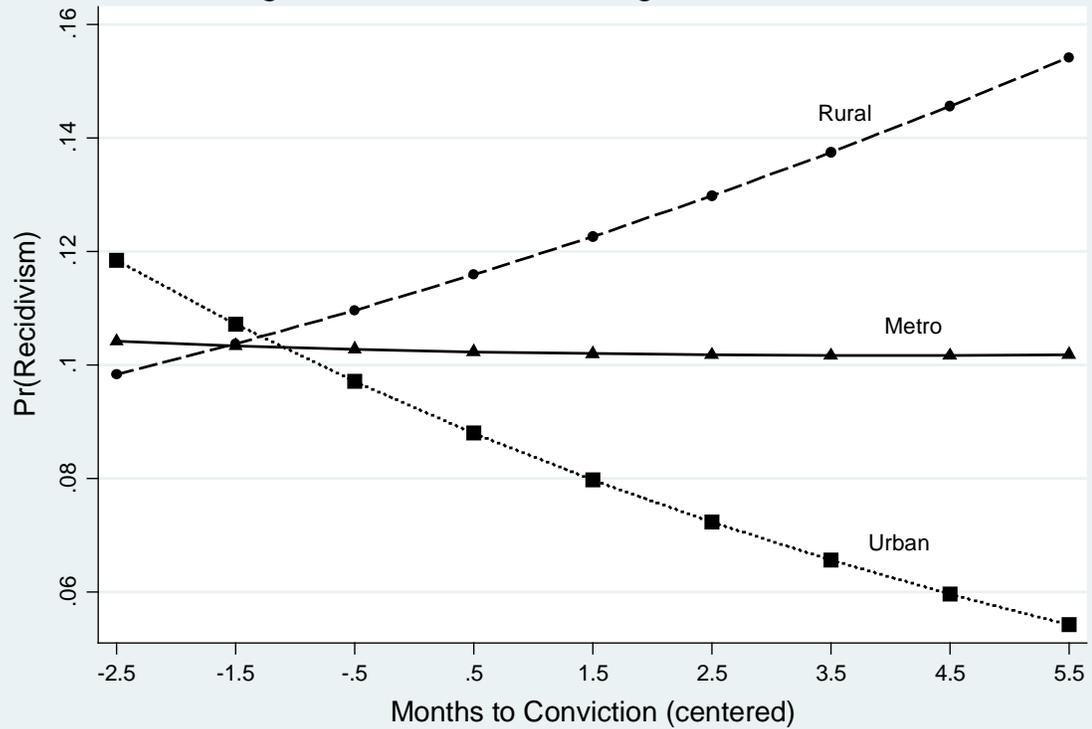# Figure 5.3. Average Marginal Effects of Age (centered) with 95% CIs

Figure 5.4. Predictive Margins of Location

Moderation Model 2

Research Question 6, which asks whether age, gender, problem severity, or location moderate the relationship between punishment severity and recidivism, was also tested using a single logistic regression model (refer to Figure 4.9 on p.54). Similar to the first moderation model, this model included the predictor (punishment severity), the outcome variable (recidivism), treatment/education compliance as a potential covariate, and each hypothesized moderator as a predictor and an interaction term. The following hypotheses were the anticipated results of the second moderation model:

H_9:   Location will moderate the relationship between punishment severity and recidivism. The negative relationship between punishment severity and recidivism will be weaker for non-metropolitan urban and rural offenders compared to metropolitan offenders.

H_10:   Problem severity will moderate the relationship between punishment severity and recidivism. For individuals demonstrating lower problem severity, the negative relationship between punishment severity and recidivism will be stronger.

H_11:   Age will moderate the relationship between punishment severity and recidivism. The negative relationship between punishment severity and recidivism will be stronger for older offenders.

H_12:   Gender will moderate the relationship between punishment severity and recidivism. The negative relationship between punishment severity and recidivism will be stronger for females.

The logistic regression analysis for the second hypothesized moderation model revealed that treatment/education compliance and being female significantly predicted DUI recidivism with the odds of recidivating being higher for compliant DUI offenders (B = .273, OR = 1.313, CI (95) = 1.089 – 1.584) and lower for female offenders (B = -.267, OR = .766, CI (95) = .587 – .999). Problem severity, age at time of conviction,

gender, substance use problem severity, and location, were not significantly related to recidivism.

The interaction between punishment severity and location was the only moderation found to be statistically significant. Specifically, the interaction between residential treatment and non-metropolitan urban location was statistically significant and positive, indicating that non-metropolitan urban offenders who received residential treatment as their most intensive level of treatment were at significantly higher odds of recidivating (B = 2.380, OR = 10.800., CI (95) = 1.960 – 59.511) compared to offenders from a metropolitan area. It was hypothesized that location would moderate the relationship between punishment severity and recidivism, but that the relationship would be negative. Thus, results fail to support Hypothesis 9. Figure 5.5 on page 84 demonstrates how location and punishment severity interact to affect the odds of recidivating for DUI offenders.

See Table 5.7 for the full results of Moderation Model 2.

TABLE 5.7. Moderation Model 2 Results (N = 6387)

	B	SE	Wald	df	OR	CI(95)	P
Punishment Severity	-	-	1.423	2	-	-	.491
Outpatient Treatment	.160	.146	1.202	1	1.174	.882 – 1.562	.273
Residential Treatment	-.345	.859	.161	1	.708	.131 – 3.815	.688
Compliance	.273	.096	8.135	1	1.313	1.089 – 1.584	.004**
Age at Conviction	-.032	.044	.542	1	.968	.889 – 1.055	.462
Female	-.267	.136	3.857	1	.766	.587 – .999	.050*
Problem Severity	.199	.106	3.536	1	1.220	.992 – 1.502	.060
Location	-	-	3.017	2	-	-	.221
Non-metro urban	-.073	.120	.377	1	.929	.735 – 1.175	.539
Rural	.236	.165	2.042	1	1.266	.916 – 1.749	.153
Pun. Severity*Age	-	-	1.582	2	-	-	.453
Outpatient*Age	-.082	.072	1.311	1	.921	.800 – 1.060	.252
Residential*Age	-.214	.354	.365	1	.808	.404 – 1.615	.545
Pun. Severity* Female	-	-	.869	2	-	-	.648
Outpatient* Female	-.087	.229	.146	1	.916	.585 – 1.435	.703
Residential* Female	.793	.972	.666	1	2.211	.329 – 14.864	.415

TABLE 5.7 (continued)

Pun. Severity*Prob. Severity	-	-	.620	2	-	-	.733
Outpatient*Prob. Severity	-.071	.175	.163	1	.932	.662 – 1.312	.686
Residential*Prob. Severity	.514	.802	.412	1	1.673	.348 – 8.047	.521
Pun. Severity*Location	-	-	9.555	4	-	-	.049[*]
Outpatient*Non-metro urban	-.070	.198	.124	1	.933	.633 – 1.375	.725
Outpatient*Rural	-.323	.289	1.245	1	.724	.411 – 1.276	.264
Residential*Non-metro urban	2.380	.871	7.469	1	10.800	1.960 – 59.511	.006[**]
Residential*Rural	.309	1.313	.055	1	1.362	.104 – 17.863	.814
Constant	-2.456	-	462.435	1	-	-	.000[***]

[*] $p \leq .05$; [**] $p \leq .01$; [***] $p \leq .001$

Figure 5.5. Predictive Margins of Punishment Severity*Location
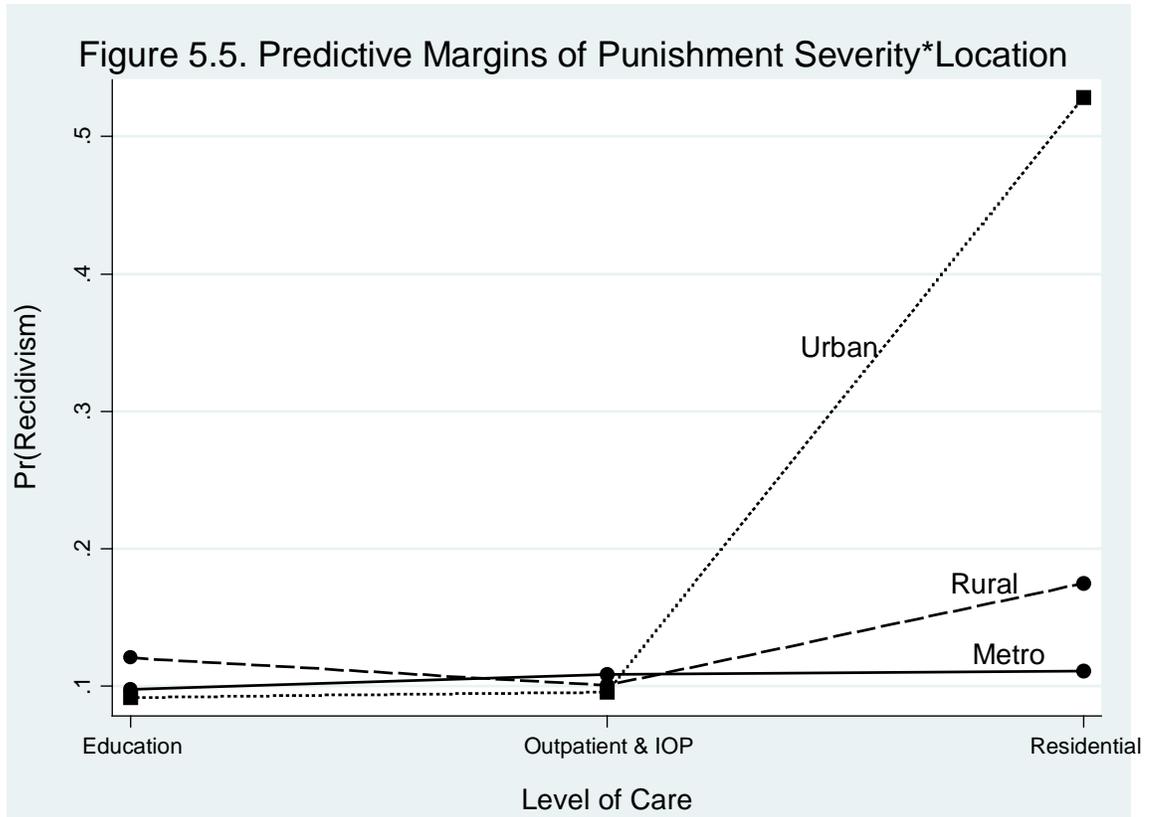
Exploratory Models

Because results from the initial hypothesized mediation and moderation models were overall null, several exploratory models were conducted to further examine the relationship among the deterrence-related variables (conviction celerity and punishment severity), treatment/education compliance, recidivism, and the personal and environmental variables previously described. Although the initial models specifically failed to support the hypothesis that deterrence-related variables were related to DUI recidivism and thus, compliance was not a mediator, analyses did demonstrate a relationship between conviction celerity and compliance and between compliance and DUI recidivism. As discussed in Chapter Three, existing literature suggests that compliance is a major correlate of driving under the influence and recidivism among DUI

offenders (Moore et al., 2008; Nochajski, 1999; Robertson et al., 2009; Williams, Simmons, & Thomas, 2000). As a result, the exploratory models further investigated the relationship between compliance and conviction celerity, punishment severity, and recidivism while examining the moderating effects of age at time of conviction, gender, substance use problem severity, and location.

The following subsections further describe the tested exploratory models and present the results from the moderation analyses.

Exploratory Model 1

The first exploratory model included conviction celerity as the primary predictor, treatment/education compliance as the outcome variable, and age at time of conviction, gender, substance use problem severity, and location as predictors and potential moderators (i.e. interaction terms). Similar to the initial hypothesized models, this model was tested using a single logistic regression analysis.

Results revealed that conviction celerity was significantly related to compliance and that as the time between arrest and conviction increased, the odds of complying with treatment/education recommendations were significantly lower (B = -.049, OR = .952, CI (95) = .919 – .987). In addition, age at time of conviction and substance use problem severity were significant predictors of treatment/education compliance. Specifically, older offenders were significantly more likely to comply with treatment recommendations (B = .115, OR = 1.122, CI (95) = 1.073 – 1.174) while offenders with a substance use problem had significantly lower odds of compliance (B = -.156, OR = .856, CI (95) = .768 – .953). Location also negatively predicted treatment/education compliance with offenders from rural areas being significantly less likely to comply with treatment/education recommendations (B = -.231, OR = .794, CI (95) = .666 – .946).

Of the included moderators, location was the only to significantly affect the relationship between conviction celerity and compliance. Although location overall did not moderate the relationship between conviction celerity and compliance, as time between arrest and conviction increased, offenders from a rural area had significantly increased odds of complying with treatment/education recommendations (B = .088, OR = 1.092, CI (95) = 1.014 – 1.175) compared to metropolitan offenders. No other moderators significantly impacted the relationship between conviction celerity and compliance. Refer to Table 5.8 for the full results of the first exploratory moderation model and to Figure 5.6 for an illustration of how location moderated the relationship between conviction celerity and compliance.

TABLE 5.8. Exploratory Moderation Model 1 with Conviction Celerity as the Predictor of Treatment Compliance (N = 6443)

	B	*SE*	Wald	*df*	*OR*	CI(95)	*P*
Conviction Celerity (# of months to conviction)	-.049	.018	7.193	1	.952	.919 – .987	.007**
Age at Conviction	.115	.023	25.394	1	1.122	1.073 – 1.174	.000***
Female	.033	.066	.244	1	1.033	.907 – 1.177	.621
Problem Severity	-.155	.055	8.014	1	.856	.768 – .953	.005**
Location	-	-	7.690	2	-	-	.023*
Non-metro urban	-.098	.061	2.615	1	.907	.805 – 1.021	.107
Rural	-.231	.090	6.641	1	.794	.666 – .946	.011*
Celerity*Age	-.004	.009	.211	1	.996	.978 – 1.014	.646
Celerity* Female	.001	.027	.001	1	1.001	.949 – 1.056	.974
Celerity*Prob Severity	.019	.022	.760	1	1.019	.976 – 1.064	.383
Celerity*Location	-	-	5.482	2	-	-	.064
Celerity*Non-metro urban	.019	.024	.611	1	1.019	.972 – 1.067	.434
Celerity*Rural	.088	.038	5.422	1	1.092	1.014 – 1.175	.020*
Constant	.975	-	434.970	1	-	-	.000***

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$

Figure 5.6. Predictive Margins of Location
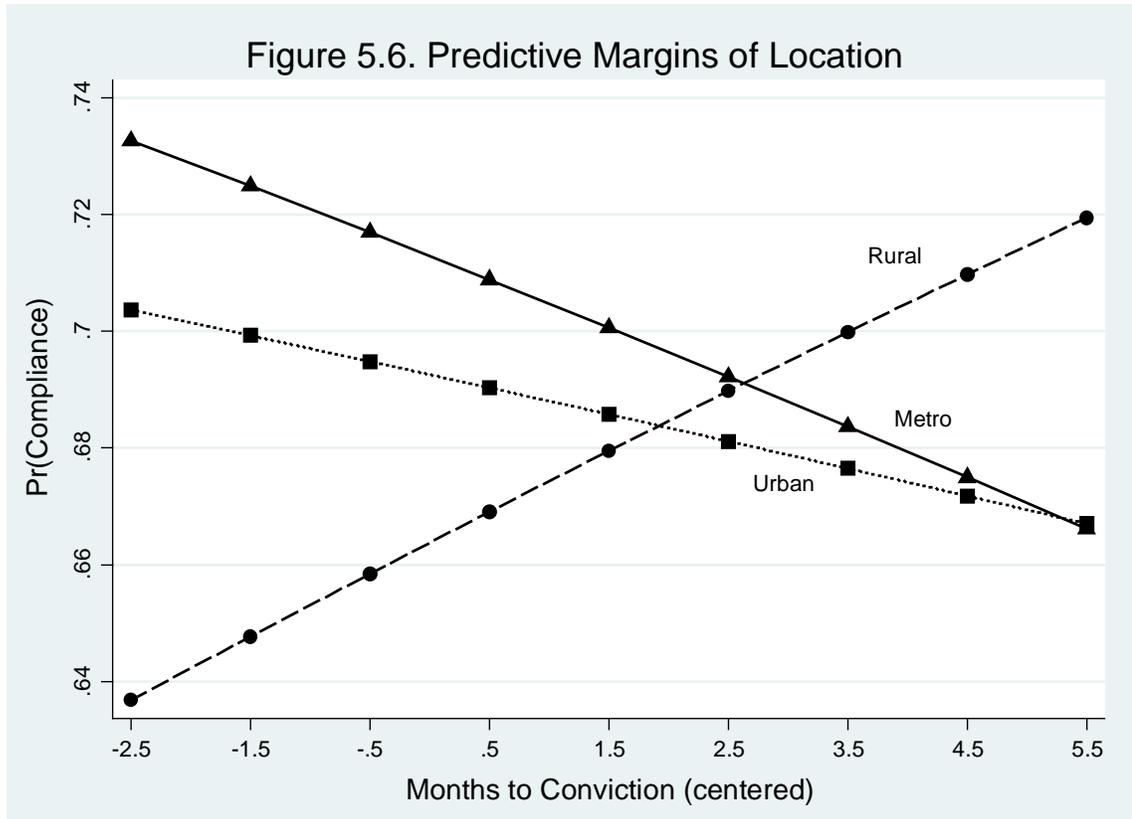
Exploratory Model 2

        Similar to the first exploratory model, the second exploratory moderation model

investigated treatment/education compliance as the outcome variable, with punishment

severity as the predictor. Age at time of conviction, gender, substance use problem

severity, and location were also included in the model as predictors and potential

moderators.

        Variables used in this model were the same as described in Chapter Four, except

for the punishment severity variable. In this model, the punishment severity variable was

dichotomized. Offenders were either placed into an "education" or "treatment" category

depending on the highest level of care to which (s)he was referred. The decision to

dichotomize was made because only 60 offenders (<1%) were referred to residential

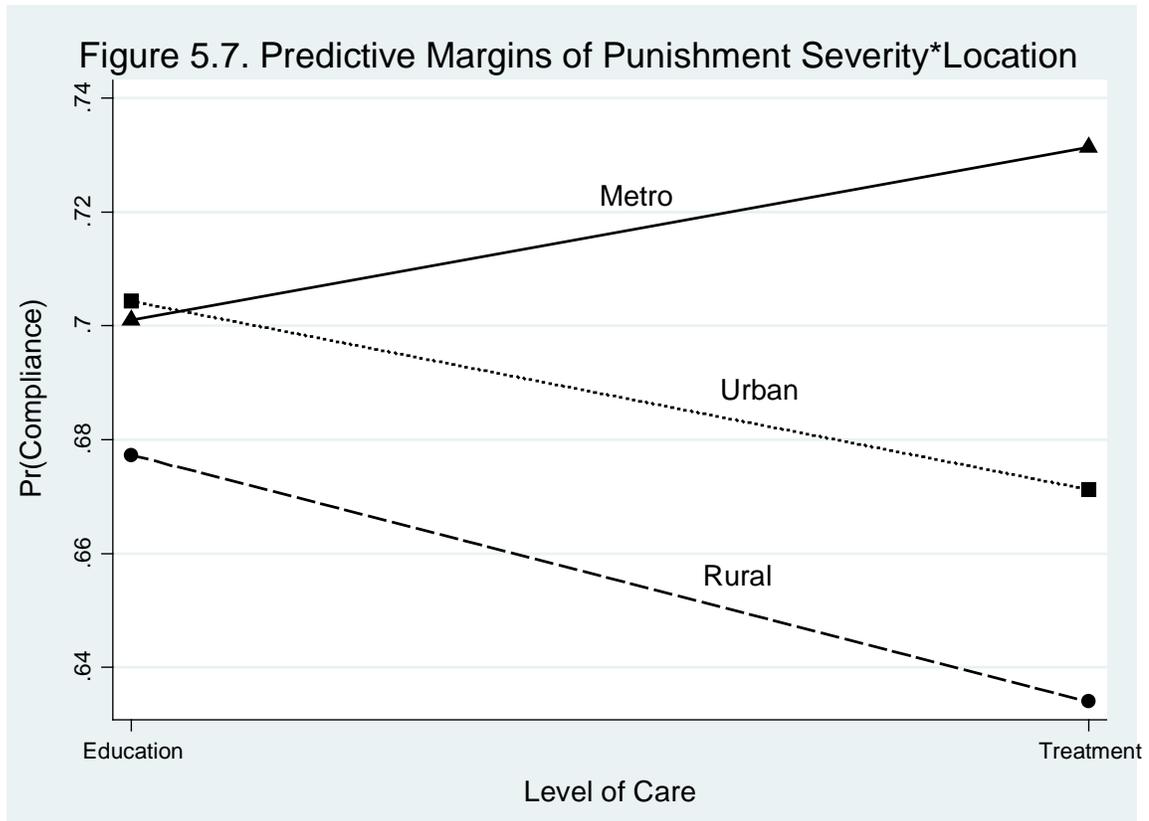treatment as the highest level of care. This model was tested using a single logistic regression analysis.

In this second exploratory model, punishment severity was significantly related to treatment/education compliance. Offenders referred to treatment were significantly more likely to comply with recommendations than offenders referred to education as their highest level of care (B = .205, OR = 1.227, CI (95) = 1.012 – 1.489). Similar to the first model, results also revealed that being older at the time of conviction significantly increased the odds of complying with treatment/education recommendations (B = .093, OR = 1.098, CI (95) = 1.038 – 1.161).

Of the hypothesized moderators, location was the only variable to significantly moderate the relationship between punishment severity and compliance. Results revealed that the interaction between non-metropolitan urban location and punishment severity (treatment) was significantly and negatively related to compliance (B = -.306, OR = .736, CI (95) = .574 – .945). In other words, non-metropolitan urban offenders who received treatment were significantly less likely to comply with the recommendation compared to those receiving education as their highest level of care while there was no significant relationship between punishment severity and compliance for metropolitan offenders. See Table 5.9 for the results from the second modified mediation model and Figure 5.7 for an illustration of how location interacts with punishment severity to affect DUI recidivism.

TABLE 5.9. Exploratory Moderation Model 2 with Punishment Severity as the Predictor of Treatment Compliance (N = 6387)

	B	*SE*	Wald	*df*	*OR*	CI(95)	*p*
Punishment Severity (Treatment)	.205	.098	4.335	1	1.227	.672 – .988	.037[*]
Age at Conviction	.093	.029	10.621	1	1.098	1.046 – 1.211	.001[***]
Female	.053	.083	.400	1	1.054	.838 – 1.303	.527
Problem Severity	-.122	.069	3.101	1	.886	.661 – .949	.078
Location	-	-	1.165	2	-	-	.558
Non-metro urban	.016	.076	.043	1	1.016	.613 – .913	.835
Rural	-.111	.113	.965	1	.895	.474 – .847	.326
Treatment *Age	.025	.047	.276	1	1.025	.889 – 1.070	.600
Treatment * Female	-.009	.140	.004	1	.991	.767 – 1.328	.949
Treatment * Prob Severity	-.112	.115	.941	1	.894	.892 – 1.401	.332
Treatment *Location	-	-	7.507	2	-	-	.023[*]
Treatment *Non-metro urban	-.306	.127	5.799	1	.736	1.059 – 1.742	.016[*]
Treatment *Rural	-.345	.186	3.418	1	.709	.980 – 2.034	.064
Constant	.897	-	189.162	1	-	-	.000[***]

[*] $p \leq .05$; [**] $p \leq .01$; [***] $p \leq .001$

Figure 5.7. Predictive Margins of Punishment Severity*Location

Exploratory Model 3

The third and final exploratory model examines the relationship between treatment/education compliance and DUI recidivism with age at time of conviction, gender, substance use problem severity, and location included as potential moderators.

Whereas the results of the hypothesized mediation models indicated a relationship between treatment/education compliance and DUI recidivism, results from this exploratory model did not support those results. None of the included predictors or interaction terms significantly predicted DUI recidivism. See Table 5.10 for the results from the final exploratory model.

TABLE 5.10. Exploratory Moderation Model 3 with Compliance as the Predictor and DUI Recidivism as the Outcome (N = 6603)

	B	*SE*	Wald	*df*	OR	CI(95)	*p*
Compliance	.213	.157	1.838	1	1.238	.909 – 1.686	.175
Age at Conviction	-.084	.069	1.456	1	.920	.803 – 1.054	.227
Female	-.319	.212	2.260	1	.727	.480 – 1.102	.133
Problem Severity	.163	.161	1.035	1	1.177	.860 – 1.613	.309
Location	-	-	.897	2	-	-	.639
Non-metro urban	-.171	.183	.877	1	.843	.589 – 1.206	.349
Rural	-.021	.252	.007	1	.979	.598 – 1.605	.934
Compliance*Age	.024	.079	.093	1	1.025	.877 – 1.197	.760
Compliance * Female	.023	.245	.009	1	1.024	.633 – 1.655	.924
Compliance *Prob Severity	.007	.187	.001	1	1.007	.698 – 1.452	.971
Compliance *Location	-	-	.539	2	-	-	.764
Compliance *Non-metro urban	.124	.212	.344	1	1.132	.748 – 1.715	.557
Compliance *Rural	.168	.297	.319	1	1.183	.661 – 2.116	.572
Constant	-2.340	-	296.216	1	-	-	.000***

*$p \leq .05$; **$p \leq .01$; ***$p \leq .001$

Results Summary

In sum, despite a general lack of support for most of the initial hypotheses, analyses did present some noteworthy findings. First, although not a mediating variable, compliance appears to be an important factor in predicting DUI recidivism. A direct relationship between the deterrence-related variables (conviction celerity and punishment severity) and DUI recidivism could not be established, but in the first hypothesized mediation model conviction celerity predicted treatment/education compliance which in turn predicted recidivism (see Figure 5.1 on p.7), and in the second mediation model compliance also predicted recidivism (see Figure 5.2 on p.13).

Also of importance, the personal and environmental variables (age, gender, substance use problem severity, and location) included in the mediation analyses were more predictive of recidivism and compliance than either of the deterrence-related variables. In both mediation models, older offenders were significantly more likely to be in compliance with treatment/education recommendations, while offenders with a substance use problem and those from more rural areas were less likely to comply. Regarding recidivism, male offenders with a substance use problem had significantly higher odds of recidivating. In Mediation Model 1 (see Figure 5.1 on p.65), age was also significantly related to DUI recidivism, with younger offenders being more likely to recidivate.

Finally, there was some evidence of moderation. Although not in the hypothesized direction, location was found to act as a moderator in both the hypothesized and exploratory moderation models, with the exception of the third exploratory model. Location interacted with both celerity and punishment severity to significantly affect DUI recidivism and treatment/education compliance. Specifically, 1) non-metropolitan urban

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location interacted with conviction celerity to negatively predict DUI recidivism, 2) the interaction between residential treatment and non-metropolitan urban location was positive, 3) the interaction between rural location and conviction celerity increased the odds of offenders complying with treatment recommendations, and 4) the interaction between non-metropolitan urban location and punishment severity (treatment) was negatively related to compliance

In the first hypothesized moderation model, age was also identified as a moderating variable. However, similar to location, the interaction between age and celerity did not affect recidivism in the direction hypothesized. It was hypothesized that the positive relationship between conviction celerity and recidivism would be stronger for older offenders, yet results indicated that as time between arrest and conviction increased, older offenders had decreased odds of recidivating. Gender and substance use problem severity did not act as moderators in either the hypothesized models or the exploratory models.

Results will be further discussed in Chapter Six.

Chapter 6: Discussion and Conclusion

Due to the high rate of substance-impaired driving in the U.S., existing literature has largely focused on efforts to deter DUI behaviors, including the prevention of DUIs and the reduction of DUI offender recidivism. However, as mentioned in earlier chapters, the criminal justice system is now employing rehabilitation efforts with DUI offenders in conjunction with more traditional types of punishment. Attempting to explore the effects of using rehabilitation approaches with DUI offenders, the overarching goal of this dissertation was to expand on existing DUI research by investigating the relationship(s) among deterrence-related variables and DUI recidivism, while also considering the role that treatment compliance and various social and environmental variables play in this relationship. More specifically, this study examined the relationship(s) among these variables through a series of mediation and moderation models, addressing the following research questions:

Q_1:   Does conviction celerity predict future recidivism among DUI offenders?

Q_2:   Does compliance with treatment and/or education referral mediate the relationship between conviction celerity and recidivism?

Q_3:   Does punishment severity predict future recidivism among DUI offenders?

Q_4:   Does compliance with treatment and/or education referral mediate the relationship between punishment severity and recidivism?

Q_5:   Do age, gender, problem severity, or location moderate the relationship between conviction celerity and recidivism?

Q_6:   Do age, gender, problem severity, or location moderate the relationship between punishment severity and recidivism?

Chapter Five outlined the results of the initial hypothesized mediation and moderation models in addition to several exploratory models that were tested when the

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hypothesized models went largely unsupported. In Chapter Six, the results of the tested

models will be discussed more in-depth and the final conclusions derived from this study

will be presented.

Interpretation of Findings

Mediation Models: Research Questions 1 through 4

Focusing first on the hypothesized mediation models, given the premise of

deterrence theory it was expected that both conviction celerity and punishment severity

would significantly predict recidivism among DUI offenders. It was specifically

expected that as time to conviction increased, the odds of recidivating would also

significantly increase (H_1) and that as punishment severity (level of care) increased, the

odds of recidivating would significantly decrease (H_3). Despite these anticipated results,

conviction celerity was not directly correlated with DUI recidivism. Punishment

severity, however, was correlated with recidivism but in the opposite direction of the

hypothesized relationship. While past research has provided ample support for

hypothesizing these relationships (Lapham & Todd, 2012; McArthur & Kraus, 1999;

Nichols & Ross, 1990; Yu, 1994), studies have also highlighted similar instances of null

and inconsistent results (McCartt, Geary, & Nissen, 2002; Nichols & Ross, 1990; Ross &

Klette, 1995; Voas & Fisher, 2001).

In this dissertation, one potential explanation for the non-significant findings

between celerity and recidivism could be the high rate of substance use disorders among

the study sample. More than 40% of the DUI offenders (both single and repeat

offenders) in this sample met criteria for either DSM-IV substance abuse or dependence.

The basic premise of deterrence theory is that we are all rational beings and crime is an

"exercise of free will" (Akers & Sellers, 2009; Beccaria, 1764; Bentham, 1830).

However, suffering from a substance use disorder likely prevents DUI offenders from making rational decisions regarding future DUI or other criminal behaviors, thus limiting the deterrent effects of any severe, swiftly-applied sanctions. Past substance use and DUI studies have drawn similar conclusions (Grant, Contoreggi, & London, 2000; Yu, 2000; Yu, Evans, & Clark, 2006). As discussed by Yu and colleagues (2006), addiction specialists have frequently questioned the extent to which individuals suffering from substance use disorders or other addictions are able to effectively make rational choices that weigh the potential benefits and consequences of a particular action. MacCoun (1993) notes that rather than making rational decisions, drug abusers tend to be guided by unconscious processes. Several DUI-specific studies have found that repeat DUI offenders often suffer from some degree of cognitive impairment due to DUI-related activities such as alcohol abuse (Glass, Chan, & Rentz, 2000; Ouimet et al., 2007).

Nochajski & Stasiewicz (2006) also argued that the use of deterrence theory implies that "DUI offenders are able to control their behavior" (p.182). However, research has shown the substance-impaired individuals experience disinhibition and are more likely to engage in risky behaviors that might not otherwise occur (Lane, Cherek, Pietras, & Tcheremissine, 2003), suggesting that substance-impaired individuals may decide to drive under the influence without considering the possible consequences of their actions. The impediment of rational thinking by substance use and addiction could have resulted in the lack of deterrent effects in the first mediation model.

While the results in the second mediation model were opposite of the hypothesized direction, it may be due to the use of level of care as the measure of punishment severity. Results show that offenders referred to treatment, or more

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specifically residential treatment, are more likely to recidivate than offenders referred to less intensive forms of treatment or education. Because offenders experiencing more severe substance use problems are referred to higher levels of care, it again suggests that these offenders are more likely to recidivate because addiction limits their rational thinking by impairing cognitive abilities (Bates, Bowden, & Barry, 2002; Lundqvist, 2005; MacCoun, 1993). Further, research has often highlighted the high rates of impulsivity in substance-addicted populations, noting that individuals with substance use disorders frequently choose immediate rewards rather than considering long-term rewards and/or consequences (Allen, Moeller, Rhoades, & Cherek, 1998; Kirby & Petry, 2004; Kirby, Petry, & Bickel, 1999).

It was also hypothesized that compliance would mediate the relationship between conviction celerity and recidivism (H_2) and the relationship between punishment severity and recidivism (H_4). However, following the method for establishing mediation originally presented by Baron and Kenny (1986; refer to Chapter Four, pp.44-45), mediation can only be proven after a regression analysis first establishes that there is a direct, significant relationship between the independent and dependent variable and in the hypothesized direction (Step 1). Because the direct relationships between the deterrence-related variables and DUI recidivism were either nonsignificant or were significant, but in the direction opposite of the hypothesis, compliance was not supported as a mediating variable.

Despite the hypothesized models failing to support compliance as a mediator, compliance was significantly related to a number of variables in the mediation analyses. In particular, weak conviction celerity significantly decreased the odds of complying with

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treatment/education recommendations suggesting that a swift conviction is important in ensuring offenders' engagement in and successful completion of rehabilitation programs.

Compliance was also significantly related to DUI recidivism in both of the hypothesized mediation models. Although past studies would lead one to expect treatment compliance to significantly decrease the odds of recidivating (Nochajski, 1999; Robertson, Gardner, Xu, & Costello, 2009; Williams, Simmons, & Thomas, 2000), results from the mediation models showed that DUI offenders who complied with treatment/education recommendations were significantly more likely to recidivate. Bivariate analyses produced similar results (see p.39). Though this finding contradicts much of the existing literature, it suggests that offenders may not be receiving referrals for appropriate levels of treatment. Bivariate analyses showed that both groups of offenders were overall most likely to be referred to a 20-hour education class (>60%), with no significant differences between single and repeat offenders. This referral trend has resulted in high rates of compliance for both groups of offenders (~70%) in this study, which is consistent with research showing that retention rates are higher for short-term programs (Hser, Joshi, Maglione, Chou, & Anglin, 2001; Simpson et al., 1997). Despite this lack of variation in treatment referral, bivariate analyses also revealed that offenders who eventually recidivated during the sample timeframe were significantly more likely to screen positive for a substance use disorder. This could have potentially resulted in these higher rates of recidivism since offenders' substance use problems were not adequately addressed.

Additionally, the significantly higher rates of recidivism for compliant offenders could be the result of treatment duration. Specifically, Kentucky state law mandates that

a first-time DUI offender receive no more than 90 days of treatment (KRS 189A.010) while education curriculum in Kentucky is 20-hour program and is often completed within 30 days. If an individual has a substance use disorder, he/she may require more treatment than required by state regulation. Treatment consistency and delivery is also a possible influencing factor.

Moderation Models: Research Questions 5 and 6

The hypothesized moderation models were also largely non-significant. Similar to the mediation models, DUI recidivism was not predicted by either conviction celerity or punishment severity whereas treatment/education compliance was significantly associated with an increased chance of recidivating.

Next, though it was hypothesized that age, gender, substance use problem severity and location would moderate the relationship between conviction celerity and recidivism ($H_5 - H_8$) and between punishment severity and recidivism ($H_9 - H_{12}$), only age and location were revealed to be significant moderators. Age significantly moderated the relationship between conviction celerity and recidivism, revealing that older offenders were significantly less likely to recidivate as time between arrest and conviction increased. Although this relationship is not in the hypothesized direction, it suggests that age of the offender is a stronger predictor of DUI recidivism than conviction celerity. In the full model, conviction celerity alone was not predictive of DUI recidivism. However, age was significantly related to recidivism and showed that older offenders were significantly less likely to recidivate than younger offenders. When the two variables interact the result is significantly decreased odds of recidivating. The negative effects of age on recidivism can be explained by looking at past theoretical discussions of criminal behavior and drug use. For example, Sampson and Laub (1993; 2005) found that

informal social controls present in adulthood, such as marriage, families, and jobs, are directly related to reductions in crime over the life course. Focusing specifically on drug use, Winick (1962) proposed the maturation hypothesis, arguing that addicts eventually "mature out" of substance use because the problems that caused their initial drug use become less salient and less urgent as they age.

Location was also a significant moderator, interacting with both conviction celerity and punishment severity (level of care) to significantly affect DUI recidivism. In the first moderation model, conviction celerity interacted with non-metropolitan urban location to significantly decrease the odds of recidivating, when compared to metropolitan offenders. While this is an unusual finding, it may be the result of non-metropolitan urban DUI offenders being under-detected by the police. In this dissertation, DUI recidivism is measured by formal arrest and subsequent conviction. While this is a common way for measuring DUI recidivism (Nochajski & Stasiewicz, 2006), Marques, Tippetts, and Voas (2003) suggest that the probability of being arrested while driving under the influence of alcohol may be as low as 0.1%, which is supported by other research (Voas & Lacey, 1990). It may be that non-metropolitan urban offenders (refer to coding scheme for location on pp.40-41) in this sample are less likely to be detected by police because of decreased police presence in these communities compared to metropolitan areas (Field, 1991).

In Moderation Model 2, non-metropolitan urban offenders were significantly more likely to recidivate as punishment severity (level of care) increased. Referring back to Figure 5.5 (p.81), the graph of predicted probabilities reveals that the location does not affect the relationship between punishment severity and DUI recidivism at the first two

levels of care (education and outpatient/IOP treatment). Rather, the impact is present at

the highest level of care – residential treatment. This suggests that non-metropolitan

urban offenders in this sample who were referred to the most intensive form of treatment

experienced more significant substance use problems. Not only could this increase the

odds of recidivating due to impaired rational thinking, as previously discussed, but

because addiction has been identified as chronic condition, individuals experiencing a

substance use problem cannot be "cured" after one treatment episode (Dennis & Scott,

2007) and may be more likely to reoffend when they experience a relapse (Hanlon,

Nurco, Kinlock, & Duszynski, 1990; Speckart & Anglin, 1986).

Exploratory Models

As presented in the Chapter Five, neither the hypothesized mediation nor the

moderation models were supported by the results. However, because compliance was

found to be significantly related to both the deterrence-related variables and DUI

recidivism, the moderations were re-tested focusing on the role of compliance.

Although three exploratory moderation models were analyzed, results were again

limited and only two of the exploratory models produced significant results. Similar to

the hypothesized moderation models, the only variable that acted as a significant

moderator was location. In the first exploratory model, conviction celerity interacted

with rural location to significantly increase the odds of complying with treatment

recommendations compared to metropolitan areas. This effect could be attributed to the

limited treatment options inherent in rural communities (Fortney & Booth, 2001). It may

be that due to this limitation, offenders were most often referred to education-only

programs which have higher compliance rates since they are short-term programs (Hser,

Joshi, Maglione, Chou, & Anglin, 2001; Simpson et al., 1997). Further, because it is not

uncommon for cases to move slowly through the court system in rural communities (Fahnestock & Geiger, 1993), conviction celerity may not have the same deterrent effect on rural offenders as it does for offenders from metropolitan areas.

In the second exploratory model, being from a non-metropolitan urban location significantly decreased the odds of complying with treatment/education recommendations for offenders referred to a higher level of care compared to those in metropolitan communities. This interaction suggests that compliance with treatment becomes more difficult in non-metropolitan areas (including non-metro urban counties; refer to coding scheme for location on pp.40-41) possibly due to barriers that are not typically present in larger metropolitan communities. Specifically, non-metropolitan areas generally have poorer economic conditions than larger metropolitan communities, often resulting in limited access to resources such as substance abuse treatment (Booth et al., 2000; Fortney et al., 1995; Fortney & Booth, 2001; Sexton et al., 2008). Limited treatment options means offenders may have farther to travel to obtain services (Beardsley, Wish, Fitzelle, O'Grady, & Arria, 2003), making attendance at more intensive, long-term treatment programs difficult. Additionally, noncompliance could be the result of treatment costs. Non-metropolitan counties (both non-metropolitan urban and rural) in Kentucky have a significantly lower median household income than metropolitan counties (Davis, 2009), so treatment noncompliance in these regions could be due to non-payment of treatment and/or assessment fees. This is further supported by the interaction of rural location and treatment. Although not significantly predictive of compliance at the $p \leq .05$ level, it was approaching significance ($p = .064$).

In these models, conviction celerity and punishment severity were both significantly related to compliance. Similar to the results of the first mediation model, there was a negative relationship between conviction celerity and treatment/education compliance. On the other hand, the relationship between punishment severity and compliance was positive, indicating that offenders who received a higher level of care (treatment) were more likely to be in compliance than offenders who received education. This again suggests that higher rates of noncompliance among DUI offenders receiving an education-only referral is the result of offenders not being referred to appropriate levels of care.

Other Key Findings

While age, gender, substance use problem severity, and location were tested as moderators, they were also included in the mediation, moderation, and exploratory models as covariates. Although no hypotheses were presented regarding the potential correlation of these variables to compliance and DUI recidivism (other than their potential moderating effects), a number of these covariates were significantly related to both DUI recidivism and treatment/education compliance. These results support findings from earlier studies, suggesting that certain populations are at greater risk of failing to comply with treatment/education recommendations and are at greater risk of recidivating.

Beginning with age, in Mediation Model 1 and Moderation Model 1, age was significantly and negatively correlated with DUI recidivism, meaning that older offenders in the study sample were significantly less likely than younger offenders to recidivate during the 5-year follow-up time frame. Results also revealed a significant relationship between age and compliance in both mediation models and both Exploratory Models 1 and 2. In each of these four models, age was positively correlated with treatment

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compliance, indicating that older DUI offenders were more likely to comply with treatment/education recommendations. Existing studies have produced similar results (C'de Baca, Miller, & Lapham, 2001; Peck, Arstein-Kerslake, & Herlander, 1994). As mentioned with the hypothesized moderation models, the relationship between age and recidivism and between age and compliance is supported by previous theoretical arguments – specifically, Sampson and Laub's (1993; 2005) life course theory and Winick's (1962) maturation hypothesis. Focusing on Sampson and Laub's discussion of the life course, the informal controls that they claim are responsible for reductions in crime also represent forms of social support (e.g., close-knit families) and may be responsible for increased treatment compliance among offenders (McCaul, Svikis, & Moore, 2001).

Gender was also found to significantly correlate with DUI recidivism in all of the hypothesized mediation and moderation models, with results revealing that females were significantly less likely than males to recidivate. Supported by existing literature (C'de Baca, Miller, & Lapham, 2001; Nochajski & Stasiewicz, 2006), the effects of gender on DUI recidivism should also be considered from a theoretical standpoint. As presented by Gottfredson and Hirschi (1990), the general theory of crime suggests that crime is impulsive and the result of a lack of self-control. Using Gottfredson and Hirschi's theory, Keane, Maxim, and Teevan (1993) found that low self-control was a significant predictor of drunk driving. With research highlighting a "substantial self-control difference between the sexes" (Gottfredson & Hirschi, 1990, p.147) and higher rates of impulsivity in males (Chapple & Johnson, 2007; Waldeck & Miller, 1997), this characteristic may be one reason for higher rates of DUI and DUI recidivism in males.

Substance use problem severity was correlated with both recidivism and compliance in a number of models. Overall, results revealed that DUI offenders experiencing a substance use problem were less likely to comply with treatment/education recommendations and at higher odds of recidivating compared to those who did not have a substance use problem. In further support of earlier comments, these results imply that DUI offenders who have substance use problems likely have impaired cognitive functioning and are not able think as rationally as offenders who do not abuse substances. Thus, they are less likely to recognize the importance of attending recommended treatment and are less likely to consider the consequences of driving under the influence of drugs or alcohol.

Lastly, location predicted compliance in a number of the models, specifically showing that rural DUI offenders had significantly decreased odds of complying with treatment/education recommendations compared to metropolitan offenders. Again, the decreased odds of complying with treatment recommendations among rural DUI offenders could be due to the limited treatment availability and overall decreased accessibility to treatment that is often characteristic of more rural areas (Booth et al., 2000; Fortney et al., 1995; Fortney & Booth, 2001; Sexton et al., 2008). This includes having to travel farther distances to obtain treatment (Beardsley et al., 2003), which is complicated by having a suspended license and limited public transportation.

Together, the relationships between these social and environmental variables and DUI recidivism and compliance provide some support for theories of bounded rationality, as discussed in Chapter Two. Cornish and Clarke's (1985, 1986) model of bounded rationality recognizes that there is some degree of rational thinking involved in crime, but

it is often limited or constrained by time, ability, and/or the availability of relevant information. They have pointed out that crime-related decisions are often made under imperfect conditions in which the costs and benefits of an action are hard to predict, including when under the influence of substances (Cornish & Clarke, 2011). This theory looks at the subjective nature of criminal decision-making, taking into consideration the context in which these decisions are made. Provided the results of these analyses, it is important to consider personal and situational variables associated with an offender and his/her past DUI behaviors in order to ensure compliance and reduce future recidivism.

Implications

Deterrence theory, as discussed in Chapter Two, is based on the premise that humans are rational beings and engaging in criminal behavior is an "exercise of free will" (Akers & Sellers, 2009). However, as highlighted by the results of this research study, due to disinhibition when under the influence of substances and the effects of possible addiction, DUI offenders are not always rational thinking individuals that have control over their actions as is implied by deterrence theory. Rather, this study provides further evidence of risk-factors identified in earlier studies, highlighting a number of social and environmental variables that are more predictive of recidivism and noncompliance than deterrence-related variables, including age, gender, substance use problem severity, and location.

Taken together, these results suggest that deterrence theory is not a one size fits all approach for reducing DUI recidivism. Using a deterrence approach to more effectively reduce DUI recidivism would require an extension of classical deterrence theory to account for characteristics of or issues among DUI offenders that would limit their ability weigh the rewards and consequences of engaging in DUI behaviors. In other

words, efforts to reduce DUI recidivism should be grounded in an approach more closely resembling Cornish and Clarke's bounded rationality (1985; 1986; 2011), as discussed in the previous section. Decisions to drive under the influence are made under imperfect conditions, when an individual is impaired and likely not able to anticipate the consequences of DUI while factors such as age and location further constrain DUI offenders' ability to think rationally.

Other criminological theories should also be considered when investigating chronic DUI offending. For example, the effects of age on DUI recidivism and compliance in this study point to changes in the life course, as originally described by Sampson and Laub (1993; 2005), which may be responsible for reduced recidivism among older DUI offenders. The use of criminological theories other than deterrence to investigate DUI recidivism has been supported by existing literature (DeMichele, Lowe, & Payne, 2013).

These results also provide a number of implications for the criminal justice system and treatment providers. First, as mentioned, results imply that DUI offenders' decisions to drive impaired are impacted by a number of factors that limit the ability to think rationally, and thus, traditional efforts may not deter DUI offenders from recidivating. Instead, in order to potentially reduce DUI recidivism rates, the criminal justice system and treatment providers must acknowledge that "chronic drunken driving involves complex social-psychological processes involved in decision making" (DeMichele et al., 2013, n.p.), which can be further limited by various social and contextual factors.

Consequently, the criminal justice system should consider the risk-factors associated with noncompliance and recidivism, including substance use problems and impulsivity, and make efforts to tailor interventions and treatment programs to individual DUI offender needs. However, before interventions and treatment programs can be tailored to meet offender needs, the criminal justice system must thoroughly assess DUI offenders upon conviction to identify these recidivism risk factors. Properly screening DUI offenders for underlying problems or risk of recidivism is necessary to make sure offenders are referred to appropriate treatment programs. Past studies have argued that there are important distinctions between types of DUI offenders, which may require special responses from the criminal justice system or treatment providers (DeMichele et al., 2013; Lenton, Fetherston, & Cercarelli, 2010).

It is also important for the criminal justice system to identify ways to make treatment available to offender populations who previously have had limited access to treatment, including extending treatment into more rural areas and increasing the availability of quality treatment programs. For example, the results of this study suggest that DUI offenders in this sample are often not being referred to appropriate levels of care, which could be the result of residing in a nonmetropolitan area and, as a result, having limited access to treatment. Existing studies have suggested that the criminal justice system "offers a unique window of opportunity for addressing rural offenders' treatment needs" (Dickson, Wasarhaley, & Webster, 2013, p.432) and for reaching other offender populations who have limited access to treatment (Knight & Farabee, 2004).

Efforts to reach substance-using populations that have had limited access to adequate treatment is important because of the potential societal implications presented

by offenders with untreated or under-treated substance use disorders. Not only are these offenders likely to persist in substance use and substance-related behaviors, including DUI, research has shown that having an untreated or under-treated substance use disorder is associated with increased criminal activity and incarceration (Field, 1989), premature death (Grönbladh, Ohlund, & Gunne, 1990), and mental health problems (Teesson et al., 2007).

Finally, as a result of the aforementioned long-term personal and social problems associated with an untreated substance use disorder, making treatment more accessible to all individuals experiencing a substance use disorder is important because it can be cost effective on a societal scale. Research has regularly shown that there are high economic costs resulting from the problems associated with having an untreated substance use disorder (Mark, Woody, Juday, & Kleber, 2001; Wall et al., 2001). One Canadian study concluded that the social cost burden of one illicit opioid user was approximately $45,000 per year (Wall et al., 2001). Considering these costs, other studies have conducted cost analyses of substance use treatment and found that it is an economically sound investment, saving money overall (Cole, Logan, Scrivner, & Stevenson, 2013; French et al., 2000; McCollister et al., 2003). Recently, a cost analysis conducted as part of the Kentucky Treatment Outcome Study 2013 Annual Report found that "for every dollar spent on publicly funded substance abuse treatment there is a savings of $5.26 in costs to society" (Cole et al., 2013).

Additional Limitations and Directions for Future Research

Because of the high recidivism rates among DUI offenders and the costs associated with recidivism, preventing and reducing DUI recidivism will continue to be a high priority in the criminal justice system and a necessary area of inquiry for scholars.

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As the criminal justice system continues to shift towards rehabilitating DUI offenders and away from punishment-only approaches, future research should continue to explore the relationship among deterrence, rehabilitation compliance, and DUI recidivism. Academics should specifically conduct similar mediation models using other deterrence-related variables, including measures of punishment certainty – the third component of deterrence theory. Existing studies have examined punishment certainty as it relates to DUI recidivism (Nagin, 1998; Yu 2000) but not in a mediation model similar to those conducted in this dissertation. Future research should also investigate different measures of punishment severity. Whereas the recommended level of care was used as a measure of punishment severity in this study, it is important to look at other forms of punishment such as fines and incarceration in similar mediation models. Past studies have demonstrated that deterrent effects vary across punishment type (Lapham & Todd, 2012; Wagenaar et al., 2007; Yu, 1994). It is possible that conducting similar mediation models with other measures of punishment severity would yield different results.

Similar studies should also be conducted using other measures of DUI recidivism. In this dissertation, recidivism was measured by subsequent DUI convictions during the 5-year sampling timeframe. Past studies have often highlighted discrepancies between self-report data and official arrest data for DUI and other criminal activity (Hindelang, Hirschis, & Weis, 1981; Voas & Lacey, 1990). As previously mentioned, Marques and colleagues (2003) found that the probability of being arrested for DUI may be as low as 0.1%. It is possible that single DUI offenders in this study had actually driven under the influence a number of times but never formally arrested or convicted. Perrine (1990) argues that first-time DUI offenders are like recidivists who have not yet been arrested

for a second DUI offense. Further, because DUI arrests in Kentucky are only on an

offender's official driving record for a period of five years, there is no way to know

whether single offenders in this study had previously been sanctioned for driving under

the influence. Again, it is possible that these individuals had previously been arrested

and convicted of a DUI, but the arrest(s) occurred more than five years prior to the

sampling timeframe and thus did not show up on his/her record. Other states and motor

vehicle departments have similar policies, which result in an official record that is not

representative of an offender's full driving history. Researchers should consider these

issues when designing future DUI studies.

While future studies should incorporate other measures of deterrence, it is also

important to consider the possibility of other moderating variables. As mentioned,

moderators are often used to explore relationships that are weak, inconsistent, or

inconclusive (Baron & Kenny, 1986). Although location was identified as a significant

moderator in a number of the models, the limitations of the dataset prevented the

exploration of several other potential moderators, including race, social support, mental

health, and criminal history.

Finally, future researchers should explore the hypothesized mediation models

using an analytic method different from that of Baron and Kenny (1986) and MacKinnon

and Dwyer (1993). Though Baron and Kenny's methods still are commonly used in

social science research, in more recent years a number of academics have proposed

various extensions to Baron and Kenny's work (Collins et al., 1998; Kenny, Kashy, &

Bolger, 1998; MacKinnon et al., 2000; Shrout and Bolger). Future researchers may want

to consider these newer procedures when conducting similar mediation analyses.
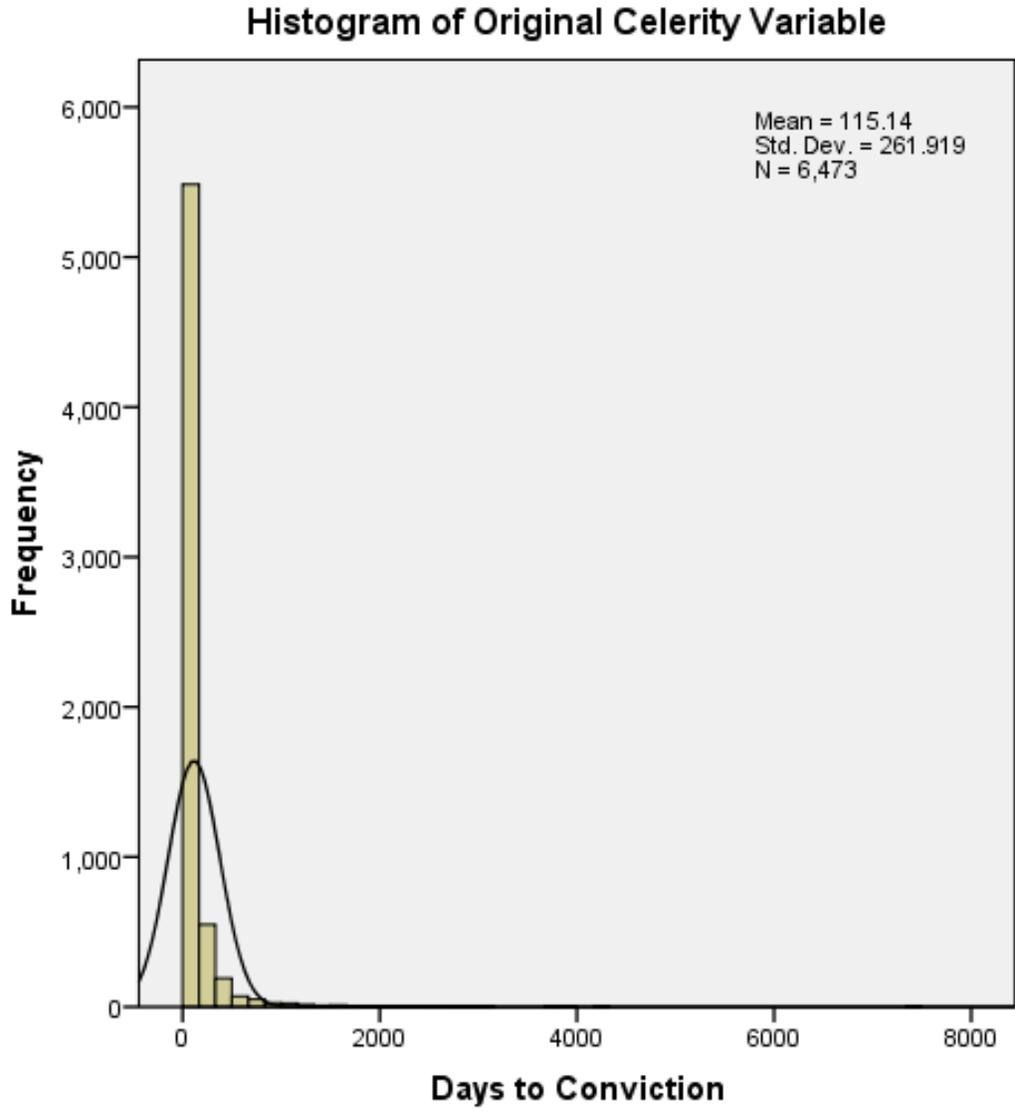
Conclusion

More than 1 million people were arrested for driving under the influence of alcohol or drugs in 2011 (FBI, 2012), and past studies have estimated that approximately one-third of those offenders have at least one prior DUI conviction (NHTSA, 2004). Given these statistics, it is not surprising that DUI behaviors, including recidivism have long been prominent areas of research. However, as demonstrated by the current dissertation, gaps remain in the literature, especially when considering how treatment compliance relates to DUI recidivism.
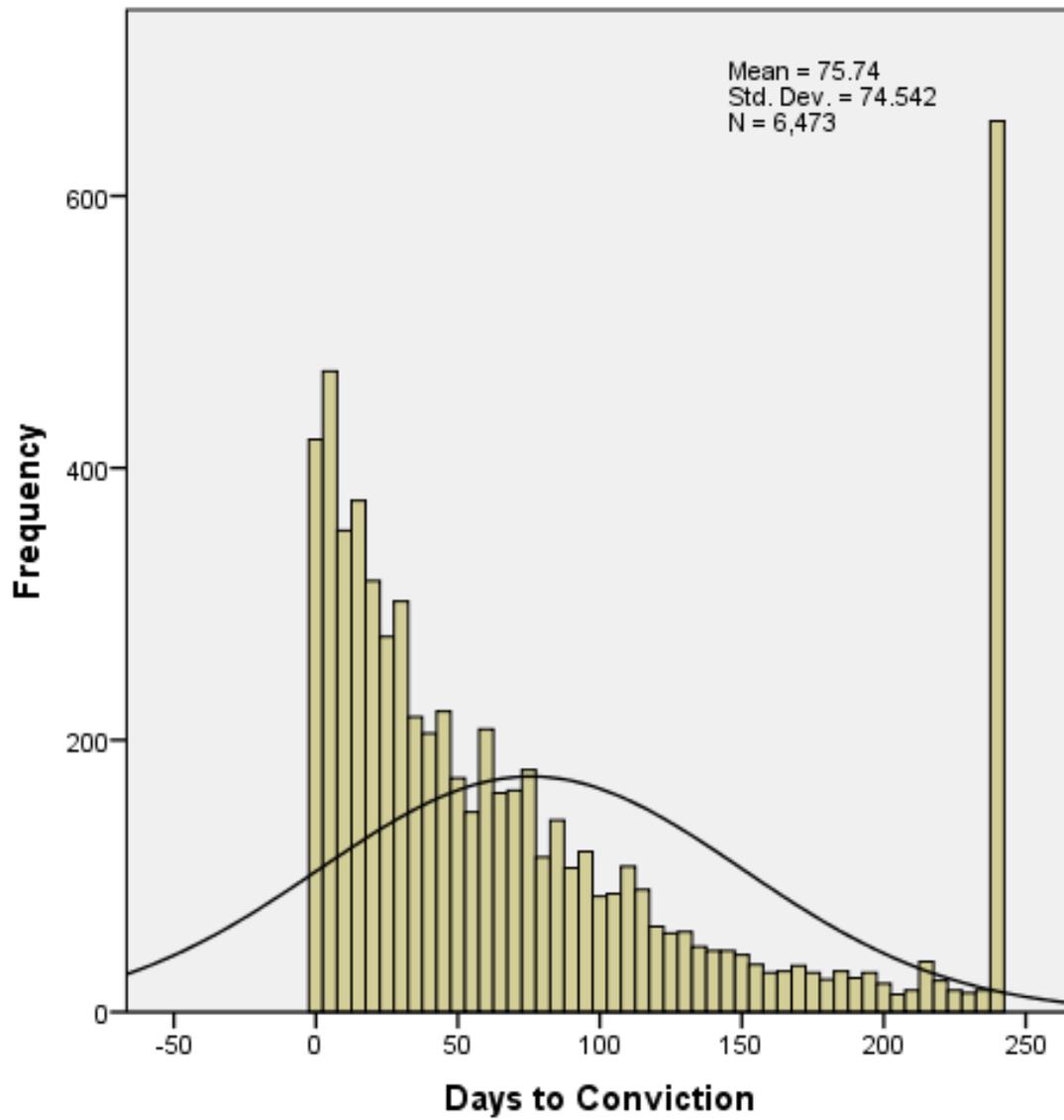
Building upon existing research, this dissertation specifically used a deterrence theory framework to examine how compliance and other social and environmental variables affected the deterrence of future DUI offenses among a statewide sample of first-time DUI offenders. Although a majority of the hypotheses were unconfirmed, results pointed to the limited rationality of DUI offenders due to contextual factors such as substance use and location, further highlighting the problem with using deterrence theory as a foundation for policies designed to prevent and reduce future DUI offenses.

In conclusion, rather than relying on swift convictions, severe punishments, and more traditional methods for deterring DUI offenders, the criminal justice system and treatment providers should focus on 1) properly assessing DUI offenders to identify the risk-factors associated with DUI recidivism, 2) tailoring treatment efforts to address underlying causes of potential recidivism, and 3) taking strides to retain DUI offenders in treatment, including making treatment more accessible to all types of offenders.

Appendix

Histogram of Original Celerity Variable

Mean = 115.14
Std. Dev. = 261.919
N = 6,473

Frequency

Days to Conviction

Histogram of Recoded Celerity Variable

Mean = 75.74
Std. Dev. = 74.542
N = 6,473

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Curriculum Vitae

EDUCATION:

Master of Arts, Sociology (4.0 GPA), University of Kentucky, 2009
    Concentrations: Crime, Law, & Deviance and Media
    Thesis: Racism in Black & White: Newspaper Portrayals of Crime and Societal Implications
    Committee: Drs. Joanna Badagliacca (chair), Ana Liberato, and Tanja Link

Bachelor of Arts, Sociology & Broadcast Communications (double major; Summa Cum Laude), Western Kentucky University, 2007
    Concentrations: Criminology and Radio & Television Operations

TEACHING EXPERIENCE:

January 2012 to May 2013 – Adjunct Instructor
    Saint Catharine College, Department of Social Services
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August 2011 to May 2012 – Instructor
    University of Kentucky Department of Sociology
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August 2007 to May 2009 – Teaching Assistant
    University of Kentucky Department of Sociology
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RESEARCH EXPERIENCE:

June 2009 to Present -   Data Coordinator Senior/Interviewer
    University of Kentucky Center on Drug and Alcohol Research, College of Medicine
    Lexington, Kentucky

Projects:
- *Criminal Justice - Drug Abuse Treatment Studies (CJ-DATS), Phase II*: Principal Investigator, Carl Leukefeld, D.S.W. Funded by the National Institute on Drug Abuse.

- *Drugged Driving in Alcohol-Restricted Rural Appalachia:* Principal Investigator, J. Matthew Webster, Ph.D. Funded by the National Institute on Alcohol Abuse and Alcoholism (Grant # R03AA015964).

- *Kentucky Needs Assessment Project:* Principal Investigator, J. Matthew Webster, Ph.D. Funded by the Kentucky Division of Behavioral Health.

- *Kentucky DUI Project:* Principal Investigator, J. Matthew Webster, Ph.D. Funded by the Kentucky Division of Behavioral Health.

- *A Web-based Employment Intervention for Drug Court Participants:* Principal Investigator, J. Matthew Webster, Ph.D. Funded by the National Institute on Drug Abuse (Grant # R21DA021178).

May 2008 to May 2009 -   Graduate Research Assistant
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Projects:
- *Drugged Driving in Alcohol-Restricted Rural Appalachia:* Principal Investigator, J. Matthew Webster, Ph.D. Funded by the National Institute on Alcohol Abuse and Alcoholism (Grant # R03AA015964).

- *Kentucky DUI Project:* Principal Investigator, J. Matthew Webster, Ph.D. Funded by the Kentucky Division of Behavioral Health.

- *Kentucky Needs Assessment Project:* Principal Investigator, J. Matthew Webster, Ph.D. Funded by the Kentucky Division of Behavioral Health.

PEER REVIEWED PUBLICATIONS:

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MANUSCRIPTS IN PROGRESS:

Dickson, Megan F. "Race & crime in the news: An examination of the portrayal of racial minorities in offender roles in crime-related newspaper articles."

Webster, J. Matthew, Megan F. Dickson, Michele Staton-Tindall, and Carl G. Leukefeld. "Predicting recidivism among rural and urban drug users."

Webster, J. Matthew, Megan F. Dickson, Michele Staton-Tindall, and Carl. G. Leukefeld. "Prevalence of drug use, drugged driving, and criminal activity among DUI offenders in rural Appalachia."

TECHNICAL REPORTS:

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PRESENTATIONS:

Dickson, Megan F. and J. Matthew Webster. 2013. "Conviction Celerity and Rehabilitation Compliance as Predictors of DUI Recidivism: A Mediation Model of Deterrence." Poster presented at the 8th annual Center for Clinical and Translational Science Spring Conference, Lexington, Kentucky.

Dickson, Megan F., J. Matthew Webster, Michele Staton-Tindall, and Carl Leukefeld. 2012. "The Relationship between Social Support, Employment, Health, and Behaviors of Drug Court Clients." Poster presented at the 7th annual Center for Clinical and Translational Science Spring Conference, Lexington, Kentucky.

Dickson, Megan F., Nesa E. Wasarhaley, and J. Matthew Webster. 2011. "A comparison of single and repeat DUI offenders in a rural setting." Paper presented at the 61st annual meeting for The Society for the Study of Social Problems, Las Vegas, Nevada.

Webster, J. Matthew, Megan F. Dickson, Nesa E. Wasarhaley, Paula K. Elliston, and Michele Staton-Tindall. 2011. "Work histories and employment needs of drug court clients." Poster presented at the 73rd annual meeting of the College on Problems of Drug Dependence, Hollywood, Florida.

Dickson, Megan F., Nesa E. Wasarhaley, Michele Staton-Tindall, and J. Matthew Webster. 2011. "A comparison of Appalachians arrested for alcohol-impaired versus drug-impaired driving." Poster presented at the 6th annual Center for Clinical and Translational Science Spring Conference, Lexington, Kentucky.

Dickson, Megan F., Nesa E. Wasarhaley, and J. Matthew Webster. 2010. "Problem recognition and readiness to change among DUI offenders in rural Appalachian Kentucky." Poster presented at the Addiction Health Services Research Conference, Lexington, Kentucky.

Wasarhaley, Nesa E., Megan F. Dickson, and J. Matthew Webster. 2010. "Substance-related perceptions and behaviors of DUI offenders with and without additional drug charges." Poster presented at the Addiction Health Services Research Conference, Lexington, Kentucky.

Webster, J. Matthew, Nesa E. Wasarhaley, Megan F. Dickson, and Jamieson L. Duvall. 2010. "Differences between drug-impaired drivers and alcohol-impaired drivers in a statewide DUI offender population." Poster presented at the Addiction Health Services Research Conference, Lexington, Kentucky.

Webster, J. Matthew, Megan F. Dickson, Nesa E. Wasarhaley, and Michele Staton-Tindall. 2010. "Lifetime and past year prevalence of drug use and drugged driving among rural Appalachian DUI offenders." Poster presented at the 72nd Annual Meeting of the College on Problems in Drug Dependence, Scottsdale, Arizona.

Dickson, Megan F. and J. Matthew Webster. 2010. "The Kentucky Needs Assessment Project: A collaborative research study." Poster presented at the 4th Annual University of Kentucky Graduate Student Interdisciplinary Conference, Lexington, KY.

Dickson, Megan F., Nesa E. Wasarhaley, and J. Matthew Webster. 2010. "Family history of substance and mental health problems among rural Appalachian DUI offenders." Poster presented at the 5th Annual Center for Clinical and Translational Science Spring Conference, Lexington, Kentucky.

Wasarhaley, Nesa E., Megan F. Dickson, and J. Matthew Webster. 2010. "A geographical comparison of DUI-related crashes in Kentucky." Poster presented at the 5th Annual Center for Clinical and Translational Science Spring Conference, Lexington, Kentucky.

Dickson, Megan F. 2009. "Race in the Newspaper: Effects and Criminological Implications." Poster presented at the American Society of Criminology Conference in Philadelphia, Pennsylvania.

Webster, J. Matthew, Aleigha C. Colwell, Steven B. Cook, Megan F. Dickson, and Jamieson L. Duvall. 2009. "A Statewide Web-Based DUI Substance Abuse Assessment System." Poster presented at the Addiction Health Services Research Conference in San Francisco, California.

Dickson, Megan F. 2009. "Race in Print: The Effects of Bias in the Media." Paper presented at the International Crime, Media & Popular Culture Studies Conference in Terre Haute, Indiana.

Webster, J. Matthew, Michele Staton-Tindall, Megan F. Dickson, Nesa E. Wasarhaley, Carl G. Leukefeld, and John F. Wilson. 2009. "Gender Differences in Employment and Employment Barriers among Drug Abusers." Poster presented at the College on Problems of Drug Dependence in Sparks, Nevada.

Dickson, Megan F. 2009. "Racism in Black & White: Newspaper Portrayals of Crime and Societal Implications." Poster presented at the Southern Sociological Society Conference in New Orleans, Louisiana.

Webster, J. Matthew, Megan F. Dickson, David B. Clark, and Thomas F. Garrity. 2008. "Trends in Adolescent Substance Use, Abuse, Dependence, and Treatment Need between 1998 and 2005 in Kentucky." Poster presented at the College on Problems of Drug Dependence in San Juan, Puerto Rico.

AWARDS AND HONORS:

- Spring 2013 – The Wilkinson Award for Outstanding Paper in Work, Medical, and Social Inequalities, University of Kentucky Department of Sociology.

- Summer 2011 – Student Travel Support Award, University of Kentucky Graduate School.

- Summer 2011 – Lee Student Support Travel Award, Society for the Study of Social Problems.

- Fall 2010 – Junior Investigator Travel Award, Addiction Health Services Research Conference. Award funded by the National Institute of Alcohol Abuse and Alcoholism.

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- Fall 2009 – Student Travel Support Award, University of Kentucky Graduate School.

- Spring 2009 –Outstanding Teaching Assistant Nominee, University of Kentucky College of Arts & Sciences.

- Summer 2008 – Howard Beers Summer Fellowship, University of Kentucky Department of Sociology.

- Spring 2007 – Outstanding Undergraduate in Radio and Television Operations, Western Kentucky University School of Journalism & Broadcasting.

- Spring 2007 – Outstanding Undergraduate Alpha Kappa Delta Member, Western Kentucky University Department of Sociology.

PROFESSIONAL SERVICE:

2009 to 2011 – Member of Sociology Graduate Student Organization (SocGSO) Events Committee.

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