# Crime in Late Life

by

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ABSTRACT

Most criminological theories are tested using samples of adolescents. Consequently, there is ample evidence regarding the correlates of criminal behavior committed by teenagers. The problem, however, is that there is relatively little information regarding the correlates of criminal offending committed during late life. This limits the ability to assess the generalizability of some of the leading theories in criminology. To fill this void in the literature the present study used a sample of 2,000 elderly people (i.e., 60 years of age and older) from Arizona and Florida to examine three issues: (1) the role of general and specific routine activity measures in the explanation of criminal activity in late life, (2) the invariance of low self-control across various subgroups of the elderly sample, and (3) the generality of self-control theory and routine activity theory. The analyses revealed several important findings. First, general routine activity measures are better predictors of general criminal offending than specific indicators. However, specific routine activity measures still matter in the explanation of specific types of crimes. Another important finding of this study was that low self-control has an invariant effect on criminal offending across gender, race/ethnicity, and age. Finally, self-control theory and routine activity theory are general frameworks that explain criminal behavior committed by older people in much the same manner as among teenagers. Routine activity does not mediate the link between low self-control and offending. Rather, both low self-control and routine activity

exert independent effects on late life criminal activity, net of statistical controls. The present study concludes with a discussion of the findings situated in the literature and provides policy implications that stem from the results.

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# CHAPTER 1

# INTRODUCTION

## INTRODUCTION

Social science research has established the importance of age in explaining criminal behavior. Beginning with Hirschi and Gottfredson's (1983) seminal article, the distribution of crime over the life course (i.e., the age-crime curve) is such that the frequency of offending increases in the teenage years, peaks in the mid- to late-teens, decreases steadily through the 20s and 30s, and becomes relatively uncommon later in life. Indeed, the age-crime curve has been described as "one of the brute facts of criminology" and is largely considered a criminological law (Hirschi & Gottfredson, 1983, p. 552).

Growth of life course, developmental, and criminal career research over the past several decades has been motivated by the desire to better understand the age-crime relationship (see Piquero, Farrington, & Blumstein, 2003 for a review). Many of these perspectives emphasize the importance of early life experiences in explaining adult criminal behavior. For example, Moffitt's (1993) dual-taxonomy theory highlights two developmental trajectories of offending frequency—adolescence-limited and life-course persistent—youths may take. Other theories suggest that the causes of offending vary across age groups and change over the life course. Sampson and Laub's (1993) age-graded informal social control theory offers insight into the various turning points that people may experience as their lives unfold which steer them away from crime (e.g., steady employment,

supportive marriage, and military service). Regardless of whether they focus on early or later life experiences, developmental and life course theories provide explanations for how different social processes during the life-course affect offending.

The age-crime curve has also influenced researchers to focus disproportionately on specific age groups. After all, the lion's share of crime is committed by younger individuals. Many theories of crime causation stress the importance of the teenage years, often ignoring later stages in which offending is less common (see, e.g., Gottfredson & Hirschi, 1990; Hirschi, 1969; Moffitt, 1993; Sutherland, 1939). In his address to the American Society of Criminology (ASC), Cullen (2011) argued that professional reward structures (e.g., tenure and promotion) in the field of criminology are built upon adherence to the field's dominant paradigm—what he refers to as "adolescence-limited criminology." Consequently, researchers have restricted their attention to theory testing among teenagers for the better part of 40 years. Even research guided by age-graded theories frequently uses age-truncated samples consisting of only younger people. This orientation has led to the casual dismissal of criminal offending in late life as a research topic. As Cullen (2011) warned, however, a great deal of harm can result if knowledge is created by only studying crime among one age group. It is important to understand what influences criminal offending *before* and *after* adolescence.

The problem with limiting the scope of offending research to a few age groups is that the generality of theories of crime causation cannot be fully

assessed. General theories are touted by their supporters as frameworks that explain all types of crime, across time and cultural context, and across the life course. In other words, general theories are constructed to account for variation in individuals' offending behavior regardless of demographic characteristic (e.g., age, gender, race, or ethnicity), regional (e.g., part of the country or world a person lives), or time period (e.g., the birth cohort an individual was born) differences. To empirically assess the generality of a theory, it must be tested using a wide range of population segments.

The generality of most theories of crime causation has not been tested among people in the later stages of the life course. The present study will begin to fill this void by assessing influential theories of crime using an atypical sample. Specifically, this project will examine the ability of self-control theory (Gottfredson & Hirschi, 1990) and routine activity theory (Cohen & Felson, 1979; Felson & Boba, 2010) to explain offending among a sample of elderly respondents (i.e., people 60 years of age and older). While these are two of the most widely tested theories of offending, the question remains whether criminal propensities (i.e., low self-control) or crime opportunities resulting from legal routines account for seniors' involvement in crime in a manner similar to adolescents. Self-control theory and routine activity theory are a good starting point for the assessment of theoretical generality in the late life course.

## CRIMINAL ACTIVITY AMONG THE ELDERLY

To understand crime among the elderly, it is important to first define what is meant by the term "elderly." The age at which research participants are deemed elderly has important implications for research design (Steffensmeier, 1987). While consensus on the definition has remained elusive (see Newman, Newman, & Gewirtz, 1984), the Administration on Aging (AOA) (2010) defines the "older population" as persons 65 years and older. Rarely do researchers use less than 55 years of age to define an elderly person. Most studies, in fact, use 60 as the age at which people have entered the elderly years of life (e.g., Akers, La Greca, Cochran, & Sellers, 1989; Alves & Wilson, 2008). Consistent with a large body of prior research, the present study will use the terms "elderly," "aged," "older," and "seniors" interchangeably to refer to people 60 years of age and older.

Crime-oriented research on the aged disproportionately focuses on victimization. Overrepresentation of these studies (compared to elderly offending) in criminology is likely due to the perception that seniors are vulnerable and require protection more so than young people. While the study of elderly victimization is important for theoretical and policy reasons, a small body of research has assessed seniors as offenders.

*Incidence of elderly crime*. Research in the 1980s concluded that crime committed by the elderly was not pervasive (Newman et al., 1984; McCarthy & Langworthy, 1988). Scholars noted, however, that the elderly population in the United States (U.S.) was growing and crime among this age group may become more common in the future. Feldmeyer and Steffensmeier (2007) analyzed UCR

data from 1980 to 2004 and found that while there is certainly no cause for alarm regarding a gray crime wave, offenses committed by senior citizens are salient enough to merit continued research attention (see also Steffensmeier, 1987). In particular, the extant literature is based on arrest statistics which may hide important information about elderly crime. Self-report data provides information on crimes that go undetected by law enforcement officials. The dark figure of elderly crime may be large relative to other age groups because the police are not targeting low-risk, elderly populations. Also, because scholars have a limited grasp on crime committed by the aged, researchers may blindly accept the notion that offending is nearly nonexistent in later life. Simply because offending tends to decrease as people age does not mean every individual desists from crime.

*Nature of elderly crime*. Despite relatively low incidence rates, the elderly commit crime. Research suggests a degree of offending specialization among seniors. Older people tend to engage in (or are arrested for) certain types of offenses such as shoplifting and drunk driving (Feinberg, 1984; Feldmeyer & Steffensmeier 2007; Meyers, 1984; Steffensmeier, 1987). Disaggregating arrest rates by gender reveals that nearly all elderly male arrests are for alcohol related crimes (e.g., drunk driving) and senior females are arrested for larceny (i.e., shoplifting). What is more, while significantly less frequent than youth violence, a non-trivial amount of index crimes (about three percent) are committed by seniors (Feldmeyer & Steffensmeier, 2007). In short, crime is not solely a product of young people.

The available research on the nature of elderly offending offers an incomplete picture of the phenomenon. For example, knowledge of elderly crime is based on a limited amount of information contained in a few edited volumes and a splattering of scholarly journal articles. A number of theoretical and empirical questions regarding offending in late life remain unanswered. For example, without empirical tests of established theories using senior samples it remains unknown whether the correlates of criminal activity in late life are fundamentally different from those during adolescence.

## Why Study Elderly Crime?

There are three important justifications for studying elderly crime. First, addressing offending among older individuals fills a research gap concerning the causes of criminal behavior during the late part of the life-course. Second, empirical data on elderly offending offers insight on the distribution of elderly offending across crime types. Finally, the empirical evidence will provide information to inform policies geared toward reducing crime in later life. Each of these topics will be discussed in turn.

*Theoretical justification*. The bulk of knowledge on the causes of crime is based on the results from studies of younger individuals. In fact, research on criminal activity by people in late life is quite limited and varies in method and scope. For example, Laub and Sampson (2003) interviewed previously institutionalized elderly men to assess the impact of turning points (e.g., marriage and military experience) on the desistance process. Testing of criminological

theory to explain ongoing offending among seniors was not of interest to them. In fact, Akers and colleagues (1989) are among the only researchers to investigate deviance using a sample of elderly people. Their research showed that peoples' definitions and differential reinforcement with respect to alcohol use influence the amount of drinking they engage in. Clearly, more research is needed. Given the limits of existing research, it is clear that theory testing using samples of participants in late life is necessary.

Some consider theory testing using elderly samples a waste of time given the relatively low prevalence of criminal activity among this group. Who cares whether theories explain offending among a group of individuals that rarely offend? This apathy is effectively neutralized by two arguments. First, crime does not cease completely for all older people. In fact, some researchers have suggested that impulsive individuals will continue to be involved in criminal activity well into old age even if the maturation process slows the relative frequency of offending (Feldmeyer & Steffensmeier, 1987; Gottfredson & Hirschi, 1990). Research guided by Moffitt's (1993) dual-taxonomy theory supports a similar argument by demonstrating that a select group of people—life-course persisters—begin antisocial behavior at an early age and continue to offend at a relatively stable rate throughout life (see also Wolfgang, Figlio, & Sellin, 1972). Thus, while offending in old age may be less common than during adolescence, variation in elderly offending exists. Second, it remains an empirical question whether existing theories of crime causation can explain offending among older people. Lifestyle adaptations associated with older age may explain

lower offending frequencies due to decreased opportunities for crime and the elderly may vary on a number of different criminogenic risk factors (e.g., criminal propensity) (Feldmeyer & Steffensmeier, 2007). As with all empirical questions, the matter of whether theories generalize to older samples can only be resolved by systematic investigation.

Self-control theory and routine activity theory are general theories of crime. Self-control theory posits that an individual's level of self-control remains relatively stable throughout life and explains offending regardless of age (Gottfredson & Hirschi, 1990). Similarly, routine activity theory holds that daily activities (e.g., participation in activities away from home) account for offending independent of age by bringing together motivated offenders, suitable targets, and ineffective guardianship in time and space (Cohen & Felson, 1979; Felson & Boba, 2010). Neither theory has been tested using samples of older individuals. The present study will do so.

Self-control and routine activity are also compatible theories. People with low self-control generate opportunities for crime by living risky and unstructured lives. Therefore, low self-control should independently explain offending and account for variations in daily routines. Exploring the connection between low self-control and opportunity among the elderly will provide insight on the mechanisms of offending during old age. With the theoretical importance of studying crime during late life in mind, empirical justifications for the endeavor are presented next.

*Empirical justification*. Senior citizens are a large segment of the country's population and growing. The AOA (2010) estimates that there were 40 million people 65 years or older in the United States in 2009, comprising 13 percent of the total population. By 2030 the AOA estimates that this number will grow to over 70 million (about 19 percent of the total population). Overall, the growing elderly population will likely have a downward influence on crime rates (because they offend less as a group). At the same time, to the extent that elderly offenders are specialists, increases in certain types of crimes may be observed (e.g., increases in shoplifting and driving under the influence [DUI]).

One reason the number of seniors is increasing is that people are living longer. The average life expectancy in the United States is about 79 years, compared to 74 years in 1981 (World Bank, 2011). Longer and healthier lives combined with the fact that many people have retired from work by age 65 may change older Americans' daily lives in significant ways. For example, contemporary seniors may have more opportunity to participate in leisure activities. Changes in elderly activities may influence opportunity structures available for criminal activity. To date, however, little is known about elderly routines, criminal opportunities, and offending.

Another empirical justification concerns the fact that most of our knowledge of elderly crime is based on arrest statistics (e.g., the Uniform Crime Reports), which offers only a glimpse into the scope of the phenomenon. A dark figure of crime is present for most offenses committed by the general population because a great deal of criminal behavior goes undetected by law enforcement.

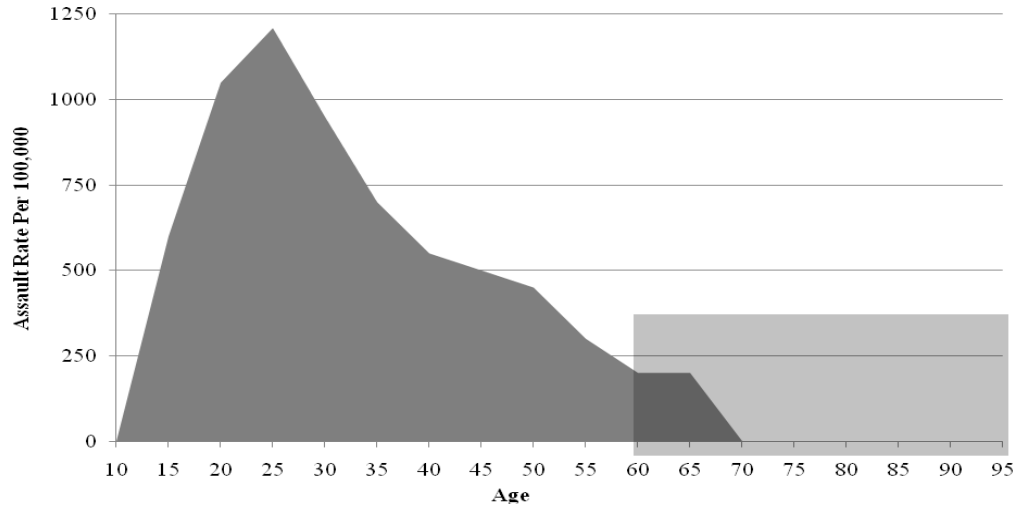
The dark figure of elderly crime may be even more pronounced considering that self-report data from elderly samples large enough to conduct multivariate analyses are virtually nonexistent. Self-report data will show the types of offenses seniors tend to engage in, the types of crimes they are not caught for, and emerging types of elderly offenses (e.g., prescription drug abuse and DUI).

Figure 1 displays an age-crime curve for assault rates per 100,000 people. The figure reveals that assault frequency peaks in the late teenage years, declines with age, and becomes a relatively rare behavior among seniors. This trend is mirrored in several other offense categories, such as drug-crime, DUI, larceny, and fraud (see Appendix A). The uneven distribution of crime across age groups has resulted in researchers dedicating their attention to the meaty part of the curve (i.e., the teen years). Doing so has resulted in a firm understanding of the correlates of crime committed by adolescents.

The shaded portion of the figure draws attention to the later stage of the life course that has been neglected by social scientists. As noted, this stage of life includes almost one-fifth of the U.S. population, but there is virtually no understanding of criminal behavior among this group of people. Notice the right end of the distribution is truncated. The oldest group for which the data are collected by the FBI is for people 65 years and older. Official data tell us little (if anything) about how offending tapers off as the life course ends. People 65 years of age and older offend, but official data are unable to determine the extent of criminal involvement for people in this group because all individuals older than

Figure 1

*Age-Crime Curve for Assault Rate*




*Note*. The shaded region highlights the later stages of the life course that are neglected in most criminological research. Adapted from the Federal Bureau of Investigations Uniform Crime Reports 2010.

65 are grouped together. Thus, the low incidence of criminal offending in the later years of life may be partly a methodological artifact hidden by this truncation. With the theoretical and empirical justifications for studying elderly crime established, the next section discusses the policy implications that may flow from research on the topic.

*Policy justification*. Understanding why the elderly break the law is important for the formulation of evidence-based policy. Examining why the elderly engage in particular crimes, what personal characteristics make senior offending more or less likely, and what daily activities place the aged at increased risk to commit crime will provide necessary information to design and implement policies to curb elderly offending. For example, conventional wisdom in the area

of loss prevention holds that retail theft is overwhelmingly committed by teenagers after three o'clock in the afternoon when this age group is released from school. Anti-shoplifting strategies, however, may be improved by taking into consideration that older people shoplift at a relatively high rate, are in stores at different times than teens, and value different products than adolescents. Strategies to reduce store-wide theft may include placing surveillance (both human and electronic) in stores during peak shopping times for older citizens (as opposed to targeting *only* teens) and monitoring loss of particular products that appeal to the elderly more so than youth (e.g., disposable batteries).

Additionally, arrest statistics suggest that the police have historically been lenient on elderly DUI and increasing rates of the behavior may be indicative of a trend toward stricter enforcement of DUI laws for people in this age group (Feldmeyer & Steffensmeier, 2007). Law enforcement should ensure they are enforcing DUI statutes for individuals regardless of age, especially considering the increased frequency of elderly activities away from home that often require a vehicle. Leniency on drunk driving for the innocent looking grandfather may backfire and give other seniors the impression that such behavior is not taken seriously by the police.

As is evident, neglecting the study of crime in the later stages of the life course contributes to considerable theoretical, empirical, and policy-oriented gaps in social science research. The current study aims to examine some of these issues.

## ORGANIZATION OF DISSERTATION

The remainder of this dissertation will be divided into several chapters. Chapter Two describes the key propositions of self-control theory and routine activity theory and reviews the research literature. The chapter will also carve out a series of research questions. Chapter Three describes the research design, data, and variables used in this study. Chapter Four presents the results of the analyses in three parts. The first section pits two different operational forms of opportunity against each other to determine whether general or specific opportunities are better predictors of late life offending. The second part of the chapter presents tests of the self-control invariance thesis by splitting the sample into various subgroups. The final section examines the simultaneous role of self-control theory and routine activity theory in explaining criminal offending among older people. Finally, Chapter Five situates the results within the self-control and routine activity literatures and considers the policy implications of the findings.

# CHAPTER 2

# LITERATURE REVIEW

## INTRODUCTION

Gottfredson and Hirschi's (1990) self-control theory has been one of the most influential individual-level explanations of criminal behavior for more than 20 years. A lengthy roster of research studies has tested the core propositions of the theory, gaining many supporters along the way. At the same time, however, the broad scope of the theory and ability of low self-control to account for all individuals' criminal activity has been the center of controversy. One of the most persistent criticisms of the theory is that the authors neglected to sufficiently discuss the role of opportunity in the connection between low self-control and offending. In recent years, scholars have considered the role of daily routines (e.g., how frequently people participate in social activities away from home) that differentially expose people to opportunities for criminal behavior. The empirical evidence suggests that self-control theory and routine activity theory are quite compatible and help explain individual predispositions to offending and opportunities for crime. The extent to which such findings generalize to all age groups, especially for individuals in the later stages of life, remains open to empirical scrutiny.

This chapter is divided into several sections that discuss the self-control and routine activity literature. The first section examines the key propositions of self-control theory and reviews the empirical evidence. Next, several

controversies surrounding the theory are discussed including the sources, stability, measurement, and invariance of self-control. The role of opportunity in self-control theory is discussed in a later section. Specifically, the chapter outlines how opportunity has been conceptualized in the literature with special attention devoted to the routine activity framework. The key propositions and research findings related to routine activity theory are covered with a focus on studies that have explored the nature of the relationship between low self-control, routine activities, and criminal behavior. The final section of the chapter outlines a series of general research questions that the current study addresses.

## SELF-CONTROL THEORY

Gottfredson and Hirschi (1990) argued that the problem with most explanations of crime is that theorists often fail to comprehend exactly what it is that they are trying to explain—crime. Rather than putting the cart before the horse, Gottfredson and Hirschi began their examination of the causes of offending by exploring the essential nature of crime. Therefore, to fully understand self-control theory one must first examine the authors' conceptualization of crime.

### Defining Crime

Gottfredson and Hirschi (1990) rejected the idea of defining crime simply as a violation of criminal statute (i.e., a legalistic definition) because such a definition is a social construction. According to the authors, all crimes share common characteristics. All crimes offer immediate gratification and few or

meager long-term benefits, are easy or simple and require little skill or planning to accomplish, are exciting, risky, or thrilling, and often result in pain or discomfort for the victim (Gottfredson & Hirschi, 1990). As such, the authors defined crimes as "acts of force or fraud undertaken in pursuit of self-interest" (Gottfredson & Hirschi, 1990, p. 15). This definition freed the authors from the social conceptualization of criminal activity and allowed crime to be operationalized in a manner consistent with the essential characteristics of the behavior.

Criticisms of Gottfredson and Hirschi's (1990) definition of crime abound. Most prominent in the debate is that the characteristics of crime too closely resemble those of low self-control. Critics argue that self-control theory is tautological because low self-control, characterized by impulsivity, risk-seeking behavior, and apathy, is proposed to explain crime, which is characterized by the same qualities (Tittle, 1991). The cynic contends that self-control theory is nothing more than a statement that crime causes crime. Other critics argue that a legalistic definition of crime is more appropriate for use in crime and justice research. From this argument, criminologists are seen as being concerned with explaining crime and, therefore, should focus on what the government defines as a criminal offense.

While criticisms of Gottfredson and Hirschi's (1990) conceptualization of crime are theoretically and practically important, this study will adopt the theorists' definition of crime for several reasons. Most importantly, to conduct a test of self-control theory in good faith one should adhere to the conceptual definitions originally advanced by the authors. The theory's propositions cannot

be falsified or verified without using the conceptualization of the outcome the theory is intended to explain. Also, the tautological argument does not hold water if the researcher testing self-control theory avoids using tautological measures of low self-control. A problem only arises when low self-control is operationalized with behavioral measures that could by themselves be considered crime (e.g., drunk driving, speeding, failing to wear a seatbelt, or failing to pay taxes). As clarified later, both attitudinal and behavioral self-control measures can be used to test the theory without falling victim to the tautological critique. Lastly, this study rejects the legalistic definition of crime because it unnecessarily limits the theory's scope. As discussed below, low self-control explains a host of deviant behaviors other than crime and to adopt the legalistic definition would falsely restrict the generality of the theory. At this point, a review of the key concept of Gottfredson and Hirschi's theory—low self-control—is necessary.

## Low Self-Control

Gottfredson and Hirschi (1990) posit that the cause of crime is low self-control. As a personal characteristic, self-control exists on a continuum and determines the extent to which individuals will succumb to the temptations of criminal opportunities. Individuals with poor self-control are apathetic, shortsighted, and nonverbal, prefer to engage in physical (as opposed to mental) and risky activities, and behave impulsively. Likewise, criminal behavior is fun, easy, and immediately gratifying and people naturally pursue such pleasurable activities unless constrained by an ample level of self-control. Therefore, those

people who are most likely to commit crime are those with lower levels of self-control because they recklessly engage in behavior that offers immediate gratification, they are insensitive to the harm that crime may cause, they enjoy the physical requirements of most crimes, they enjoy the danger and risk posed by criminal endeavors, and they are unable to realize the potential long-term consequences of their actions.[1]

Gottfredson and Hirschi (1990, p. 117) made bold claims about the generality of their theory by arguing that low self-control explains "all crime, at all times." This argument, which is often referred to as the "invariance" thesis, suggests that low self-control should predict all types of criminal activity for every type of person regardless of personal, background, or situational differences. Put differently, self-control theory is the general theory of crime.

Low self-control is also said to account for or explain the effect of most known correlates of crime. The connection between peers and delinquency, for example, is said to simply be the result of individuals with low self-control self-selecting peers with similar personal attributes. The fact that males engage in more crime than females is explained by differences in self-control (i.e., men tend to have lower levels). Gottfredson and Hirschi argued that the higher incidence of crime among racial and ethnic minorities should be explained by differential child-rearing practices (presumably leading to lower levels of self-control).

[1]While low self-control is the topic of focus for many examinations of Gottfredson and Hirschi's theory, they actually specified two necessary conditions for a criminal act to occur. First, an opportunity for a crime must be present (e.g., a car must be available to be broken into or a person must be present to be robbed). Second, there must be an offender that is "insufficiently restrained" (i.e., has low self-control) (Gottfredson & Hirschi, 1990, p. 22). The concept of opportunity in low self-control theory has been the topic of debate and it will be addressed later in this chapter.

Accordingly, self-control theory renders all other theories useless. The scope of Gottfredson and Hirschi's (1990) theory is summarized nicely in the following passage:

> The fact that crime is by all odds the major predictor of crime is central to our theory. It tells us that criminality (low self-control) is a unitary phenomenon that absorbs its causes such that it becomes, for all intents and purposes, *the* individual-level cause of crime. As a corollary, it tells us that the search for personality correlates of crime other than self-control is unlikely to bear fruit, that short-term institutional experiences (e.g., treatment programs, jobs, jail) are incapable of producing meaningful change in criminality. And, of course, it tells us that theories based on contrary assumptions are wrong (p. 232, emphasis in original).

At this point two issues are clear. First, self-control is a general theory that purportedly explains *all* offending. Second, the theory is said to explain crime among *all* groups of individuals. Such provocative assertions have attracted considerable research attention.

## Empirical Evidence

*Crime.* Gottfredson and Hirschi (1990) bill their theory as an explanation for why people *do not* commit crime, but most criminologists view it simply as a theory of individual offending (see Akers, 1991). Accordingly, most studies that have tested the theory specify the key independent variable as "low self-control" and the dependent variable as some form of criminal or deviant behavior. A meta-analysis of 21 studies conducted 10 years after the publication of the theory revealed that the effect size of low self-control on offending consistently exceeded .20, ranking it as "one of the strongest known correlates of crime" (Pratt & Cullen, 2000, p. 952). The analysis also showed that important correlates of

crime, such as variables from social learning theory, often persist as significant predictors of offending even after the inclusion of low self-control. Therefore, whether the theory explains the effects of all other correlates of crime has been called into question. Nevertheless, strong empirical support brought increased research attention to self-control theory throughout the past decade.

Overall, the research finds that low self-control is associated with involvement in a wide variety of crimes. For example, people with lower levels of self-control are more likely to commit violent (Felson & Osgood, 2009; Piquero, MacDonald, Dobrin, Daigle, & Cullen, 2005; Sellers, 1999), property (Longshore, 1998; Longshore & Turner, 1998), and drug-related crimes (Goode, 2009b; Ribeaud & Eisner, 2006). They are also more likely to illegally download software (Wolfe & Higgins, 2009) and drive while intoxicated (Keane, Maxim, & Teevan, 1993).

Scholars continue to debate whether low self-control is related to white-collar crime (Benson & Moore, 1992; Reed & Yeager, 1996). Gottfredson and Hirschi (1990) are firm in their belief that white-collar crimes are not fundamentally different from street crime and low self-control should predict such offenses in the same manner. The problem is that a person needs to delay gratification by obtaining an education to achieve a high-level occupation that would afford opportunities for white-collar offenses. Further, white-collar offenses require mental as opposed to physical tasks. These attributes are antithetical to Gottfredson and Hirschi's conceptualization of crime and low self-control. In fact, research has shown that among business managers and trainees

individual levels of self-control are unrelated to intentions to engage in corporate crime (Simpson & Piquero, 2002). While behavioral intentions are not actual behavior, research suggests that intentions significantly predict future actions (Ajzen, 1991). A more important criticism of Gottfredson and Hirschi's treatment of white-collar offending is their definition of this type of crime as acts of forgery, fraud, and embezzlement. Reed and Yeager (1996) correctly point out that this definition comes from the UCR and, therefore, is not necessarily representative of white-collar crime.

Aside from white-collar offenses, much of the research literature provides evidence consistent with Gottfredson and Hirschi's (1990) argument that people with low self-control are more criminally involved. The theory did not stop short by explaining *only* crime because Gottfredson and Hirschi challenged that low self-control should also account for participation in a host of deviant behaviors that are not violations of criminal statute.

*Crime-analogous behaviors*. It is argued that lower levels of self-control will also manifest in behaviors that are analogous to crime. That is, the behavioral tendency of people with lower self-control to pursue activities that are risky, exciting, immediately gratifying, and self-serving cause them to be involved in deviant behaviors that exhibit qualities similar to crime. For example, low self-control individuals are believed to be more likely to drink excessive amounts of alcohol, cheat (e.g., in school or on a partner), use tobacco, regularly eat unhealthy foods, get tattoos, procrastinate, have unprotected sex, and lie. Accordingly, the generality of self-control theory is hypothesized to extend to

behaviors outside the realm of criminal activity. These behaviors may not violate the law, but are acts undertaken in pursuit of self-interest.

Arneklev, Grasmick, Tittle, and Bursik (1993) reported mixed support for the theory's generality in one of the first examinations of the effect of low self-control on crime-analogous behaviors. Individuals with lower self-control drank alcohol and gambled more often, but no association was observed for smoking tobacco. What is more, their analysis suggested that certain aspects of low self-control (e.g., risk seeking) were more predictive of imprudent behaviors than a 24-item scale. Recent research has found more convincing support for the low self-control/deviant behavior link. Reisig and Pratt (2011) showed that low self-control predicts deviant behaviors, such as swearing in public, making telephone calls while intoxicated (i.e., "drunk dialing"), and public flatulence. Those who lack self-control have also been shown to binge drink (Gibson, Schreck, & Miller, 2004; Reisig & Pratt, 2011) and cheat on academic assignments (Cochran, Wood, Sellers, Wilkerson, & Chamlin, 1998; Reisig & Pratt, 2011) at a higher frequency than their counterparts who can more effectively control their behavior. Gottfredson and Hirschi's (1990) contention that low self-control predicts behaviors analogous to crime seems to have qualified support. People who do not have an adequate ability to control themselves often cannot resist the temptation (or do not care about the consequences) to engage in a spectrum of deviant behaviors ranging from gambling away hard-earned money to passing malodorous digestive gas through their rectum in public places.

Along similar lines, Gottfredson and Hirschi (1990) argued that low self-control should also result in a number of negative life consequences for people other than increased involvement in criminal and imprudent behaviors. Research demonstrates that people with lower levels of self-control are more likely to experience numerous negative social and life events including, poor friendship quality, unstable family relationships, weak attachment to the church, fewer years of educational attainment, and lower occupational prestige (Evans, Cullen, Burton, Dunaway, & Benson, 1997). Low self-control folks are also more likely to hold criminal attitudes and associate with criminal peers (Evans et al., 1997; McGloin & Shermer, 2010; Wolfe & Higgins, 2009). To sum up, the outlook for people with low self-control is bleak. They engage in more crime, participate in deviant behaviors that can be hazardous to their health (or the health of others), and experience negative events more often throughout life. Unfortunately, this is not an exhaustive list of the negative consequences of low self-control.

*Victimization.* Schreck (1999) extended self-control theory to criminal victimization. He argued that people who act impulsively, seek risky activities, and act without thinking about the long-term consequences of their behavior, will disproportionately place themselves in situations where the risk of criminal victimization is elevated. Compared to their higher self-control counterparts, these people will often fail to take the appropriate precautions to reduce the chances of victimization and will be involved with people, places, and activities that are associated with crime (e.g., frequent bars or hang out with drug dealers). Schreck's analyses show that those with lower levels of self-control experience

more frequent victimization. Longitudinal analysis of the Gang Resistance Education and Training (GREAT) data replicated these results by showing that those with relatively low self-control are more likely to experience multiple criminal victimizations (Higgins, Jennings, Tewksbury, & Gibson, 2009).

Other scholars have argued that crime victims are often the same individuals that are committing criminal offenses. For example, Holtfreter, Reisig, Piquero, and Piquero (2010) demonstrated that individuals with low self-control are more likely to commit fraud and be victims of fraud. The inability of these people to control their selfish motives not only causes them to be more likely to use someone else's credit card illegally, it also puts them in situations where the risk of fraud victimization is high. For example, responding to unsolicited telemarketing calls promising free vacations is often too tempting for people with low self-control to resist. These people may be undeterred by the potential threat of fraud victimization posed by such solicitations. If participation in more criminal activity and being victimized at a greater frequency were not enough, folks with low self-control also seem to have a difficult time dealing with the criminal justice system.

*Criminal justice system-related outcomes*. A growing body of research has demonstrated that people with low self-control have more negative experiences with the criminal justice system and system-related outcomes. For example, Beaver, DeLisi, Mears, and Stewart (2009) used ADD Health data to show that individuals with low self-control are significantly more likely to encounter criminal justice system agents. This is not surprising given that these same

individuals are more likely to commit crime, fall victim to crime, and place themselves in situations that come to the attention of the criminal justice system at a higher rate. Low self-control people also experience negative encounters with the system more often than those with higher self-control. Mastrofski, Reisig, and McCluskey (2002) found that civilians who exhibited signs of low self-control (e.g., showing signs of intoxication and/or behaving emotionally) were more likely to be treated disrespectfully by police.

Another line of research has shown those with lower self-control have more pessimistic attitudes and perceptions of the justice system, its actors, and the law. College students with low self-control are more likely to perceive police actions in hypothetical scenarios as unfair compared to those with higher self-control (Piquero, Gomez-Smith, & Langton, 2004). Similarly, low self-control people are less likely to judge the police as procedurally fair or evaluate them as legitimate authority figures (Reisig, Wolfe, & Holtfreter, 2011; Wolfe, 2011), have less confidence in legal authorities to effectively perform their job (Reisig & Holtfreter, 2007), and are more likely to have a cynical view of the law (Reisig et al., 2011).

Also relevant to this discussion is the idea of deterrence. Gottfredson and Hirschi (1990) suggested that the system can do little to deter crime by threatening punishment because those in need of deterrence are not concerned with long-term consequences of their actions (i.e., those with low self-control). Contrary to this hypothesis, however, research suggests that people with lower levels of self-control do consider the potential consequences of criminal activity

(e.g., potential punishment) (Piquero & Pogarsky, 2002). What is more, low self-control folks appear to be deterred by the certainty of punishment more so than their high self-control counterparts (Wright, Caspi, Moffitt, & Paternoster, 2004). Researchers suspect that those with low criminal propensity (i.e., high self-control) never consider committing a crime and have no need to be deterred by the threat of government punishment. At the same time, these individuals tend to have lower certainty estimates (Pratt, Cullen, Blevins, Daigle, & Madensen, 2006).

Without question the link between low self-control and criminal behavior has been the primary focus of research attention devoted to self-control theory. The association between this individual attribute and other outcomes, such as acts analogous to crime, victimization, and criminal justice outcomes, has also received a considerable amount of attention in recent years. The boldness of some of Gottfredson and Hirschi's (1990) claims (e.g., the broad generality of the framework) has prompted continued research attention on several aspects of their theory over the years. Further research is needed to assess the accuracy of Gottfredson and Hirschi's theoretical propositions. The next section will closely examine each of these areas of contention beginning with a discussion of the sources of self-control.

## CONTROVERSIES IN SELF-CONTROL THEORY

### Sources of Self-Control

Gottfredson and Hirschi (1990) assumed that people are born with the natural urge to be hedonistic and pursue behaviors or situations that are in their self-interest. The task for criminologists is to determine what drives individuals to learn the ability to resist natural impulses and selfish desires in exchange for long-term goals and out of respect for other's interests. That is, how does someone develop *high* self-control?

Self-control is established during early childhood through adequate parental socialization. The authors stipulated three necessary conditions that must occur for parents to instill high levels of self-control in their children: Parents must (1) supervise their children's behavior, (2) recognize deviant behavior when it occurs, and (3) punish wayward behavior (Gottfredson & Hirschi, 1990). *Supervision* of a child's behavior has a direct influence on his or her self-control for two reasons. For one, it literally prevents the child from committing criminal/deviant behaviors. It also teaches the child to avoid criminal/deviant behavior when the parent is not physically present. Supervision is necessary for establishing high self-control, but not sufficient in and of itself. For supervision to impact self-control the parent must have the ability to *recognize deviant behavior* when it occurs. By recognizing unacceptable behavior a parent is able to intervene and begin the process of teaching definitions favorable to high self-control. For children to learn such definitions the parent must *punish deviant actions*. Gottfredson and Hirschi did not advocate for corporal punishment per se, but

suggest that strong disapproval of deviant behavior can be enough punishment to curb its occurrence in the future. At the same time, however, the child must also learn that parental disapproval is important.

A parent that satisfactorily accomplishes these requirements will be more likely to raise a child who delays gratification, is empathetic to the interests of others, understands the importance of self-restraint, and is less willing to use force or fraud to accomplish personal goals. Low self-control manifests itself in the absence of parental nurturance, discipline, or training. Therefore, effort is required to establish high self-control. Ineffective child rearing is the primary cause of low self-control. The source of self-control has attracted extensive empirical attention.

*Parental influences on self-control.* The effect of parenting on self-control is central to the theory. Hay (2001) showed that a combined measure of parental monitoring and discipline was negatively related to low self-control. Confirming Gottfredson and Hirschi's (1990) hypothesis, parents that adequately monitor their child's behavior and discipline them for deviant acts are more likely to have a child with higher self-control. The fairness of the discipline process was also shown to influence variation in self-control. Therefore, it is incorrect to assume that more parental control is always better. It is important to note that Hay only examined two of the three components of parenting proposed by Gottfredson and Hirschi (i.e., there were no measures of deviant behavior recognition). The quality of Hay's monitoring and discipline measures are also limited. At best, the measures offer an indirect assessment of parenting practices because respondents themselves were asked questions pertaining to their parents' supervision and

discipline practices. Asking children's parents directly about their parenting practices would be a superior strategy for measuring Gottfredson and Hirschi's parenting component. Some support exists regarding parenting's influence on self-control (Gibbs, Giever, & Martin, 1998; Hay, 2001; Perrone, Sullivan, Pratt, & Margaryan, 2003), but emerging evidence suggests that there is more than one source of the characteristic.

*Context matters.* Given Gottfredson and Hirschi's (1990) claim that parenting is the main cause of self-control, one would assume that children with ineffective parents are destined to develop poor self-control. However, children who are not effectively socialized by their parent(s) may have the opportunity to be taught self-control while at school. These institutions have an opportunity to instill some level of self-control in their students because they have the ability to monitor the children's behavior for a large portion of the day, are efficient at recognizing deviant behavior, and have the authority to punish unruly kids. School socialization has a positive effect on children's levels of self-control independent of parental socialization (Turner, Piquero, & Pratt, 2005). However, the school only seems to influence the development of self-control in more advantaged neighborhoods and has no effect in disadvantaged communities. Additionally, the school only exerts an influence when a child's family has failed to effectively teach self-control.

To explore further the contextual factors that may influence self-control development, Pratt, Turner, and Piquero (2004) examined the influence of perceived community conditions on the relationship between parental

socialization and self-control. Using longitudinal data, they assessed community conditions by asking mothers about the amount of informal social control, crime, and disorder in their neighborhoods. In support of Gottfredson and Hirschi's (1990) argument, parenting influenced a child's self-control independent of perceived neighborhood conditions. Still, mothers were less likely to effectively monitor their children's behavior and discipline deviant acts if they perceived their community to have few parents that supervise their children, few people who care about what happens in the neighborhood, or many people who break rules. Consequently, these mothers were more likely to raise children with lower levels of self-control. Once again, the hypothesis that parenting influences self-control is met with qualified support as mother's perceptions of neighborhood context may have an important effect on her ability to adequately socialize her children.

Recent research, however, has shown that parents who are less able to teach their children self-control are also more likely to select disadvantaged neighborhoods to live in (Gibson, Sullivan, Jones, & Piquero, 2010). After taking into account the neighborhood selection process, the effect of community context on self-control disappears and parental efficacy remains as the key factor in its development.

*Biological sources of low self-control*. An emerging literature within criminology examines whether biological factors are related to criminal behavior. This literature has also staked out territory in exploring biological influences on the development of self-control. Research has suggested that the roots of self-control may also have a biological basis and not lie solely within social causes.

One study examined the impact of children having attention deficit hyperactivity disorder (ADHD) on their levels of self-control (Unnever, Cullen, & Pratt, 2003). The results demonstrated the salience of parenting, but having ADHD also influenced the development of self-control. Given that ADHD has genetic roots, the researchers concluded that low self-control is not merely the result of socialization but also biological predispositions.

Recently, researchers have started to use robust methodologies to determine whether there is a biological basis to the development of self-control. Drawing on medical, biological, and psychological research, Beaver and his colleagues have spearheaded these efforts using twin samples (Beaver, Schutt, et al., 2009; Wright & Beaver, 2005; Wright, Beaver, DeLisi, & Vaughn, 2008). Twin samples offer a unique way to examine the genetic or biological underpinnings of low self-control using a counterfactual approach. After controlling for all relevant environmental factors that may influence self-control researchers can examine the concordance rate between twins' levels of self-control. With parenting practices held constant, levels of self-control for monozygotic twins (siblings who are genetically identical) should be more similar than levels among dizygotic twins (those who share 50 percent of their genes) if genetics are associated with the characteristic. To date, research has demonstrated that parenting practices have little effect on a child's self-control once genetic factors are accounted for. Regardless of situational or individual differences, levels of self-control are more similar for identical twins compared to fraternal

twins. At the same time, however, the twin approach is problematic because true genetic factors are unmeasured in such studies and leaves results open to debate.

Researchers suggest that these findings demonstrate a strong genetic link to self-control and that people are biologically predisposed to have a particular level of criminal propensity. In fact, some scholars in this area have proposed that "biogenetic factors are a cause—perhaps even the dominant cause—of problems with self-control and self-regulation" (Beaver, Schutt, et al., 2009, p. 55). The task for researchers at this point is to uncover the specific biogenetic factors that are responsible for the development of self-control. Currently, research shows that biological factors such as a low resting heart rate, high testosterone levels, low serotonin levels, and certain genes are associated with criminal behavior (see Raine, 2004). For example, the monoamine oxidase A (MAOA) genotype, sometimes referred to as the "warrior gene," has been shown to be associated with gang membership (Beaver, DeLisi, Vaughn, & Barnes, 2010) and fraudulent behaviors (Beaver & Holtfreter, 2009). Are these same factors associated with children being predisposed to lower levels of self-control? Research exploring this link is needed before the question can be answered.

This line of research is promising, but by no means does it suggest that social explanations of self-control development are meaningless. On the contrary, the evidence suggests that a better understanding of self-control will come with an integrated theoretical approach such as a "biopsychosocial" explanation (a similar trend is seen in the literature examining the causes of criminal behavior). Nofziger (2008), for example, has shown that maternal self-control shapes the self-control

of children. This association operates through parenting practices. Mothers with lower self-control used harsher punishment strategies (e.g., corporal punishment rather than disapproval), which were associated with lower levels of self-control in their children. Boutwell and Beaver (2010) also showed that both maternal and paternal self-control were related to variations of self-control in children. Analyses revealed that this association was partially attributed to assortative mating (low self-control mothers pick low self-control fathers as partners, and vice versa). While low self-control mothers and fathers may exhibit inferior parenting practices, the connection between maternal/paternal and offspring self-control may be because parents have a predisposition to low self-control that they genetically pass to their child. In a careful examination of the biosocial explanation of self-control development, Ratchford and Beaver (2009) showed that biological (e.g., neuropsychological deficits, birth complications, and low birth weight), micro-sociological (e.g., harsh parental punishment and family rules), and macro-sociological (e.g., neighborhood disadvantage) factors all influence self-control development in children.

*Sources of low self-control in summary.* Scholars have taken issue with Gottfredson and Hirschi's (1990) controversial argument that parenting is the only source of self-control. Lack of parental efficacy, particularly the supervision and discipline of children, is believed to increase the chances of rearing children with lower self-control. Nonetheless, research clearly indicates that there is more than one cause of self-control. The origins of self-control are many and encompass aspects of socialization (e.g., parenting and the school), macro-level forces (e.g.,

community context), and biological factors. All of this work is in agreement that self-control is formed early in life which has implications for stability over time.

## Stability of Low Self-Control

Gottfredson and Hirschi (1990) proclaimed that self-control is a time-stable individual characteristic. The stability hypothesis, as it has come to be known, stipulates that a person's level of self-control is established by the age of eight or ten and remains unchanged throughout the entire life course. That is to say, children have experienced all socialization relevant to the development of self-control by the age of 10 and will experience no gains or losses in criminal propensity as they age.

A variety of samples have been used to test the stability hypothesis. One of the first studies to address the issue examined self-control stability over a four-month period (Arneklev, Cochran, & Gainey, 1998). Consistent with theoretical expectations, study participants displayed self-control stability over time. This finding is muted slightly by the fact that the observation period was relatively short (i.e., about four months) and the age of the sample (mean = 22.8 years) was older than the age at which self-control is believed to be established. To address this concern, Turner and Piquero (2002) used seven waves of data from the National Longitudinal Study of Youth (NLSY). Over a 12-year period data were collected on respondents that were, on average, 6.89 years old at wave 1 and 19.05 years old at wave 7. Turner and Piquero demonstrated partial support for

the stability hypothesis—self-control fluctuated throughout childhood and then remained relatively stable in adolescence.

More recent investigations have found mixed support for the stability hypothesis. For example, self-control was shown to be unstable over a two-year period in a sample of African-American adolescents (Burt, Simons, & Simons, 2006). Social factors after the age of eight such as parenting, attachment to teachers, and association with pro-social peers are associated with increases in self-control. Hay and Forrest (2006) analyzed youth from the NLSY who were surveyed every two years from the age of seven to fifteen. They demonstrated relative stability in self-control for more than 80 percent of the sample after the age of 10. Still, about 16 percent of the respondents experienced fluctuations in their level self-control after 10 years of age during a time when it is supposed to remain stable.

Other researchers have explored whether intervention programs influence self-control. A meta-analysis revealed that children 10 years and younger are susceptible to self-control improvement programs, suggesting that the attribute is malleable prior to adolescence (Piquero, Jennings, & Farrington, 2010). The question that remains is whether self-control fluctuates throughout the later years of life. This question remains open and should be addressed because improvements in self-control were also shown to reduce delinquent involvement in the children. The limited data on adult self-control improvement is drawn from an incarcerated setting, which showed that level of self-control is unaffected by boot-camp intervention programs (Mitchell & Mackenzie, 2006).

In summary, the stability hypothesis remains a controversial aspect of self-control theory. The hypothesis has received mixed support and most research has not moved past adolescence in the examination of self-control stability. Therefore, there is no systematic evidence to suggest that meaningful changes in self-control occur throughout life. For this reason, there is little reason to question whether self-control remains stable into old age. The current study sides with Gottfredson and Hirschi's (1990) contention and assumes that individual levels of self-control remain stable.

## Measuring Low Self-Control

The proper measurement of self-control has remained a controversial aspect of Gottfredson and Hirschi's (1990) theory since it was introduced. Without a valid and reliable low self-control scale the theory cannot properly be tested. Over the years scholars have used a host of different measures that can be grouped into three broad categories: attitudinal, behavioral, and Hirschi's reconceptualization. Each of these measurement categories will be discussed in turn.

*Attitudinal measures.* Perhaps the most influential self-control measurement study to date was conducted by Grasmick, Tittle, Bursik, and Arneklev (1993). The authors conceptualized low self-control as a personality characteristic comprised of the six underlying dimensions. They argued that self-control can be measured through survey participants' responses to a series of attitudinal statements that tap the six dimensions. Four items for each of the

following six dimensions of low self-control were formulated by the authors to comprise a 24-item low self-control scale: *impulsivity* (e.g., "I often act on the spur of the moment without stopping to think"), *simple tasks* (e.g., "I frequently try to avoid projects that I know will be difficult"), *risk seeking* (e.g., "Sometimes I will take a risk just for the fun of it"), *physical activities* (e.g., "I like to get out and do things more than I like to read or contemplate ideas), *self-centeredness* (e.g., "I will try to get the things I want even when I know it's causing problems for other people"), and *temper* (e.g., When I'm angry, other people better stay away from me"). Grasmick and colleagues' principle components analysis (PCA) confirmed a six-component solution. The researchers concluded that low self-control is a multidimensional construct composed of the six components that coalesce into a single personality trait.

The scale, which has become known as the "Grasmick scale" (perhaps to the dismay "et al."), has been the topic of much debate. While it has been argued to be a valid indicator of low self-control and that it consistently predicts criminal and crime-analogous behaviors in general population and student samples (see e.g., Arneklev et al., 1993; Gibbs, Giever, & Higgins, 2003; Pratt & Cullen, 2000), some have questioned the scale's dimensionality across all types of samples. Longshore, Turner, and Stein (1996), for example, examined the dimensionality of the scale using confirmatory factor analysis among a sample of drug-using offenders. Their five-factor solution showed that impulsivity and self-centeredness were indistinguishable. More importantly, there was no evidence of a single low self-control latent trait and specific components (e.g., risk seeking)

seemed to better predict crime than the 24-item scale. The scale was again shown to not be unidimensional within an incarcerated sample and the temper dimension was the only component that predicted offending (DeLisi, Hochstetler, & Murphy, 2003).

To some, these findings may call into question the validity of the Grasmick scale, but Piquero and Rosay (1998) argued that Longshore et al. (1996) used poor structural equation modeling techniques that biased their findings. Piquero and Rosay reevaluated the dimensionality of the scale applying more widely accepted statistical standards to the same data set used by Longshore et al. They demonstrated that the scale represents a unidimensional low self-control construct with six underlying components. It did appear that the risk-seeking component still had the strongest effect on offending.

In one of the most persuasive empirical studies on the topic, Arneklev, Grasmick, and Bursik (1999) assessed the scale's dimensionality using two diverse samples. One sample consisted of randomly selected adults from a large southwestern city and the other was comprised of college students from a large southwestern university. The samples were used because of the demographic differences between the two groups, which allowed the researchers to test whether there were between-group differences in the dimensionality of the Grasmick scale. The results suggested that the scale captured a multidimensional trait with six dimensions representing a single latent factor—low self-control. This finding was robust across both samples.

Many claim that the Grasmick scale validly represents the latent characteristic of low self-control as proposed by Gottfredson and Hirschi (1990). Research results suggest that six dimensions underlie the complete low self-control construct. Evidence refuting the utility of the scale seems to be constrained to analyses that inadequately test the dimensionality of low self-control or those that use offender samples. While the Grasmick scale is the most commonly used measure of self-control in criminological research, other attitudinal scales have emerged in the literature.

Another attitudinal self-control scale that is gaining popularity is the "Brief Self-Control Scale" (BSC) developed by Tangney, Baumeister, and Boone (2004). Unsatisfied with the available self-control scales, Tangney and colleagues used Baumeister, Heatherton, and Tice's (1994) extensive review of self-control to develop a new scale. The authors argued that self-control is "the ability to regulate self strategically in response to goals, priorities, and environmental demands" (Tangney et al., 2004, p. 314). Five major domains underlie self-control: control over thoughts, emotional control, impulse control, performance regulation, and habit breaking. To construct the BSC, Tangney et al. generated a pool of 93 survey items that encompassed each of the self-control domains. This list was then reduced to a 36-item "Total Self-Control Scale" (TSC) by deleting duplicate items and items with low item-total correlations. Factor analytic techniques demonstrated that the TSC consists of five underlying dimensions of self-control and has adequate internal consistency. The authors then constructed the 13-item BSC. The scale consists of items from each of the self-control

domains, is highly correlated with the TSC ($r$ = .92 to .93 in two separate samples), and displays high internal consistency ($\alpha$ = .83 to. 85 in two separate samples). Five items on the BSC capture general capacity for self-discipline, three items measure deliberate/non-impulsive action, two items assess healthy habits, two items capture work ethic, and one item measures reliability. Using the BSC, people with higher self-control have been shown to achieve better grades, experience fewer impulse control problems, have better psychological adjustment, and enjoy better interpersonal relationships (Tangney et al., 2004).

Importantly, the BSC asks respondents similar questions to those commonly seen in criminal offending research. For example, the scale contains items related to risk-seeking behavior (e.g., "I do certain things that are bad for me, if they are fun") and impulsivity (e.g., "I often act without thinking through all of the alternatives") in much the same way as the Grasmick scale. To date, the BSC has only been used sparingly in crime and justice research. Holtfreter and colleagues (2010) used the scale and demonstrated that people with lower levels of self-control are more likely to be targeted by fraud perpetrators and commit fraud themselves. Reisig and Pratt (2011) show it predicts self-reported offending, binge drinking, and academic dishonesty (see also Reisig et al., 2011).

Use of the BSC among criminologists will likely increase in coming years for several reasons. For starters, the scale's items, like those of the Grasmick scale, have been shown to be valid and reliable indicators of self-control (Finkel & Campbell, 2001; Gailliot, Schmeichel, & Baumeister, 2006; Tangney et al., 2004). Additionally, the BSC eludes the tautological criticism that is often

brought against behavioral indicators. While some may argue that the BSC is more of a personality measure than an indicator of criminal propensity, it was clear Gottfredson and Hirschi (1990) originally intended low self-control to represent a personality characteristic. They even state that low self-control is "well within the meaning of personality trait" (Gottfredson and Hirschi, 1990, p. 109). Attitudinal self-control scales have dominated self-control research, but controversy remains over whether such scales are appropriate.

*Behavioral measures*. Some claim that attitudinal measures of low self-control do not capture the true essence of the concept (Marcus, 2004). In fact, Hirschi and Gottfredson have argued that low self-control manifests in behavioral actions and should be measured using behavioral indicators (Gottfredson & Hirschi, 1990; Hirschi & Gottfredson, 1993, 2000). Attitudinal measures are thought to introduce measurement error because it is difficult for people, particularly those with low self-control, to answer survey items that represent abstract conceptions of the self (Ward, Gibson, Boman, & Leite, 2010).

An early study that employed behavioral self-control measures (e.g., not wearing a seat belt) demonstrated a positive association with driving under the influence of alcohol (Keane et al., 1993). Marcus (2003) developed a retrospective behavioral self-control (RBS) scale that asks respondents about various behaviors they may have engaged in at specific times in their life course (e.g., not preparing for exams in adolescence and not showing up to meetings on time in adulthood are indicators of lower self-control). Behavioral low self-control scales such as the RBS have not been used as widely as attitudinal scales,

but they have been shown to be effective at predicting crime (Marcus, 2003; Ward et al., 2010).

Several difficulties emerge with the implementation of behavioral self-control measures which may contribute to their limited use. Recall that Gottfredson and Hirschi (1990) argued that low self-control predicts criminal behavior and acts analogous to crime because both types of behaviors share the same characteristics. Behavioral low self-control scales ask respondents about their involvement in behaviors that are risky, impulsive, easy, physical, and offer immediate gratification because these are the characteristics of low self-control. The problem is that developing behavioral indicators of low self-control that are independent from the behaviors one wishes to predict is a difficult task (Tittle, Ward, & Grasmick, 2003a). Researchers are left with two options. The first is to use behavioral indicators that are very similar to the outcomes they are designed to predict. For example, some researchers have used wearing a seatbelt to predict criminal behavior (Welch, Tittle, & Grasmick, 2006). This is problematic because it is tautological—one is using a behavioral indicator of low self-control to predict a behavioral outcome that is indistinguishable from the independent variable. The second option leaves the researcher to his or her own devices to construct behavioral indicators of low self-control that are conceptually distinct from criminal and crime-analogous behaviors to avoid a tautological quandary. This often results in weak indicators of low self-control. For example, one study classified people as having high self-control if they did not drink alcohol or if they were married (Tittle, Ward, & Grasmick, 2003b; see also Welch et al., 2006).

Classifying an individual as having low self-control simply because he or she chooses to have a beer while watching a football game or separate from an abusive spouse has limited face validity. On the contrary, Marcus' (2003) RBS contains some of the best behavioral measures of low self-control that avoid many tautological problems (e.g., borrowed something and did not return it).

The debate over whether attitudinal or behavioral indicators are more appropriate to use in tests of self-control theory will likely continue for some time. A growing body of evidence suggests this effort may be futile. Tittle and his colleagues (2003a) pitted attitudinal and behavioral measures of low self-control against one another to determine which one better predicted criminal and crime-analogous acts. They demonstrated that both types of measures predicted deviance equally well and that using behavioral indicators of low self-control would probably not result in any better support for the theory compared to using attitudinal measures. Pratt and Cullen (2000) came to a similar conclusion in their now classic meta-analysis by showing that the impact of low self-control on offending was fairly consistent across studies regardless of the type of scale used. In the end, researchers should construct self-control scales that are informed by these issues. Perhaps the best measurement strategy entails using both behavioral and attitudinal items.

*Hirschi's reconceptualization.* In an attempt to clarify some of the confusion surrounding the measurement of self-control, Hirschi (2004) offered a reconceptualization of the concept. His main critique of previous studies was that researchers have strayed from the original meaning of low self-control and

convoluted the construct. To Hirschi (2004, p. 543), self-control is more clearly defined as "the tendency to consider the full range of potential costs of a particular act" and is the "set of inhibitions one carries with one wherever one happens to go." Within this reconceptualization, Hirschi draws on his social control theory to augment the concept of low self-control (Hirschi, 1969). He argues that a lack of self-control reflects broken ties to conventional society (e.g., family, friends, school, employment, or the church). Having a strong bond to society is indicative of high self-control because such people, by definition, care about their bonds to different institutions and consider what friends, family, and employers would think if they were to engage in criminal or crime-analogous acts. Ultimately, "social control and self-control are the same thing" (Hirschi, 2004, p. 543). Hirschi subjected his redefinition to empirical test by using social control-type indicators of low self-control (e.g., "Do you like or dislike school?" and "Does your mother know where you are when you are away from home?"). Not surprisingly, he showed that those with higher self-control engage in less criminal behavior.

For many, Hirschi's (2004) attempt to simplify the meaning of self-control may have only added to the confusion. Attempts to empirically test Hirschi's reconceptualization have been made. Piquero and Bouffard (2007) were the first to assess the effect of the redefined low self-control measure on crime. Because Hirschi's operationalization was too similar to social control measures, Piquero and Bouffard had respondents list five "bad things" that could happen if they were to engage in a deviant behavior depicted in a scenario and indicate the importance

of these consequences (from 0 to 100% important). In their view, this operationalization more adequately captures the full range of potential consequences of particular acts. Their analysis confirmed Hirschi's (2004) hypothesis. The standardized effect of the redefined self-control on intentions to drive drunk and engage in sexual coercion was stronger than the Grasmick scale. The study's results should be interpreted with caution, however, because the sample was 97 percent white and included only 212 college students.

Higgins, Wolfe, and Marcum (2008) examined the effect of the reconceptualized self-control on illegal music downloading. They compared three measures of low self-control—the Grasmick scale, Piquero and Bouffard's (2007) "bad things" list, and a social bonds-type self-control scale. The bonding-type measures were used because they seemed to be more consistent with Hirschi's (2004) reconceptualization than simply asking respondents the "bad things" that may occur after engaging in crime. Contrary to Piquero and Bouffard, the results of the analyses revealed that the standardized effect of the Grasmick scale had the strongest effect among the three measures.

Future research is needed on this topic because of the conflicting evidence and data limitations. For example, the only understanding we have of the redefined self-control is based on students responding to hypothetical scenarios and reporting involvement in low-level offenses. This is a problem because we do not know whether Hirschi's reconceptualization of self-control applies only to individuals' *intentions* to engage in minor criminal offending. Research is needed

to determine whether the concept is associated with *actual* serious offending (e.g., violent crimes).

*Measurement in summary*. A number of low self-control scales have been developed and used to test self-control theory. Both attitudinal and behavioral measures seem to predict criminal behavior to similar magnitudes (Pratt & Cullen, 2000), but controversy persists over the appropriate operationalization. For these reasons, it seems preferable for researchers to use both attitudinal and behavioral measures of low self-control when assessing the effects of low self-control on criminal behavior. Including both types of measures will help determine whether the results are influenced by the way self-control is measured. This is particularly advantageous when examining the invariance of self-control across different groups of people. Studies that include both measures in a single analysis are rare. Fortunately, the present study will use both attitudinal and behavioral indicators of low self-control to minimize concerns over the appropriate measure. Another controversial topic—the invariance thesis—is vitally important because it speaks to the generality of self-control theory. This topic is discussed next.

## The Invariance Thesis

Gottfredson and Hirschi's (1990) "invariance thesis" holds that low self-control should have an equally strong effect on criminal outcomes regardless of individual characteristics such as nationality, culture, gender, race/ethnicity, and age. Low self-control is hypothesized to predict offending for whites to the same degree as African-Americans and for the elderly to the same magnitude as

adolescents. Although variations in self-control levels for particular groups may exist (i.e., some groups will have higher or lower self-control than others), individual variations in self-control within a given group will predict participation in criminal behavior in the same manner as any other group. For example, the effect size of low self-control on criminal behavior will be relatively the same for males and females even though group averages differ.

Overall, the literature provides qualified support for the invariance thesis. For example, low self-control predicts offending equally for individuals from Hungary, the Netherlands, Switzerland, and Japan in comparison to U.S. residents (Vazsonyi, Pickering, Junger, & Hessing, 2001; Vazsonyi, Wittekind, Belliston, & Van Loh, 2004). This research suggests that the effect of low self-control may be culturally invariant, but the bulk of research focuses on gender, race/ethnicity, and age invariance and provides less definitive support. Each of these research areas will be discussed in turn.

*Gender invariance.* An enduring fact in criminology is that there is a gender gap in offending. Simply put, males engage in more crime than females. Gottfredson and Hirschi (1990) proposed that this phenomenon can simply be explained by differences in self-control—levels of self-control are, on average, lower for males than females. Gottfredson and Hirschi proposed that such variation across genders is a product of differential parenting. Females tend to be "parented more" (i.e., they are supervised to a greater degree than males), which results in higher levels of self-control compared to males who are "parented less." Although self-control varies between males and females, the overall effect of the

attribute on individual offending should be of relatively *equal magnitude* across genders.

Gender invariance has received a significant amount of research attention. Burton, Cullen, Evans, Alarid, and Dunaway (1998) explored whether low self-control could account for the gender-gap in offending. Consistent with the expectations of the theory, self-control reduced the effect of gender on crime to non-significance. Males tend to have lower self-control than females, which accounts for their higher offending frequencies. Importantly, however, the authors demonstrated that self-control's effect on crime was conditioned by gender. Low self-control predicted offending for males, but was only significant for females when the number of evenings they went out for recreational activities was taken into account. Therefore, the effect of low self-control on offending was not shown to be invariant because it was conditioned by gender and lifestyle. Similar results were reported by LaGrange and Silverman (1999). Lower levels of self-control among males accounted for their greater participation in criminal and crime-analogous behaviors. Still, particular aspects of low self-control predicted criminal activity more strongly than others depending on the respondent's gender. Risk seeking had the strongest effect on female offending (especially for general delinquency and property offenses), but impulsivity had the strongest effect on male offending. Low self-control was also invariant across gender in an offender-based sample (Piquero & Rosay, 1998). The results from these studies suggest that the effect of low self-control on crime may vary between males and females

under certain conditions and that low self-control is not the only factor that accounts for the gender-gap in offending.

The two previous studies used attitudinal measures of low self-control (versions of the Grasmick scale). Tittle and associates (2003a) explored the issue in greater detail by determining whether the type of measurement affected the invariance of low self-control across gender. The authors found that the Grasmick scale did not account for the gender effect on crime, but an 18-item behavioral low self-control scale (e.g., "Do you sometimes get so far in debt that it's hard to see how you will get out of it?") equally predicted offending for males and females. More research that examines both attitudinal and behavioral indicators of low self-control is needed before definitive conclusions can be made as to whether gender invariance depends on the manner in which low self-control is measured. A limitation within the gender invariance literature is that few studies have examined the issue while simultaneously exploring the invariance of self-control across race/ethnicity and age. These research areas are discussed next.

*Race/ethnicity invariance*. Gottfredson and Hirschi (1990) posited that low self-control accounts for the differences in offending between racial and ethnic groups. For example, the argument follows that African American parents often have difficulty inculcating high levels of self-control in their children because they disproportionately live in disadvantaged conditions. Child rearing is often made more difficult for African Americans because they are more likely to be unemployed, less likely to have a partner to help with parenting, and must more frequently battle conflicting messages sent to children via the streets when

compared to whites (Anderson, 1999). Accordingly, minorities have a greater chance of developing lower self-control and committing more crime than whites do. The effect of low self-control on offending should not vary by racial or ethnic group, but the average level of self-control should be lower for minorities than for whites.

Tentative support for this proposed relationship has emerged. Low self-control appears to have an equal effect on crime for African American and white adolescents (Vazsonyi & Crosswhite, 2004). The invariance thesis is not supported, however, when the interaction between race and gender is taken into consideration. Low self-control is a stronger predictor of crime for African American males than African American females. In related literature, low self-control predicts substance abuse among Native Americans to a stronger degree than among whites (Morris, Wood, & Dunaway, 2006).

In summary, the invariance thesis is met with qualified support in terms of race/ethnicity. The effect of low self-control seems to be invariant between African Americans and whites, but not between Native Americans and whites. Furthermore, when gender is added to the equation self-control better predicts offending among minority males than for their female counterparts. The race/ethnicity invariance literature is limited to adolescent samples and little information exists on whether self-control's effect on crime is invariant between ethnic minorities (e.g., Latinos) and whites. The next section focuses attention on the invariance of self-control across different age groups, which is a line of research that has received modest research attention.

*Age invariance*. Gottfredson and Hirschi (1990) did not contend that low self-control should account for the age distribution of crime. Rather, they argued that the declining frequency of offending with age is simply attributed to the "inexorable aging of the organism" (p.141). Regardless of the reduction in criminal opportunities that may explain why older people engage in less crime than younger people, variation in self-control should predict crime for any given age group in the same way as all others. Arneklev et al. (1999) found support for this hypothesis by showing that low self-control (attitudinal measure) explains offending regardless of age. What is more, they demonstrated invariance of self-control across age in two different samples—general population adults (ages 18-89) and college students (ages 19-55).

Conflicting evidence has also emerged. In a sample of adults, a behavioral indicator of low self-control did not equally predict crime for all age groups (Tittle et al., 2003b). Specifically, low self-control had the strongest effect among young people (18-24 years old) and a relatively small effect among older individuals. For the oldest group of participants (65 years and older), low self-control did not significantly predict criminal behavior.

Currently, the evidence regarding the invariance of self-control across age is mixed. This line of inquiry requires more research because relatively few studies have investigated the topic. Studies that have done so often include low numbers of older people (i.e., over age 60) making it difficult to determine whether the effect of self-control is invariant in the later years of life.

*Invariance in summary*. Gottfredson and Hirschi's (1990) invariance thesis has been tested across several individual characteristics including gender, race/ethnicity, and age. The evidence suggests that the invariance thesis is not fully supported but much more work is needed before definitive conclusions can be made. Most importantly, we have an incomplete understanding of the invariance of self-control across different age groups. Only a handful of studies have devoted attention to the topic and the results are typically based on data from relatively young samples. Accordingly, information is needed on the invariance of self-control across age groups, particularly among people in late life. The present study will address this void.

A considerable amount of research has explored the invariance of self-control across gender, but the evidence is conflicting. Few investigations have explored invariance across different races and examinations across ethnicities are virtually nonexistent in the literature. Therefore, the present study will also examine the invariance thesis across gender and race/ethnicity among older people.

Lastly, most of the invariance literature uses the Grasmick scale. The current study will examine whether the invariance of self-control across the aforementioned demographic characteristics is contingent on the operationalization of low self-control by analyzing both attitudinal and behavioral measures. Doing so is important because it will allow for a clearer understanding of whether invariance is contingent on the manner in which self-control is measured.

## Controversies in Summary

An extensive body of research has focused on several controversial aspects of self-control theory. Gottfredson and Hirschi (1990) claimed that the source of self-control is effective parenting; however, research shows that perceived neighborhood context, schools, and biological predispositions also influence the development of self-control. The proposition that self-control remains relatively stable throughout the life course has not been met with strong empirical evidence to the contrary. Accordingly, the current study assumes that people maintain a consistent level of self-control from childhood into the elderly years of life. The invariance thesis is perhaps the most important topic because it deals with the generality of self-control theory. Many research questions remain unanswered, but this study will address the void by examining the topics discussed throughout the above section.

The final controversy discussed in this chapter is the role of opportunity in self-control theory. According to Hirschi and Gottfredson (2000), criminal opportunities are ubiquitous and are irrelevant to the explanation of crime. In their opinion, low self-control is the only factor that accounts for criminal activity because it determines which people will take advantage of criminal opportunities when available. Routine activity and lifestyle researchers often criticize the theory because they feel opportunity plays a more significant role in the explanation of crime. This chapter now turns to a discussion of the importance of opportunity in explaining criminal behavior.

## OPPORTUNITY AND CRIME

The concept of opportunity is important to the study of crime but conceptualizing the concept has proven difficult because many operational definitions are possible. Opportunity can be considered the physical presence of an item to steal, a person to assault, or a line of cocaine to snort. Many scholars view opportunity as more complex than this conceptualization. Some of the different conceptual forms that opportunity has taken in past research include perceived criminal opportunity (e.g., the ease of a crime or a low likelihood of detection makes for a greater opportunity) (Longshore, 1998), motivational opportunity (e.g., a crime may satisfy a need/urge of a person and be a greater opportunity) (Sasse, 2005), and community characteristic opportunity (e.g., lack of informal social control provides greater opportunity for crime to be committed) (Sampson & Groves, 1989). This list is by no means exhaustive. While the diversity of conceptualizations can be quite overwhelming, there are some common themes. For example, researchers often define opportunity as the set of circumstances, associations, or activities that disproportionately place individuals in situations where criminal behavior is more likely.

Perhaps the biggest problem with the opportunity debate is that different theoretical perspectives employ unique conceptual definitions (Meier & Miethe, 1993). Therefore, opportunity is sometimes viewed as a nebulous concept that is difficult to operationalize when testing theory. Routine activity theory has emerged as the theoretical framework that guides many operationalizations of opportunity. The theory rejects the idea that crime must stem from other social ills

(e.g., disorganized communities) (Cohen & Felson, 1979; Felson & Boba, 2010). Rather, routine activity theory rests on the assumption that people's legal daily activities differentially place them in situations where crime is more likely.

## ROUTINE ACTIVITY THEORY

Cohen and Felson (1979) originally proposed routine activity theory as macro-level perspective to explain changes in crime rates. Their basic argument was that people's routine activities in post-World War II U.S. took people out of their homes with more regularity than in the past. For example, more women entered the labor force during this time which forced them to engage in most daily routines away from home. Accordingly, burglary risk increased as citizens spent less time guarding their property. Further, people were at increased risk of assault, robbery, and other predatory crimes as a consequence of being in public spaces more often. Cohen and Felson suggest that shifts in routine activities over time restructure opportunities for criminal behavior and differentially expose people to victimization. Accordingly, by understanding the elements of criminal opportunity one can begin to address the crime problem.

*Components of routine activity theory.* Routine activities are defined as the "recurrent and prevalent activities that provide for basic population and individual needs…formalized work, as well as the provision of standard food, shelter, sexual outlet, leisure, social interaction, learning, and child-bearing" (Cohen & Felson, 1979, p. 593). The theory posits that everyday routine activities such as going to work or school, participating in recreational activities, or enjoying a night on the

town, make it more or less likely for victimization to occur because they determine the location, type, and quantity of potential illegal acts (Cohen & Felson, 1979). In other words, routine activities expose people to criminal opportunities.

According to Cohen and Felson (1979), four opportunity elements must be present for a crime to occur. The first three components include (1) a motivated offender (i.e., a person willing/able to commit a crime), (2) a suitable target (i.e., a potential victim or valued object), and (3) the absence of capable guardianship (i.e., lack of protection against a crime). The fourth necessary element of opportunity is the convergence in time and space of the first three elements. If any of the elements are not present in a given situation a crime will not occur.

Cohen and Felson (1979) focused attention on suitable targets and guardianship in their analyses and assumed an unlimited supply of motivated offenders in society. Suitable targets can be anything that is attractive to a motivated offender. For example, a video game on a store shelf can be a suitable target to offenders that want to own the item. A person that has disrespected another could also be considered a suitable target for a revenge assault. Simply put, suitable targets are objects, people, or places that a motivated offender views worthy of victimization. Potential offenders also examine the observable characteristics of a target to determine its suitability. For example, the size of an object or person can reflect level of physical vulnerability (e.g., large televisions are less likely to be stolen than iPods and large men are less likely to be attacked

while alone in a park compared to small women). Smaller items and people are seen as more vulnerable and, consequently, suitable targets.

Capable guardianship refers to the amount of controls in a situation that make crime more or less likely to occur. Among others, guardianship can include the physical presence of a person that can deter crime (e.g., a resident in a home, police officer patrolling the street, or a store employee), or objects that make crime more difficult (e.g., door locks, motion-sensor lights, or bullet-proof glass at a check cashing establishment). Increasing guardianship can reduce crime by taking away opportunities for offending. A number of strategies may be used to increase guardianship depending on the object, person, or place that one wishes to protect. For example, theft can be reduced by installing alarm systems or security cameras, home burglaries can be prevented by leaving lights on while not home or by trimming bushes to limit hiding places for would-be burglars, shoplifting can be deterred by placing security tags on store items or by making packages bulkier and less concealable, and the risk of predatory victimization can be reduced by encouraging people to avoid dimly light public places and to walk in groups rather than alone (see Clarke, 1995).

*The empirical link between routine activity and victimization.* A significant amount of research has investigated the association between routine activities and victimization. Cohen and Felson (1979) demonstrated that time spent doing household or family activities is inversely related to victimization rates. The simple presence of a person in a home is enough guardianship to decrease the risk of burglary victimization. Likewise, the authors showed that the

physical size of consumer items (e.g., the size of televisions) decreased throughout the 1950s and 1960s. This translated into higher theft rates because smaller items are easily concealed and carted away from the scene of the crime. In short, smaller electronic items became more suitable targets because they have less guardianship.

Around the same time that Cohen and Felson's work was introduced, Hindelang, Gottfredson, and Garofalo (1978) proposed their lifestyle perspective of victimization. The perspective explains *individual* victimization whereas routine activity theory initially sought to explain victimization *rates*. According to Hindelang et al., people who lead risky lifestyles such as routinely associating with deviant peers, frequenting nightclubs and bars, and hanging out in seedy neighborhoods are at greater risk for victimization because such activities bring potential victims into close proximity to individuals and situations primed for criminal activity. The conceptual overlap between routine activity theory and the lifestyle perspective has led many researchers to use the terms interchangeably (Miethe, Stafford, & Long, 1987).

Routine activity theory enjoys support at both the macro- and micro-level of analysis. For example, routine activities have been shown to explain variation in the rates of burglary, assault, larceny (Cohen, Kluegel, & Land, 1981), and criminal homicide (Messner & Tardiff, 1985). Sampson and Wooldredge (1987) demonstrated that both macro- and micro-level elements explain predatory victimization. Specifically, people who are young and single more frequently leave their homes and go out at night and, therefore, place themselves at greater

risk for victimization. Regardless of individual-level characteristics, however, lack of community social cohesion and the rate at which people in a neighborhood go out at night increase the overall risk of personal theft. Burglary victimization risk increases from the presence of single-person households, family disruption, unemployment, and housing density in a community.

Kennedy and Forde (1990) showed that numerous risky behaviors are associated with different forms of victimization. Unmarried, young people who are involved in activities away from their homes (e.g., going to sporting events, bars, movies, restaurants, and work) are more likely to have their residences broken into and to be assaulted or robbed compared to those who lead more sedentary lives. Car theft victimization was increased by routinely going to work and frequenting public areas (e.g., shopping malls). Echoing Sampson and Wooldredge's (1987) findings, Kennedy and Forde demonstrated that victimization risk increased when neighborhood rates of participating in activities away from home were higher. Therefore, the evidence suggests that both individual-level and community-level routine activities influence the degree to which motivated offenders encounter suitable and inadequately guarded targets (Pratt & Cullen, 2005; Wilcox, Madensen, & Tillyer, 2007).

A growing body of research has shown that people who routinely participate in illegal activities (i.e., risky behavior) have an elevated risk of victimization (Schreck & Fisher, 2004; Schreck, Wright, & Miller, 2002). For example, individuals involved in prostitution and drug use are exposed to motivated offenders at a higher rate than those who work in public elementary

schools, which translates into higher probabilities of victimization. Guardianship is reduced drastically during such risky activities and makes protection from criminal victimization less likely.

Recently, researchers have extended routine activity theory to explain online fraud targeting. Pratt, Holtfreter, and Reisig (2010) demonstrated a significant link between demographic characteristics and being targeted by fraud attempts online. It was not demographics per se, but the distribution of routines across social groups that explained the targeting. For example, younger and more educated people were more likely to be targeted by online fraud attempts. These groups spent more time online and made more frequent online purchases than older and less educated people do. Therefore, frequent online activity creates more opportunities for individuals to be targeted by fraud attempts.

Routine activity theory was originally articulated to explain crime rates and a large amount of research has focused on its connection with individual-level victimization. However, an increasing number of research studies have also used the theory to examine how opportunity increases the likelihood of offending.

### A General Routine Activity Theory and Offending

Although often viewed as a theory of victimization, routine activity theory is also used to explain individual-level offending. Indeed, Cohen and Felson (1979) were open to this idea and Felson suggested in later work that the framework may be used to explain criminal activity (Felson, 1987, 1994).

Osgood, Wilson, O'Malley, Bachman, and Johnston (1996) were the first to formally expand the scope of routine activity theory to explain offending. Osgood and colleagues' version of routine activity expands on the original framework. The primary point of departure between Felson and Osgood and colleagues' perspective on routine activity theory is their conceptualizations of opportunity. Felson argues that the elements of opportunity (i.e., motivated offender, suitable target, and ineffective guardianship) coalesce during people's routine activities, but his most recent work views micro activities as most important in the creation of criminal opportunities. That is to say, specific activities create opportunities for specific types of crime (Felson, 1987, 1994; Felson & Boba, 2010). For example, having access to a car increases the opportunity for DUI. This contracted view of opportunity comes from Felson's goal of guiding crime prevention policy. As noted, crime can be reduced if opportunities are taken away or restricted. In Felson's view, research that shows specific activities are associated with particular crimes can be used in targeting hardening to reduce the opportunity for criminal behavior (e.g., making targets less suitable or increasing guardianship). For example, breath alcohol ignition devices can be installed into the cars of convicted drunk drivers to make it more difficult for them to drive while intoxicated. This conceptualization of opportunity has been widely adopted within the environmental criminology literature that uses the framework to develop ways to reduce criminal opportunities in specific locations and places (see Clarke, 1995; Felson & Clarke, 1998; Newman & Clarke, 2003).

Osgood et al. (1996) acknowledge that some specific routine activities only apply to certain crimes (e.g., one must earn an income to commit tax fraud). However, Osgood and his associates are disinterested in examining activities that are largely "idiosyncratic to specific deviant behaviors" (p. 639). What is more, Osgood et al. argue that focusing on only predatory crime unnecessarily limits the scope of the theory by making it inapplicable to a host of criminal/deviant behaviors (e.g., illicit drug use or reckless driving). Instead, Osgood and colleagues are more concerned with general routine activities that explain many types of deviant and criminal behaviors. This interest stems from their intention to understand broadly how opportunity influences criminal activity. Policy-oriented research findings are far less of a concern to them. Accordingly, Osgood et al. refined the elements of opportunity to create a general routine activity theory of criminal/deviant behavior.

To begin, Osgood et al. (1996) argue that the "motivated offender" is more important in the explanation of crime than Cohen and Felson (1979) originally recognized. They suggest that people vary (continuously, not discretely) in their susceptibility to the temptations of criminal opportunities. For example, people with low self-control will be more likely to seize criminal opportunities that are presented to them. This view of offenders is different from Cohen and Felson's original discussion of motivated offenders. However, it meshes well with later work that stresses the importance of self-control in a routine activity theory context (see Felson & Boba, 2010). Nevertheless, Osgood and colleagues' main point is that all people have the potential to occasionally succumb to criminal

opportunities and that motivation for criminal behavior is inherent in the situation rather than the person. As such, they assume that the "*motivation resides in the deviant behavior itself*" (Osgood et al., 1996, p. 639, emphasis in original).

Osgood et al. (1996) view crime as a spontaneous act motivated by situational inducements (i.e., routine activities). In their opinion, the traditional "suitable target" element is too narrow and forces the framework to apply only to predatory crime. In order for the theory to be more general, Osgood et al. substitute this element with the "more general notion of situations in which *a deviant act is possible and rewarding*" (p. 639, emphasis in original). Once again, Osgood et al. pull from Gottfredson and Hirschi's (1990) self-control theory. They argue that individuals will succumb to criminal opportunities that are easy and have greater symbolic or tangible rewards (e.g., impress friends or immediate gratification). The suitability of a target can still be important, but situations also provide the opportunity for crime.

Lastly, Osgood and his associates (1996) reconceptualize the element of "ineffective guardianship." To them, this is the most important component of routine activity theory. Opportunities for criminal behavior arise out of situations where there are deficiencies in social control. Specifically, they argue that two general types of routine activities are related to criminal behavior—unstructured socializing with peers and activities that take place away from home. Spending time with peers is believed to facilitate opportunities for crime by making offending easier and more rewarding. Friends may help commit a criminal act or

provide encouragement to do so. Furthermore, the presence of peers offers the chance to enhance one's status or reputation by committing a crime.

Simply being with peers does not necessarily increase the chances of criminal activity. The activity must include *unstructured* time spent in the absence of authority figures. This aspect of their general theory retains much of the essence of "ineffective guardianship" (see Cohen & Felson, 1979). To Osgood et al. (1996, p. 640) authority figures are individuals "whose role in a situation carries a responsibility for attempting to exert social control in response to deviance." Parents, teachers, supervisors, place managers, or law enforcement officers are all examples of authority figures. Accordingly, unstructured socializing spent in the absence of authority figures is hypothesized to increase criminal activity because these situations are not effectively guarded and provide opportunities for crime. The problem, however, is that most research focuses on unsupervised socializing with peers among teenagers. Once again, this emphasizes the obsession among criminologists with the correlates of offending among adolescents.

Osgood et al. (1996) suggest that leisure activities that take place away from home are also conducive to criminal behavior. Such activities are often carried out in the absence of authority figures and involve peers. In the end, Osgood et al. hypothesize that unstructured socializing with peers and activities away from home are the two primary routine activities that provide criminal opportunities and, therefore, explain individual variations in criminal activity.

The current study assesses Osgood and colleagues' (1996) version of routine activity theory and compares it to Felson's more specific approach to the operationalization of opportunity. The advantage of Osgood and colleagues' version of the framework is that it offers a general theory of crime that is hypothesized to account for offending regardless of demographic characteristics or stable individual differences (e.g., self-control). Routine activity theory has received a considerable amount of empirical attention over the years.

*Routine activity and offending research.* Osgood and associates (1996) tested their general routine activity theory using a sample of adolescents and young adults. They operationalized routine activity with a scale that included several items related to the amount of unstructured time a person spends socializing with peers in the absence of authority figures or away from home. For example, respondents were asked how often they "participate in community affairs or volunteer work," "actively participate in sports, athletics, or exercising," "get together with friends, informally," "go shopping or window-shopping," "go to parties or other social affairs," and how many evenings during the week they "go out for fun and recreation" (p. 653). The results showed that the routine activities of visiting with friends, going to parties, and going out in the evening were associated with deviant behaviors such as heavy alcohol use, narcotics use, and reckless driving. These activities explained much of the association between demographic characteristics (e.g., age, gender, and socioeconomic status) and deviance. Participating in community affairs and going on dates was negatively associated with crime whereas being active in sports and going shopping was not

associated with deviance. Osgood et al. suggest that these more structured routines provide less opportunity for crime because an authority figure is frequently present during such activities.

Osgood and Anderson (2004) expanded the scope of this earlier study by examining the effect of both individual and contextual routine activities on crime. Their results confirmed those of Osgood et al. (1996)—more time spent in unstructured socializing with peers increased criminal activity. They also showed that similar routines at the community-level affect crime rates. The number of kids hanging out in a community is lower when residents inform more parents in the community about children's activities. The increased guardianship translated into fewer opportunities for deviance. Osgood and Anderson also reported that disorganized communities produce situations where unstructured socializing is more frequent (possibly because disorganization inhibits effective parenting). Therefore, unstructured routine activities mediate the effect of social disorganization on crime (see Sampson & Groves, 1989). Maimon and Browning (2010) reported similar findings. Specifically, they demonstrated that the effect of unstructured socializing on violent offending is lower in neighborhoods with higher collective efficacy. Anderson and Hughes (2009) recently extended this line of research by revealing that access to private transportation increased the likelihood of engaging in violent crime and drug use. Access to a vehicle allowed teenagers to participate in more activities away from home without parental supervision, thereby facilitating more opportunities for criminal activity. This finding is interesting because it mixes Felson's specific conceptualization of

opportunity with Osgood and associates' general conceptualization of opportunity.

In summary, routine activities such as spending unsupervised time with peers, socializing with deviant companions, participating in activities outside of the home, and the availability of goods that facilitate crime (e.g., access to a vehicle) provide opportunities for people to engage in criminal behavior. These findings have withstood a number of different empirical tests. Vazsonyi, Pickering, Belliston, Hessign, and Junger (2002) found that individual variations in routine activities in a given country explain criminal behavior in the same manner as in other countries (even though the amount of time spent doing particular activities varies by country). In short, the association between routine activities and offending appears robust.

The theory has been influential and used frequently to explain crime-related outcomes. An obvious advantage of the theory is that it explains why people are differentially exposed to situations that are conducive to crime. However, the downside of the perspective is that it does not speak to *why* offenders actually commit crime. Opportunities for crime may be ubiquitous, but a majority of people do not seize such opportunities regardless of their routine activities. Although risky lifestyles may increase criminal offending, a person must ultimately choose to commit a crime. Few studies have explicitly tested the generality of routine activity theory to explaining individual-level offending because some believe the framework is unable to speak more definitively about the motivated offender.

Limited research on the topic may stem from Cohen and Felson (1979) glossing over the importance of the "motivated offender" component of their theory. They suggest that that there is an unlimited supply of motivated offenders and, therefore, it is unimportant to study them. However, Felson and Boba (2010) have recently discussed the motivated offender in more detail. They argue that many theories provide explanations for why some people offend more than others. On several occasions they reference the importance of low self-control in the explanation of offending and how it may explain individuals' routine activities. As discussed earlier, Osgood and associates' general routine activity theory defers to self-control in explaining motivated offenders. This is convenient because routine activity theory offers insight into the neglected ingredient in low self-control theory—opportunity. Both perspectives complement one another well because each picks up the slack that the other leaves behind. Criminologists have realized the compatibility between the two theories and have recently begun to explore the simultaneous effects of low self-control and routine activities on criminal behavior.

## LOW SELF-CONTROL AND ROUTINE ACTIVITIES

Gottfredson and Hirschi (1990) argue that low self-control is a necessary, but not sufficient condition for crime to occur and suggest that situational conditions can counteract the effect of low self-control on criminal offending. For example, they state there is "every reason to believe that the necessary conditions strategy of opportunity theory is compatible with the idea of criminality, although

the connection between the two is far from straightforward and has been largely neglected by both sides" (p.23). Many scholars have interpreted this statement as meaning that there are two necessary conditions for criminal behavior to occur—an individual with low self-control and an opportunity to commit a crime (see Goode, 2009a; Grasmick et al., 1993). Gottfredson and Hirschi, however, provide little guidance on how best to conceptualize opportunity (Tittle et al., 2003a, 2003b). Instead, they muddy the waters by arguing that criminal opportunities are simply a function of low self-control and are irrelevant to the explanation of crime (Gottfredson & Hirschi, 2003; Hirschi & Gottfredson, 1993). Nevertheless, scholars have forged ahead by integrating self-control theory and routine activity theory in the belief that together they offer a more complete understanding of criminal behavior.

There are two main theoretical connections between low self-control, routine activities, and offending. First, individuals with lower levels of self-control are believed to seek riskier lifestyles, fail to understand the consequences of particular situations they may place themselves in, and focus on behaviors that satisfy only themselves. It is hypothesized that the effect of low self-control on criminal activity is partially mediated by routine activities. Figure 2 displays the mediation relationship between low self-control, routine activities, and criminal activity.

Figure 2

*Mediation of low self-control on offending by routine activities*


Research provides mixed support for this argument. Forde and Kennedy (1997) used a sample of over 2,000 Canadian adults to integrate portions of self-control theory and routine activity theory. The authors operationalized routine activities by the number of times per month an individual frequents sporting events and bars, goes to movies, restaurants, meetings, or bingo, attends class, visits with friends, and goes for a walk or drive. They argued that more frequent participation in these activities increases exposure to criminal opportunities. Hence, higher frequencies were interpreted as riskier routine activities. The results showed that low self-control was associated with risky activities and with being arrested. Counter to expectations, low self-control did not have an indirect effect on crime through its effect on routine activities. Low self-control was still associated with involvement in imprudent behaviors (e.g., smoking, drinking, speeding, and not wearing a seat belt) through its effect on routine activities. Imprudent behaviors were then associated with participation in more criminal behavior. Accordingly, imprudent behaviors are explained by routine activities (which are explained by low self-control) and they open the door to opportunities for serious forms of crime.

Research has also examined the mediation relationship in terms of victimization. Schreck, Stewart, and Fisher (2006) demonstrated that people who engage in risky lifestyles (being a delinquent or associating with delinquent peers) have a greater risk of victimization. Interestingly, people with lower self-control are less inclined to change their participation in risky behaviors. Hanging out with delinquent peers and committing delinquency is often too thrilling and pleasurable for low self-control folks to abandon even if it increases their risk of being victimized (see also Forde & Kennedy, 1997; Reisig, Pratt, & Holtfreter, 2009). Holtfreter, Reisig, and Pratt (2008) extended this type of reasoning to fraud victimization. They revealed that people who purchase more items remotely (i.e., online) are more likely to be targeted by fraud attempts. Once targeted, people with lower levels of self-control were more likely to be victimized. Routinely making online purchases and having low self-control seems to differentially expose people to situations where motivated offenders perceive opportunities to commit fraud.

Low self-control and routine activities may also interact with one another to predict crime. Some believe Gottfredson and Hirschi (1990) are incorrect in assuming that low self-control accounts for the association between all correlates of crime. People's routine activities may attenuate or amplify the effect of low self-control on crime. Even though someone may have low self-control, the activities they participate in on a daily basis (e.g., going to work or school) may restrict criminal opportunity. At the same time, a person with low self-control

may engage in more crime because their routine activities bring about many criminal opportunities.

The weight of empirical evidence supports the contention that the effect of low self-control on offending is conditioned by routine activities. Longshore (1998, p. 106) operationalized opportunity by asking respondents, "How many times did you see an opportunity to commit a property crime/crime against a person when it would have been easy to do and you were pretty sure nobody who might do something about it would quickly find out?" The reference period was six months. This unique operationalization of opportunity seems to tap into the physical presence of a criminal opportunity, perceptual opportunity, and lack of capable guardianship (i.e., absence of authority figures). The results demonstrated that both low self-control and opportunity had independent effects on criminal activity. What is more, low self-control and opportunity interacted with one another. The magnitude of the low self-control effect on crime increased when more criminal opportunities were available. Of course, it is possible that low self-control folks simply perceive more opportunities for crime than do their high self-control counterparts.

Longshore and Turner (1998) conducted a similar study but used a different operational form of opportunity. They argued that opportunities to offend are created by a person being male and associating with more criminally involved friends. With this operational form of opportunity, Longshore and Turner showed that those with low self-control engaged in more fraud if they were male and if they associated with more deviant peers. However, the effect of

low self-control on violent crime was not conditioned by opportunity. Interestingly, Burton et al. (1998) reported results contrary to Longshore and Turner's findings. Specifically, the effect of low self-control on offending was only conditioned by opportunity (i.e., frequency of going out in the evening for recreational activities) for females. That is, low self-control had a stronger effect on offending for females who frequently participated in nighttime recreational activities. This relationship was not shown for males.

Hay and Forrest (2008) followed Osgood and colleagues' (1996) operationalization of opportunity. They showed that the effect of low self-control on offending is amplified for children who routinely engage in activities away from the watchful eye of a parent or with friends (i.e., routine activities condition the effect of low self-control on offending). These results support Osgood and associates' general routine activity theory.

A potential problem with this line of literature that is worth noting is that measures of opportunity (either objective or perceptual) often resemble indicators of low self-control. For example, perceiving the presence of a criminal opportunity may simply reflect an individual's inability to perceive the long-term consequences of actions. For opportunity to be empirically independent, the measures must be independent of low self-control.

### Empirical Status of Routine Activity in Summary

The role of opportunity in self-control theory is a controversial topic largely because Hirschi and Gottfredson dismiss the concept as unimportant in

favor of low self-control as the dominant cause of criminal behavior. Contrary to this belief, research suggests that low self-control is necessary but not sufficient to explain criminal behavior. Rather, routine activities structure opportunities for crime by moderating and, in some cases, mediating the effect of low self-control on offending. Furthermore, Osgood et al. (1996) argue that all people have the potential to engage in some crime and individual differences are largely irrelevant when routine activities are accounted for (i.e., routine activities should completely mediate the link between low self-control and crime). The empirical evidence tells a different story—those with lower self-control are significantly more likely to succumb to criminal opportunities. While Cohen and Felson (1979) are criticized for ignoring the motivated offender element of opportunity, Osgood et al. are guilty of not giving enough credit to low self-control.

This line of research has been influential thus far, but gaps remain. Most important for the purposes of the present study is the question of whether routines that provide opportunities for crime are age-graded. That is, are the types of routine activities associated with criminal activity different for people in late life compared to younger people? If they are not age-graded they should exert similar effects on elderly offending as adolescent delinquency. We currently do not have an answer to this question because a majority of evidence regarding routine activity theory is based on data gathered from young populations (i.e., less than 25 years of age).

Osgood and colleagues' (1996) general routine activity theory should account for elderly offending for several reasons. First, they suggest that

adolescents are a leisure class of individuals that are able to engage in unstructured activities away from home on a regular basis. This accounts for their greater participation in offending than older adults. Seniors' lives are similar to youth in many ways. Both juveniles and the elderly have limited social responsibility relative to adults in the workforce and with families. For example, they both have an exemption from work and family responsibilities, unstructured schedules, limited financial independence, and their lives emphasize leisure (Feinberg, 1984). As hypothesized by general routine activity theory, unstructured socializing away from home should account for individual offending regardless of age (Osgood et al., 1996).

Furthermore, routine activities among the elderly should account for the effect of demographic characteristics on offending (e.g., the effect of age on crime). Osgood et al. (1996) suggested that crime declines with age because people take on more responsibility than they had during adolescence (e.g., go to college, get a job, get married, and have children). This limits leisure time activities and opportunities for crime. This should also be true among an older sample. Elderly people are likely to engage in less unstructured activities away from home as they age. While this trend is associated with less youth offending because they take on more responsibility, it should hold for the elderly because they are less physically able to participate in activities away from home as they age. Accordingly, routine activities should mediate the link between age and crime in the same manner for seniors as it does for youth (Osgood et al., 1996). These and other related issues await empirical scrutiny.

## THE CURRENT STUDY

The overarching purpose of the current study is to assess the generality of self-control theory and routine activity theory. To accomplish this goal, this study examines three broad research topics using a sample of individuals in late life. First, this study pits two versions of routine activity theory against one another. Two operational forms of opportunity—Felson's specific and Osgood and colleagues' general—are used to predict specific and general types of offending among the elderly. This is done to determine which version of the theory is a better predictor of late life offending. Second, the study explores the generality of self-control theory by analyzing the invariance of low self-control across various subgroups within the elderly sample. Specifically, the analyses determine whether the effect of low self-control is invariant across gender, race/ethnicity, and age groups. Lastly, the role of low self-control and routine activities in explaining elderly offending is explored. Analyses examine the independent and simultaneous effects of low self-control and routine activities on criminal activity. This allows the present study to determine whether opportunity mediates the link between low self-control and crime or if low self-control confounds the relationship between routine activity and late life criminal activity.

# CHAPTER 3

# DATA AND METHODS

## INTRODUCTION

This chapter discusses three main topics relevant to the data and methods used in the present study. First, the chapter provides an explanation of the procedures used to generate the sample, a description of the study participants, and information about the survey instrument. The next section discusses the measures used in the present study. Each survey item used to operationalize the key independent and dependent variables is presented. Psychometric properties of the variables are also provided. Finally, the chapter concludes with an outline of the analytic strategy adopted for the present study. The diagnostic tests and statistical techniques used to test the hypotheses of interest are discussed.

## PROCEDURE

This study uses data from telephone interviews of 2,000 Arizonans and Floridians 60 years of age and older. These data come from a larger project funded by the National Institute of Justice that explores the correlates of elderly exploitation. The telephone interviews were administered for 31 days between June 27th and July 27th, 2011 by a reputable private research firm based in Glendale, Arizona. Data were collected seven days a week during specific times of the day. For example, potential respondents were telephoned between 6 p.m. and 9 p.m. Mountain Standard Time (MST) Monday through Friday and between

12 p.m. and 9 p.m. (MST) on Saturdays and Sundays.[2] These timeframes allowed interviewers the best possible opportunity to contact respondents. The interviews were conducted in English and Spanish (when necessary).

A number of steps were taken to minimize the risk of interviewer error. Several supervisors monitored interviewers by walking the call center floor and listening to in-progress interviews on private phone lines. As an additional precaution, a member of the research team was able to call a private phone line at the research firm to monitor active interviews. Interviewers were aware that they could be monitored by supervisors and research team members, but were unaware of the exact interviews that were being checked. Respondents were also unaware that anyone other than the interviewer was listening to the questionnaire. The research team member monitored interviews several times per week and ensured that various days and times were observed. A total of 11 complete and 10 partial interviews were monitored by the research team. This process allowed the research team to assess whether the interviewers were consistently and accurately administering the survey and if particular areas of the questionnaire were problematic. No problems were detected during interview monitoring. Each interview took an average of 21 minutes to complete.

[2] All telephone interviews were conducted from the research firm based in Arizona. There was a three hour time-zone difference during data collection between Arizona and Florida. Accordingly, interviews were conducted during MST to correspond with the appropriate Eastern Standard Time (EST) target timeframe. For example, weekday Florida interviews began around 3 p.m. (MST) and ended around 6 p.m. (MST), which translated into 6 p.m. (EST) and 9 p.m. (EST).

Sample Generation

The sample was generated using a list-assisted sampling method. Specifically, individuals believed to be 60 years of age or older in Arizona and Florida listed in the White Pages were included in the sampling frame. The research firm randomly dialed respondents from the list of phone numbers to produce a random sample of individuals 60 and older with listed telephone numbers in Arizona and Florida. Not all numbers on the list resulted in contact with people 60 or older. Some of the numbers were disconnected, business lines, fax machines, or received no answer. Phone numbers that received no answer (e.g., an answering machine responded, there was a busy signal, or no person answered) were reloaded into the firm's random dialing system every two hours. Callbacks were made until someone answered but were discontinued after 10 attempts.

When contact was made with a potential respondent, the interviewers administered a series of screening questions to determine age. Interviewers asked to speak to the person in the household 60 years of age or older. In the event that there was more than one person 60 or older in the home, the person with the next birthday was asked to participate in the interview. The incidence rate (i.e., the percentage of calls that resulted in an eligible respondent 60 years of age or older) was 69%.

One concern with the use of White Pages to generate the sample is that people who only use cell phones will be excluded from the sample. While this would certainly affect a sample consisting of all ages, it is of less concern for the

current sample. Cell phone usage has increased among the elderly population in recent years. According to a recent survey, about 87% of people 57-65 years, 68% of people 66-75 years, and 48% of people 75 or older own a cell phone (Zickuhr, 2011). However, older people are significantly more likely to also use landline telephones compared to younger individuals. One survey revealed that only 2% of U.S. respondents aged 65 or over use *only* a cell phone (Blumberg & Luke, 2007). Accordingly, use of the White Pages is a reasonable method to generate a sample of elderly people for a telephone survey.

The probability of contacting a respondent with a cognitive impairment (e.g., Alzheimer's disease or some form of dementia) was greater in the present study compared to studies of the general population because the target population was much older. Consistent with prior literature, this study excluded people with cognitive impairments from the sample using a cognitive screener (Acierno, Hernandez-Tejada, Muzzy, & Steve, 2009; Callahan, Unverzagt, Hui, Perkins, & Hendrie, 2002; Woodford & George, 2007). After establishing age eligibility, the interviewers administered Callahan and colleagues' (2002) Six-Item Screener (SIS) to exclude respondents with signs of cognitive impairment. The SIS was used because it is unobtrusive and takes less than one minute to administer. Additionally, the screener has a high predictive accuracy in community-based samples for cognitive impairment and dementia. The SIS is comprised of three sections. First, respondents are read a list of objects and asked to remember them. The items are "apple," "table," and "penny." Second, three orientation questions request respondents to identify the day, month, and year. Third, the respondents

are asked to repeat the three words they heard at the beginning of the screener. Folstein, Folstein, and McHugh's (1975) Mini-Mental State Examination (MMSE) was used to derive the three-item recall test. Each screener item scores one point for a correct response (range = 0 to 6). After a review of previous literature that has used the SIS and feedback provided by hired expert consultants, a cut-off of < 3 was used in the present study. Forty-six respondents were deemed ineligible after scoring less than 3 on the SIS and were excluded from participation in the study.

## Response Rate

Response rates consist of the percentage of eligible respondents that are contacted who agree to participate in the interview. Low response rates can result in biased data and misleading results (American Association for Public Opinion Research [AAPOR], 2011). For example, study results cannot be used to generalize to a larger population if a low percentage of the sampling frame actually participated in the study. Formulas used to calculate response rates vary by the type of information used (see AAPOR, 2011, p.44). Some formulas include cases of unknown eligibility in the response rate calculation. For example, busy signals, answering machines, and business lines might be included in the denominator which would result in lower response rates than if such cases were not included. This approach is overly restrictive. Cases of unknown eligibility (e.g., no answer, busy signals, and answering machines), known ineligibility (e.g., no person in household 60 years of age or older, disconnected numbers,

businesses, and fax machines), impaired respondents, and respondents who failed the cognitive screener were excluded from the response rate calculation.

The response rate formula for the present study includes the number of completed interviews (CI), partial interviews (PI), and refusals by eligible participants (REF) (AAPOR, 2011, p. 46). CIs consist of all interviews that were completed by eligible participants (i.e., 60 or older). PIs include interviews that eligible respondents began but failed to finish (e.g., they hung up during the interview). REF is the number of participants who self-reported to be 60 years of age or older but declined to be interviewed. Table 1 provides frequencies for each possible disposition of eligible cases in the study. The response rate formula used in the present study is as follows:

$$\text{Response rate} = CI/(CI + PI + REF)$$

$$\text{Response rate} = 2000_{CI}/(2000_{CI} + 414_{PI} + 1716_{REF}) = 2000/4130 = 0.4843$$

The response rate for the present study was 48.43%, which is comparable to those from other recent telephone survey research (Curtin, Presser, & Singer, 2005). The completion rate for this study was 82.90%, which is significantly higher than the 67.20% average for telephone surveys (Hox & De Leeuw, 1994).

Table 1

*Case dispositions*

| Dispositions | *N* |
|---|---|
| Impaired[a] | 71 |
| Failed cognitive screener | 46 |
| Refusals | 1716 |
| Partial interviews | 414 |
| Completed interviews | 2000 |
| Total eligible interviewees[b] | 4130 |

[a]Participant was impaired and unable to be interviewed.
[b]Total number eligible potential participants 60 years of age or older and not impaired.

Missing Data

It is common in survey research for respondents not to answer every question. Some researchers elect to use listwise deletion or mean replacement to deal with missing values, yet such procedures are problematic. Listwise deletion excludes usable data which reduces statistical power (Allison, 2001) and mean replacement is not preferable because it distorts variances and correlations (Roth, 1994; Schafer & Graham, 2002). An alternative strategy, similar response pattern imputation (SRPI), or hot-deck imputation, has been shown to be a superior imputation strategy because it introduces less bias in results (Gmel, 2001). With SRPI a missing value for a particular survey item for a specific respondent is imputed based on the value from another respondent that displayed a highly similar response pattern on other items. Specifically, a set of matching variables (e.g., gender, race, age, education, employment status, and marital status) is used

to match a missing case to a donor case and the new value is "donated" to the missing case. SRPI is also advantageous because it is able to impute continuous, ordinal, and dummy variables and it produces imputations that are within the range of possible values (Myrtveit, Stensrud, & Olsson, 2001).

This study used SRPI to substitute missing values, which is a procedure available in PRELIS version 2.30. Missing values were relatively rare in these data. Less than 1% of cells within the data file had missing information. After imputation of missing values, complete data for 1910 respondents were available for analysis. Ninety individuals had to be excluded from the analyses because their missing values could not be imputed.

## PARTICIPANTS

The purpose of this study is to test hypotheses derived from self-control theory and routine activity theory among people in the later stages of life. An age cut-point of 60 years was chosen to designate people as elderly and those included in the study. As previously discussed, the age at which a researcher chooses to classify a person as elderly is somewhat arbitrary, but 60 was selected for several reasons. Both the AOA and the U.S. Census Bureau consider the senior population to be those 65 years and older. A significant number of crime-related studies also use 60 years or older to classify people as elderly (Akers, La Greca, Cochran, & Sellers, 1989; Alves & Wilson, 2008; Dietz & Wright, 2005; Feldmeyer & Steffensmeier, 2007; Laumann, Leitsch, & Waite, 2008; Lewis, Fields, & Rainey, 2006). Additionally, the NIJ specified 60 years and older as the

target population within their request for proposal. Therefore, the present study defines "elderly" as 60 years or older because it captures people in the older population according to several government agencies and a host of prior empirical studies. Arizona and Florida were selected for the present study because they have two of the highest proportions of people 60 years or older in the U.S. For the entire U.S., 17.75% of the population is 60 or older. Arizona seniors comprise 19.29% of the total state population and 23.38% of Florida's population is 60 or older.

Table 2 presents the sample characteristics that reveal a majority of respondents were women (63.68%, *n* = 1273), about one-third were men (36.32%, *n* = 726), and the sample age ranged from 60 to 99 years with a mean of 72.40 years (*SD* = 8.08). With respect to racial composition, 91.94% (*n* = 1792) of the sample was White, 3.54% (*n* = 69) African American/Black, 1.44% (*n* = 28) American Indian or Alaska Native, 0.46% (*n* = 9) Asian, 0.15% (*n* = 3) Native Hawaiian or other Pacific Islander, and 2.46% (*n* = 48) identified themselves as "Other."[3] Participants were asked a separate question about ethnic background. About 3% (*n* = 59) of the sample was of Hispanic or Latino origin. Most participants were married (57.95%, *n* = 1148) at the time of the interview while

[3] The terms Hispanic and Latino are traditionally used to represent ethnic group origin; however, some Hispanic and Latino individuals use this heritage to describe their racial background. Interviewers were instructed to read the ethnic origin question first and the racial category question second during the interview without providing Hispanic/Latino as a response option in the racial question. Interviewers were instructed to record Hispanic/Latino as the respondent's race only if he or she offered an unsolicited response as such. Only 1.44% (*n* = 28) of the sample self-identified Hispanic/Latino as their racial category. All of these individuals also identified themselves ethnically as Hispanic/Latino. Accordingly, those that identified racially as Hispanic/Latino were grouped into the "other" racial category.

Table 2

*Sample Characteristics*

| | Overall Sample % | Arizona % | Florida % |
|---|---|---|---|
| *Age* (mean) | 72.40 | 72.05 | 72.75 |
| *Gender* | | | |
| Male | 36.32 | 37.30 | 35.33 |
| Female | 63.68 | 62.70 | 64.66 |
| *Race* | | | |
| White | 91.94 | 93.90 | 90.01 |
| Afr. Amer./Black | 3.54 | 1.24 | 5.81 |
| Amer. Ind./AK. Nat. | 1.44 | 0.93 | 1.94 |
| Asian | 0.46 | 0.83 | 0.10 |
| Nat. Haw./Pac. Isl. | 0.15 | 0.21 | 0.10 |
| Other | 2.46 | 2.89 | 2.04 |
| *Ethnicity* | | | |
| Latino | 2.96 | 3.82 | 2.11 |
| Otherwise | 97.04 | 96.18 | 97.89 |
| *Marital Status* | | | |
| Married | 57.95 | 60.93 | 54.98 |
| Widowed | 22.61 | 20.75 | 24.47 |
| Divorced | 14.84 | 14.78 | 14.90 |
| Separated | 1.11 | 0.40 | 1.81 |
| Never married | 3.48 | 3.14 | 3.83 |
| *Education* | | | |
| Some grade school | 1.41 | 0.50 | 2.32 |
| Some HS | 9.49 | 7.97 | 11.01 |
| Grad. HS | 17.87 | 14.83 | 20.90 |
| Grad. Tech./vocat. | 2.42 | 1.82 | 3.03 |
| Some college | 28.67 | 29.87 | 27.47 |
| Grad. college | 27.11 | 29.26 | 24.95 |
| Graduate/pro degree | 13.02 | 15.74 | 10.30 |
| *Employment Status* | | | |
| Working full-time | 12.36 | 11.47 | 13.25 |
| Working part-time | 9.75 | 9.15 | 10.34 |
| Retired | 73.27 | 74.94 | 71.59 |
| Unemployed | 3.42 | 3.42 | 3.41 |
| Homemaker | 1.21 | 1.01 | 1.41 |

*Note*: Percentages may not sum to 100 because of rounding.

22.61% (*n* = 448) of the sample reported being widowed, 14.84% (*n* = 294) divorced, 1.11% (*n* = 22) separated, and 3.48% (*n* = 69) said they had never been married. On the whole, respondents were relatively well educated as 17.87% (*n* = 354) graduated high school (or had an equivalent degree), 27.11% (*n* = 537) graduated college, 13.02% (*n* = 258) had a graduate or professional degree, 2.42% (*n* = 48) graduated from a technical or vocational school, and 28.67% (*n* = 568) had some college education. Almost 10% (*n* = 188) of the sample only completed a portion of high school whereas 1.41% (*n* = 28) of respondents achieved some grade school education. With respect to employment status, a majority of the sample was retired at the time of the interview (73.27%, *n* = 1458), 12.36% (*n* = 246) were working full-time, 9.75% (*n* = 194) working part-time, and only 3.42% (*n* = 68) unemployed. A small number of participants self-identified as "homemakers" (1.21%, *n* = 24).

Table 3 compares the split-sample characteristics for Arizona and Florida to 2010 census estimates for each of the state's senior populations. For the 60 years and older population in Arizona and Florida, the mean age is 70 and 71, respectively. Accordingly, the Arizona and Florida samples are slightly older than the senior populations of the two states. Thirty-seven percent of the Arizona sample is male, whereas 46% of the elderly Arizona population is male. Likewise, males comprise 35% of the Florida sample but 45% of the population according to the 2010 census. Accordingly, males are underrepresented in the Arizona and Florida samples.

Table 3

*Sample Characteristics Compared to U.S. Census Estimates*

| | State of Arizona | | State of Florida | |
|---|---|---|---|---|
| | 2011 Sample | 2010 Census | 2011 Sample | 2010 Census |
| Age (mean) | 72 | 70 | 73 | 71 |
| *Gender* | | | | |
| Male | 37% | 46% | 35% | 45% |
| *Race/Ethnicity* | | | | |
| White | 94% | 90% | 90% | 88% |
| *Education* | | | | |
| High school + | 92% | 85% | 86% | 82% |
| *Marital status* | | | | |
| Married | 61% | 62% | 55% | 58% |
| *Employment Status* | | | | |
| Employed | 21% | 23% | 24% | 22% |

There are slight differences with respect to racial/ethnic composition of the samples compared to census estimates. Ninety-four percent of the Arizona sample and 90% of the Florida sample self-identified as white. This is compared to whites representing 90% of the Arizona population and 88% of the Florida population. While the percentages are not drastic, both samples slightly over represent white respondents. About 85% of Arizonians and 82% of Floridians have a high school degree or higher. Ninety-two percent of the Arizona sample and 86% of the Florida sample have a high school degree or higher. Therefore, the sample is slightly more educated.

With respect to marital status, the Arizona and Florida samples approximate the decennial census estimates. Sixty-one percent of the Arizona sample was married at the time of the interview whereas 62% of the 60 and older population was married in 2010. About 55% of the Florida sample self-identified as married compared to 58% of the population. The marital status percentages vary only slightly between the samples and census estimates. Finally, the sample is also representative of the Arizona and Florida populations in terms of employment status. Twenty-one percent of the Arizona sample and 24% of the Florida sample indicated that they were employed during the interview. Of the 60 years and older population in Arizona and Florida, 23% and 22% are employed, respectively.

In summary, the overall sample includes respondents that are slightly older, female, white, and educated. These differences are not drastic. What is more, the sample is highly representative of the Arizona and Florida populations with respect to marital and employment status.

## SURVEY INSTRUMENT

The survey consisted of 86 questions but not every question was administered to each respondent because some items were screening questions. For example, if a respondent was a victim of a particular crime he or she was asked a series of follow-up questions about the most recent incident (e.g., the relationship between the perpetrator and the respondent). If a respondent was not a victim of the particular crime in question, the follow-up questions were not

asked. Items for the survey were developed specifically for the broader study and gleaned from the research literature. Items selection was also based on empirical validation (e.g., convergent and discriminant validity, internal consistency, and predictive accuracy). Additionally, the research team benefited from the advice of four outside consultants. These individuals are recognized experts in areas such as criminological theory, survey methodology, and elderly exploitation. These paid consultants provided feedback on the survey instrument.

The final draft of the survey instrument was approved by the Institutional Review Boards (IRB) at Arizona State University and Florida State University. Consistent with IRB requirements, all respondents were informed of the voluntary nature of the interview and that all answers would be completely anonymous. Furthermore, the anonymity of the respondents was protected by collecting no identifying information and by storing the data set on computers accessible only to members of the research team behind locked office doors.

## MEASURES

### Dependent Variables

*Self-reported criminal activity.* The present study used seven items to construct the dependent variables. Participants were asked to indicate how frequently they had done each of the following in the past year: "Parked a car in a place that you were not supposed to" (illegal parking), "Broke traffic laws while driving a motor vehicle" (traffic violation), "Drove a motor vehicle while under the influence of alcohol" (DUI), "Took an inexpensive item from a store without

paying for it" (shoplifting), "Deliberately wrote a bad check" (check fraud), "Took medication that was not prescribed to you" (illegal drug use), and "Slapped, kicked, or punched another person" (simple assault). The participants were asked to respond on a four-point Likert-type scale (1 = *never*, 2 = *rarely*, 3 = *sometimes*, and 4 = *frequently*). The distributions of responses for each of the self-reported offending items are provided in Table 4.

Table 4

*Distribution of Responses for Self-Reported Offending Items*

| | Response Set | | | |
|---|---|---|---|---|
| Items | Never % | Rarely % | Sometimes % | Frequently % |
| Illegal parking | 84.59 | 11.35 | 3.36 | 0.70 |
| Traffic violations | 53.16 | 26.58 | 15.36 | 4.90 |
| DUI | 91.01 | 6.38 | 2.06 | 0.55 |
| Shoplifting | 98.60 | 1.00 | 0.20 | 0.20 |
| Check fraud | 98.15 | 1.15 | 0.25 | 0.45 |
| Illegal drug use | 91.12 | 5.77 | 2.36 | 0.75 |
| Simple assault | 96.05 | 2.95 | 0.70 | 0.30 |

These particular items were chosen for several reasons. First, each of the offenses is consistent with Gottfredson and Hirschi's conceptualization of crime (i.e., they are acts of force or fraud undertaken in pursuit of self-interest). Second,

the items capture a wide range of offense seriousness. At the same time, the items include offenses known to be committed by seniors (Feldmeyer & Steffensmeier, 2007). Finally, overall criminal offending scales are often favored in the research literature because they capture respondents' diversity, breadth, and extent of criminal involvement (see Sampson & Laub, 1993).

Several offending dependent variables were formed from the seven items. The self-report offense items are treated as ordinal measures because the data are not truly interval. That is, the difference between 'frequently' and 'sometimes' may not be the same as between 'sometimes' and 'rarely.' A couple of techniques are available for constructing an offending scale based on ordinal items. One option is to simply sum the frequency values for each offense a person committed during the previous year. The problem with this method is that it places disproportionate weight on minor and high frequency offending (Sweeten, Bushway, & Paternoster, 2009). For example, a person that self-reported 'frequently' engaging in traffic violations (value = 4) and 'sometimes' parking illegally (value = 3) would be given more weight in the analyses than an individual who reported 'sometimes' assaulting people (value = 3) and 'rarely' driving under the influence of alcohol (value = 2). The latter person may not have engaged in as many offenses during the previous year, but his/her criminal offending is clearly more serious.

To handle this issue, the present study created a variety measure of self-reported offending. First, each item was dichotomized because there is a substantive difference between people who have committed a particular offense

and those that have not (i.e., 1 = *rarely, sometimes*, and *frequently*; 0 = *never*). Ultimately, this classification places people into offender and non-offender groups for each of the offenses. *Offending variety* was operationalized as a variety score by summing the binary responses of each item. The variety score does not place undue weight on minor or high frequency offending and it is commonly used in crime and justice research (see, e.g., Sweeten et al., 2009). The variety score ranges from a minimum of 0 for individuals who have not committed any of the offenses to a maximum of 7 for those that have committed each offense at least once during the previous year. On average, the sample committed less than one of the offenses during the past year ($M = 0.87$, variance = 1.03). Negative binomial models are used in the analyses because the offending variety score is a count measure. This issue will be discussed in further detail later in the chapter.[4]

*Driving offense items.* The present study also used four driving-related offenses as dependent variables. Specifically, a three-item additive *driving offense scale* was formed by summing 'traffic offenses,' 'illegal parking,' and 'DUI' using the original response set. PCA with varimax rotation revealed that the three items loaded onto a single component ($\lambda = 1.43$, loadings > .60). A natural log transformation was used to induce normality in the scale (skewness = 0.85). The three driving-related offenses were also used independently as separate dependent variables. *Illegal parking* and *DUI* are dichotomized because of their low

[4] An alternative operationalization of the offending scale was used to conduct sensitivity analyses. *Offending frequency* is a seven-item additive scale created by summing the items together in their original metric. A natural log transformation was used to induce normality in the scale (skewness = 1.21). Ordinary least-squares (OLS) regression is used to estimate models with this dependent variable.

prevalence and in order to distinguish between offenders and non-offenders. *Traffic violations* is treated as an ordered-categorical variable (skewness = 0.99).[5] Table 5 presents the summary statistics for the self-reported offending variety score, driving offense scale, and the individual offense items that are examined in the present study and sensitivity analyses.

Table 5

*Summary Statistics for Dependent Variables*

| Variables | Mean | SD | Minimum | Maximum |
|---|---|---|---|---|
| Offending variety | 0.87 | 1.02 | 0.00 | 7.00 |
| Driving offense scale | 1.35 | 0.29 | 1.10 | 2.48 |
| *Individual offense items* | | | | |
| Illegal parking | 0.15 | 0.36 | 0.00 | 1.00 |
| Traffic violation | 1.72 | 0.90 | 1.00 | 4.00 |
| DUI | 0.09 | 0.29 | 0.00 | 1.00 |
| Shoplifting | 0.01 | 0.12 | 0.00 | 1.00 |
| Check fraud | 0.02 | 0.13 | 0.00 | 1.00 |
| Illegal drug use | 0.09 | 0.28 | 0.00 | 1.00 |
| Simple assault | 0.04 | 0.19 | 0.00 | 1.00 |

[5] Sensitivity analyses were conducted to determine whether the present study's observed results are contingent on the specific types of crimes under consideration. To do so, each of the seven offense items was used as a separate dependent variable. *Shoplifting, check fraud, illegal drug use*, and *simple assault* are dichotomized for the same reason as discussed above.

Independent Variables

*Low self-control*. Considerable debate in the literature centers on the appropriate measurement of low self-control. In the present study, individual variations in self-control were captured using both attitudinal and behavioral items. For the attitudinal measure, respondents were asked to report their level of agreement for two items: "I do certain things that are bad for me, if they are fun" and "I often act without thinking through all of the alternatives" (1 = *strongly disagree*, 2 = *disagree*, 3 = *agree*, and 4 = *strongly agree*). The items were moderately correlated with one another ($r = .23$, $p < .01$) and coded so higher values indicate lower levels of self-control. Both items were adopted from the Tangney, Baumeister, and Boone (2004) brief self-control scale (BSC) and reflect two key dimensions of low self-control (i.e., impulsivity and risk seeking behavior). As noted, the BSC items are highly correlated with the larger total self-control scale (Tangney et al., 2004), have been shown to be reliable and valid indicators of self-control (Finkel & Campbell, 2001; Gailliot, Schmeichel, & Baumeister, 2006), and are associated with criminal and deviant behaviors (Holtfreter, Reisig, Piquero, & Piquero, 2010; Reisig & Pratt, 2011; Reisig, Wolfe, & Holtfreter, 2011). The present study addressed the controversy surrounding self-control measurement by also examining a behavioral indicator of low self-control.

Marcus's (2003) retrospective behavioral self-control scale (RBS) asks respondents about behaviors they engaged in during three phases of life—childhood, youth, and adult age. The present study adopted the behavioral low

self-control items from the adult component of the RBS. The behavioral low self-control items asked respondents to indicate how frequently in the past year they engaged in two behaviors: "Took a higher dosage of medicine than recommended by the doctor or the package insert" and "Borrowed something and did not return it" (1 = *never*, 2 = *rarely*, 3 = *sometimes*, and 4 = *frequently*). The behavioral items are correlated with one another ($r = .10$, $p < .01$) and coded so higher values indicate lower levels of self-control. These specific items have been shown to have some of the highest item-total correlations within the RBS (Marcus, 2003), to be valid indicators of self-control, and to significantly predict criminal offending (Ward, Gibson, Boman, & Leite, 2010). Table 6 presents the summary statistics for the attitudinal and behavioral low self-control items.

Principal components analysis (PCA) with varimax rotation was used to assess the dimensionality of the four low self-control items. It is important for the present study to assess the independent effect of attitudinal and behavioral low self-control on offending variety given the mixed evidence regarding proper measurement strategy. Therefore, it was necessary to use a technique that allows individual items to load on their respective components with minimal cross-loadings. PCA was used because it assesses the best linear combination of items that form a component without allowing for correlations between measured items and underlying factors (Fabrigar, Wegener, MacCallum, & Strahan, 1999; Thompson, 2004). PCA was chosen in favor over principal-axis factoring (PAF) because the latter allows correlations between the items and underlying factors. Similarly, varimax rotation was used rather than promax rotation because the

Table 6

*Summary Statistics for Low Self-Control Items*

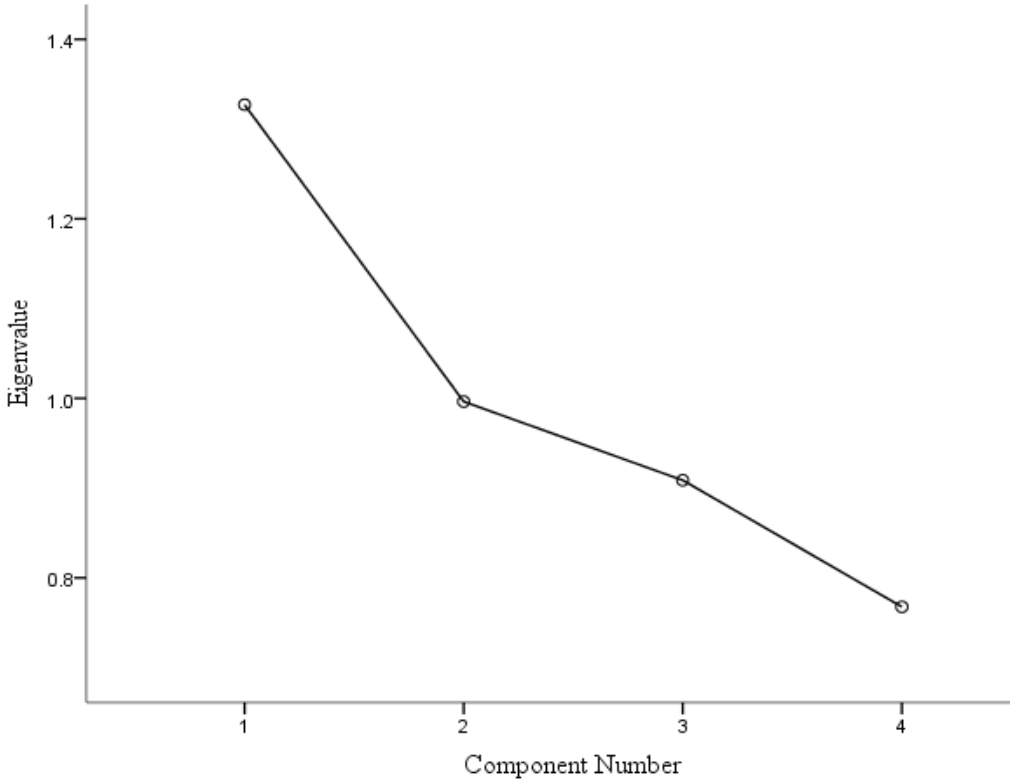
| Items | Mean | SD | Minimum | Maximum |
|---|---|---|---|---|
| *Attitudinal low self-control* | | | | |
| 1. I do certain things that are bad for me, if they are fun | 2.06 | 0.75 | 1.00 | 4.00 |
| 2. I often act without thinking through all of the alternatives | 1.94 | 0.71 | 1.00 | 4.00 |
| *Behavioral low self-control* | | | | |
| 3. Took a higher dosage of medicine than recommended by the doctor or the package insert | 1.16 | 0.45 | 1.00 | 4.00 |
| 4. Borrowed something and did not return it | 1.15 | 0.45 | 1.00 | 4.00 |

latter is an oblique rotation (i.e., it allows components to be correlated with one another).

The Kaiser criterion (i.e., the "K-1 rule") and examination of the scree plot revealed that the items represent two distinct low self-control components with eigenvalues greater than 1. Figure 3 presents the scree plot for the low self-control items.

Figure 3

*Scree Plot for Low Self-Control Items*




The PCA component loadings are displayed in Table 7. The component loadings demonstrate that the attitudinal ($\lambda = 1.33$, loadings > .70) and behavioral items ($\lambda = 1.00$, loadings > .70) coalesce onto their respective components. Therefore, *attitudinal low self-control* was operationalized as a two-item additive scale. The distribution of the scale scores approximates normality (skewness = 0.10).

Table 7

*Varimax-Rotated Principal Components for Low Self-Control Items*

| | Components | |
|---|---|---|
| Survey Items | 1 | 2 |
| *Attitudinal items* | | |
| 1. I do certain things that are bad for me, if they are fun | **0.79** | 0.04 |
| 2. I often act without thinking through all of the alternatives | **0.78** | 0.07 |
| *Behavioral items* | | |
| 3. Took a higher dosage of medicine than recommended by the doctor or the package insert | 0.04 | **0.75** |
| 4. Borrowed something and did not return it | 0.06 | **0.73** |
| Eigenvalue = | 1.33 | 1.00 |

*Note*: Loadings greater than 0.70 are shown in boldface type.

*Behavioral low self-control* was also operationalized as a two-item additive scale. The scale was positively skewed so a nonlinear monotonic transformation was performed (i.e., natural log transformation) to induce normality (Ferketich & Verran, 1994). The transformation improved the distribution of the scale (skewness = 2.18). For both scales, higher values indicate lower levels of self-control. Table 8 provides the summary statistics for both low self-control scales.

Table 8

*Summary Statistics for Low Self-Control Scales*

| Variables | Mean | SD | Minimum | Maximum |
|---|---|---|---|---|
| Attitudinal low self-control | 4.00 | 1.15 | 2.00 | 8.00 |
| Behavioral low self-control | 2.31 | 0.73 | 2.00 | 8.00 |

*General routine activities.* One goal of the present study is to examine the generality of routine activity theory and to broadly understand the effect of opportunity on late life offending. There are two views on how to operationalize opportunity within a routine activity framework—one general and one specific (Felson & Boba, 2010; Osgood, Wilson, O'Malley, Bachman, & Johnston, 1996). A majority of the analyses in the present study examine Osgood and colleagues' general routine activity theory. Guided by prior research, this study uses self-reported routine activity measures that capture unstructured socializing that takes place away from home (Averdijk, 2011; Maimon & Browning, 2010; Osgood & Anderson, 2004; Osgood et al., 1996). Unstructured socializing was assessed by asking participants how frequently in the past year they "Went to a movie, restaurant, club meeting, or other group event" (social/group event), "Participated in social activities away from home" (activity away from home), and "Exercised and/or participated in leisure sports" (leisure sports). All items featured a four-

point Likert-type scale (1 = *never*, 2 = *rarely*, 3 = *sometimes*, and 4 = *frequently*).[6] The general routine activity item summary statistics are provided in Table 9.

Table 9

*Summary Statistics for General Routine Activity Items*

| Items | Mean | SD | Minimum | Maximum |
|---|---|---|---|---|
| Social/group event | 3.19 | 0.93 | 1.00 | 4.00 |
| Activity away from home | 3.19 | 0.93 | 1.00 | 4.00 |
| Leisure sports | 2.91 | 1.13 | 1.00 | 4.00 |

Most routine activity theory research assesses the impact of individual activities on criminal activity. This is appropriate in some circumstances but the method can cause problems in regression analyses. Namely, multicollinearity may become a problem in a regression equation that includes several types of routine activities that are highly correlated with one another (Berry, 1993). Therefore, the dimensionality of the general routine activity items was assessed using PAF with promax rotation. PAF was used because the technique allows the measured items to be correlated with the underlying factors (Fabrigar et al., 1999; Thompson,

[6] Osgood et al. (1996) did not include alcohol-related activities in their analyses because most of their sample was below the legal drinking age of 21. Ultimately, they wanted to avoid the tautology of using an *illegal* routine activity to predict criminal behavior. To stay consistent with their analyses drinking-related routines were not included in the present analyses. However, sensitivity analyses discussed in the results chapter examines the role that frequenting drinking establishments plays in providing opportunities for crime. Respondents were asked how frequently in the past year they "Went to a drinking establishment, like a bar, tavern, or lounge" (drinking routines) (skewness = 0.97). The response set for this item is identical to that for the other general routine activity items.

2004). PAF was used to allow for correlations between the items and potential underlying factors because there is insufficient evidence to specify an *a priori* model with elderly unstructured and structured activities as distinct concepts (in the same manner as they often are for juveniles).

The general routine activity items—'social/group events,' 'activities away from home,' and 'leisure sports'—were included in the PAF.[7] Diagnostic analyses were conducted to determine the factorability of the routine activity items. A statistically significant Bartlett test of sphericity indicated that the null hypothesis that the routine activity items were uncorrelated could be rejected ($\chi^2 = 646.08$, $p < .01$). This is evidence that factor-analytic techniques are appropriate (Tobias & Carlson, 1969). Furthermore, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.60 indicating that the items are psychometrically related and appropriate for factor analysis (Kaiser, 1970).

The Kaiser criterion and scree plot demonstrate that the items yield a single factor with an eigenvalue over 1. The scree plot is presented in Figure 4 and Table 10 features the PAF factor loadings. The results confirm that the general routine activity items load onto a single factor ($\lambda = 1.66$, factor loadings > 0.40).

[7] Additional analyses revealed that the 'drinking routines' item failed to load with the other routine activity items, thus providing additional evidence that it should be excluded from the scale.

Figure 4

*Scree Plot for Routine Activity Items*

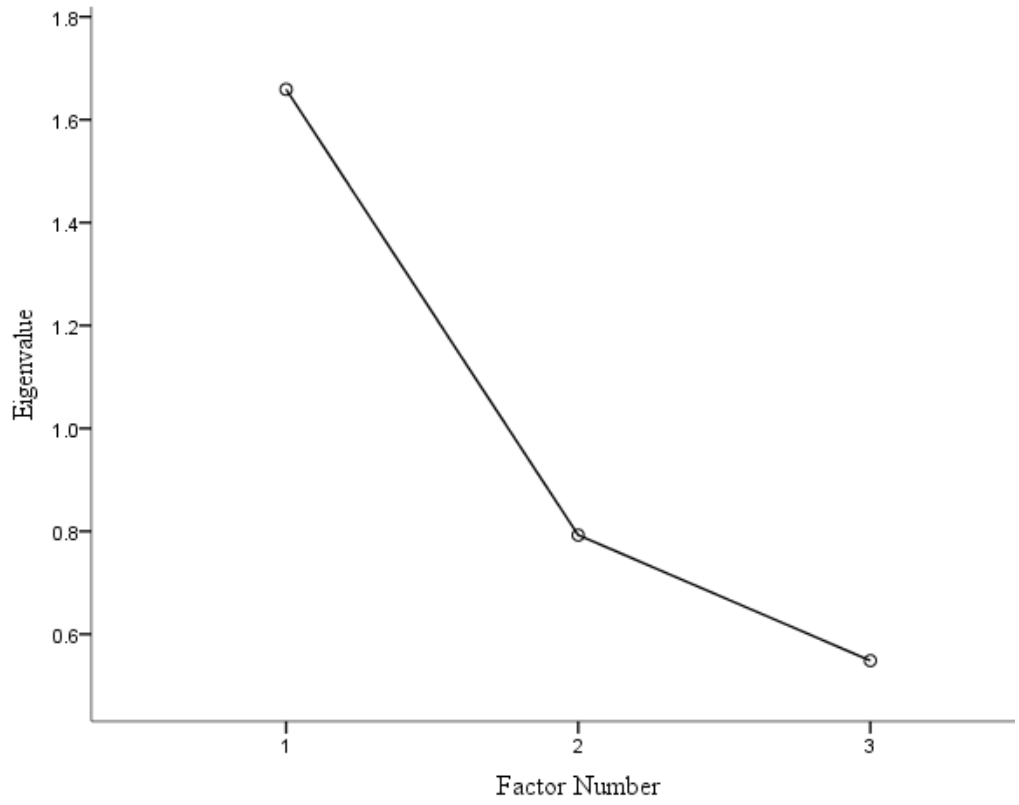



Table 10

*Promax-Rotated Principal-Axis Factor Loadings for Routine Activity Items*

| Items | | Factor Loadings |
|---|---|---|
| 1. Social/group events | | 0.59 |
| 2. Activities away from home | | 0.76 |
| 3. Leisure sports | | 0.40 |
| | Eigenvalue = | 1.66 |

It is important to note that Osgood and associates (1996) treated participation in leisure sports as a structured activity. The factor-analytic results provide preliminary evidence that routine activities are different for the elderly than for teenagers because the various types of routines load onto the same factor. Perhaps the overall daily lives of the elderly are less structured than younger age groups. For example, retirement provides elders with unstructured living situations (Iso-Ahola, Jackson, & Dunn, 1994; Scherger, Nazroo, & Higgs, 2011). This may help explain why the routine activities in Table 10 are distinct for younger people but are related to one another among the elderly. Also, participating in sports is typically a structured activity for youth because the activity often takes place in the presence of authority figures (e.g., coaches). This activity may be less structured for the elderly because they may participate in leisure sports (e.g., golf) in unstructured settings away from effective guardianship (e.g., away from the supervision of a spouse).

*Routine activity* was operationalized as an additive scale comprised of the three items (see Table 10). The scale displays reasonable internal consistency ($\alpha$ = 0.58, mean inter-item $r$ = 0.33) and the distribution of scale scores is near normal (skewness = -0.76). Higher values indicate greater frequency of participation in the unstructured activities away from home.

*Specific opportunity*. One of the research objectives of the present study is to examine whether general or specific opportunities better explain elderly offending. This study assessed the role of specific opportunity by asking participants whether they have access to a motor vehicle (i.e., "Do you have

access to or own a motor vehicle?"). Access to a motor vehicle provides the opportunity to commit driving-related offenses (e.g., drunk driving, breaking traffic laws, and parking illegally). *Access to a vehicle* is operationalized as a dummy variable (1 = *yes*, 0 = *no*). Table 11 presents the summary statistics for the general routine activity scale and the specific opportunity variable used in the analyses.

Table 11

*Summary Statistics for Opportunity Variables*

| Variables | Mean | SD | Minimum | Maximum |
|---|---|---|---|---|
| *General routine activities* | | | | |
| Routine activity scale | 9.30 | 2.20 | 3.00 | 12.00 |
| *Specific opportunity* | | | | |
| Access to vehicle | 0.94 | 0.23 | 0.00 | 1.00 |

Consistent with Felson and Boba's (2010) version of routine activity theory, it is hypothesized that the specific opportunity variable will be related to its respective offenses to a greater magnitude than the general routine activity scale is. That is, having the ability to use a vehicle provides access to driving-offense opportunities but this opportunity should have a weaker relationship with general offending (or offenses irrelevant to the activity) when compared to the effect of general routine activities.

Control Measures

Several additional measures were included in the analyses as statistical controls. Respondents' health status may affect their ability to participate in certain daily routines. It was important to control for respondents' health in order to obtain an unbiased estimate of routine activities on offending. Respondents were asked, "Overall, how would you rate your health during the past month?" (1 = *very poor*, 2 = *poor*, 3 = *fair*, 4 = *good* and 5 = *excellent*). *Health* is an ordered-categorical variable and is coded so higher values indicated better health. The distribution of scores approximates normality (skewness = - 0.90). On average, the sample self-reported 'good' health ($M$ = 4.05).

Life course research has demonstrated that marriage quality is inversely associated with criminal activity (Giordano, Cernkovich, & Rudolph, 2002; Laub & Sampson, 2003; Sampson & Laub, 1993, 2005; Sampson, Laub, & Wimer, 2006). Respondents' were asked whether they were currently married, widowed, divorced, separated, or never married. Married individuals were asked whether they were extremely unhappy, fairly unhappy, fairly happy, or extremely happy with their marriage. *Marital satisfaction* is a dummy variable coded 1 if the participant reported being "extremely happy" with his or her marriage (0 = *otherwise*). The variable distinguishes between respondents that are extremely happily married from others that do not report such marital satisfaction. About 43% of the sample reported that they were extremely happy with their marriage.

Life course researchers have also found that people who are employed engage in less criminal activity (Laub & Sampson, 2003; Sampson & Laub, 1993,

2005). Respondents were asked whether they were currently working full-time, working part-time, retired, or unemployed. Employment status was captured with two dummy variables—*unemployed* and *retired*. Being employed either full- or part-time serves as the reference category. To further disentangle the effect of employment on offending, employed respondents were asked "All things considered, how satisfied are you with your current job?" (1 = *very dissatisfied*, 2 = *dissatisfied*, 3 = *satisfied*, and 4 = *very satisfied*). *Job satisfaction* is a binary variable that compares respondents who are "very satisfied" with their current job to everyone else (1 = *very satisfied*, 0 = *otherwise*). Approximately 11% of the sample reported that they were very satisfied with their job.

Research has demonstrated that the quality of the relationship between elders and their children significantly effects their life satisfaction and decreases the risk of depression (Byers, Levy, Allore, Bruce, & Kasl, 2008; Lowenstein, Katz, & Gur-Yaish, 2007). Respondents with at least one child were asked "Overall, how happy do you feel about your relationship with your child?" (1 = *extremely happy*, 2 = *fairly happy*, 3 = *fairly unhappy*, and 4 = *extremely unhappy*). *Parental satisfaction* is dummy coded and captures extremely happy parents (1 = *extremely happy*, 0 = *otherwise*). A majority of the sample reported that they were extremely happy parents (62%).

Additionally, life course research has established that military service is an important turning point that leads to desistance from criminal behavior (Laub & Sampson, 2003; Sampson & Laub, 1993). The present study controlled for *military service* with a dummy variable (1 = *served in military*, 0 = *otherwise*)

with the assumption that prior military service may have an inverse effect on current offending. One-quarter of the sample has served in the U.S. military.

Finally, several demographic characteristics were also included. The dummy variables *male* (1 = *male,* 0 = *female*), *white* (1 = *white,* 0 = *racial minority*),[8] and *Hispanic/Latino* (1 = *Hispanic/Latino,* 0 = *otherwise)* were used to control for respondents' gender, race, and ethnicity. *Education* was operationalized as an ordered-categorical variable (1 = *some grade school,* 2 = *some high school,* 3 = *high school graduate or equivalent,* 4 = *technical or vocational school,* 5 = *some college,* 6= *graduated college,* 7 = *graduate/professional school*) and *age* was measured in years. Summary statistics for all control variables are presented in Table 12.

[8] As discussed previously, there are relatively low frequencies of racial minority categories other than African-Americans. As such, a single racial minority variable was constructed. African-Americans are the majority represented in this variable.

Table 12

*Summary Statistics for Control Variables*

| Variables | Mean | SD | Minimum | Maximum |
|---|---|---|---|---|
| Health | 4.05 | 0.87 | 1.00 | 5.00 |
| Marital satisfaction | 0.43 | 0.50 | 0.00 | 1.00 |
| Retired | 0.73 | 0.44 | 0.00 | 1.00 |
| Unemployed | 0.03 | 0.18 | 0.00 | 1.00 |
| Job satisfaction | 0.11 | 0.31 | 0.00 | 1.00 |
| Parental satisfaction | 0.62 | 0.49 | 0.00 | 1.00 |
| Military service | 0.25 | 0.43 | 0.00 | 1.00 |
| Male | 0.36 | 0.48 | 0.00 | 1.00 |
| Age | 72.40 | 8.08 | 60.00 | 99.00 |
| White | 0.92 | 0.27 | 0.00 | 1.00 |
| Hispanic/Latino | 0.03 | 0.17 | 0.00 | 1.00 |
| Education | 4.81 | 1.60 | 1.00 | 7.00 |

## ANALYTIC STRATEGY

Hypothesis testing is carried out using several types of regression analyses. Various model diagnostic tests are conducted to ensure appropriate regression assumptions are not violated. Pearson correlations and variance inflation factor (VIF) coefficients are inspected to determine whether harmful levels of collinearity exist prior to model estimation (Fox, 1991; Tabachnick & Fidell, 2007). High collinearity is problematic in regression analyses because it inflates standard errors (Berry, 1993). The models also examine for heteroscedasticity, which results when the error term from the dependent variable

is correlated with an included or excluded independent variable (Berry, 1993; Tabachnick & Fidell, 2007). Heteroscedasticity is problematic because it can result in upwardly biased standard errors. The Breusch-Pagan test is used to inspect for heteroscedasticity.

The analyses use robust standard errors that correct for clustering by 5-digit zip code (Long & Freese, 2006). Clustering of respondents in particular zip codes is problematic because it violates the regression assumption of independent observations (Berry, 1993). Robust standard errors with clustering help correct for non-independence and also partial out heteroscedasticity.

The first step in the analyses examines the Pearson's correlations between the dependent and independent variables to determine whether significant associations exist to warrant multivariate analyses. The regression analyses that follow these preliminary steps are separated into three sections. The analytic strategy for each section is described below.

## General versus Specific Opportunity

The first section of the results chapter compares Osgood and associates' (1996) general routine activity measure to Felson and Boba's (2010) specific opportunity measure. The self-reported offending measure is a count variable with a nonnormal distribution. Most respondents reported no participation in criminal activity (i.e., the mode is zero). Descriptive statistics also suggest that the distribution is overdispersed ($M$ = 0.87, variance = 1.02). Accordingly, negative binomial regression is used (Land et al., 1996). The dispersion parameter ($\alpha$) and

likelihood ratio test of alpha are used to confirm whether the data are overdispersed.

One model assesses the effect of general routine activities on offending variety and a separate model examines the effect of specific opportunity on offending. As discussed above, it is expected that general routine activities will be related to offending variety to a greater degree than the specific indicator.

A sensitivity analysis is conducted using a different operationalization of the dependent variable and modeling techniques to assess the robustness of the results. An ordered-categorical criminal offending scale is used which is comprised of the original seven items with the original response set (ranging from *never* to *frequently)*. Because the distribution of scale scores is skewed, a natural log transformation is used to induce normality. An ordinary least squares (OLS) regression model is estimated using this operationalization of the dependent variable.

The opportunity measures are also compared using the specific driving offense items. OLS regression is used to estimate the effect of each opportunity measure on the *driving offense scale* and *traffic violations* because they are ordered-categorical variables. Logistic regression is used to estimate the effects of the measures on *illegal parking* and *DUI* because these offenses are binary outcomes. As mentioned previously, it is hypothesized that the specific opportunity measure will have stronger effects on driving offenses compared to the general indicator's effect.

Is the Effect of Low Self-Control Invariant?

The second section of the results chapter investigates whether the effect of low self-control on offending is invariant across subgroups. To begin, a negative binomial regression model is estimated to determine whether low self-control has a significant effect on late life offending. Next, bivariate tests are conducted to determine whether there are significant differences between groups with respect to the correlations between low self-control and offending (i.e., Fisher's *z*).

Various split-sample negative binomial regression models are then estimated to determine whether low self-control has a uniform effect on self-reported offending for different groups of individuals. First, the association between low self-control and offending is evaluated between males and females. Second, the invariance of low self-control on offending is assessed between whites and racial/ethnic minorities. Finally, the sample is split into three age groups—young-old (60 to 72), old-old (73-79), and oldest-old (80 and older). These age groups are consistent with gerontological research that examines the social and psychological experiences of elderly people in different stages of late life (see, e.g., Suzman, Willis, & Manton, 1992). Sensitivity analyses are used to evaluate the robustness of the results. Specifically, self-reported offending is operationalized as an ordered-categorical measure and OLS regression used as the statistical modeling procedure. The Clogg, Petkova, and Haritou (1995) *z*-test is used to test the equality of regression coefficients garnered from these analyses. This test determines whether differences in the effects of low self-control on

offending across groups are statistically significant. The invariance thesis is supported in the event that the *z*-test is not statistically significant.

## Low Self-Control, Routine Activity, and Offending in Late Life

The final set of analyses investigates whether low self-control and general routine activities are associated with elderly criminal activity, net of statistical controls. Again, the analyses estimate a series of negative binomial regression models. The first model assesses the independent effect of low self-control on offending variety. The effect of the general routine activity measure on offending variety is assessed in the second model. The third model enters low self-control and routine activities into the equation simultaneously. Overall, these models speak to the generality of both theoretical frameworks and determine whether opportunity mediates the link between low self-control and offending variety or if low self-control confounds the effect of routine activity on offending. Sensitivity analyses are used to assess the robustness of the results.

# CHAPTER 4

# RESULTS

## INTRODUCTION

This chapter is comprised of three sections. The first section reports the results from a variety of tests of whether general routine activity or specific opportunity indicators are better predictors of criminal offending. The second section features analyses that explore the low self-control invariance thesis. Here, the effects of low self-control are observed across various sub-categories of the elderly sample (e.g., gender and race/ethnicity). Finally, the empirical assessment contained in the third section examines the role of low self-control and routine activities in explaining criminal behavior committed during late life. Before reporting the results, it is necessary to conduct some preliminary tests. Accordingly, the chapter opens with a discussion of model diagnostics.

## MODEL DIAGNOSTICS

Pearson's *r* correlation coefficients provide useful information regarding the relationship between independent variables which can prove helpful when constructing multivariate models. Table 13 features Pearson's correlations between the independent variables used in the regression models presented in this chapter. As can be seen in the table, almost all of the bivariate correlations fall well below the traditional threshold of an absolute value of 0.70 (Tabachnick &

Table 13

*Pearson's Correlations for Independent Variables*

| | X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | X9 | X10 | X11 | X12 | X13 | X14 | X15 | X16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X1 Att. low self-control | 1.00 | | | | | | | | | | | | | | | |
| X2 Beh. low self-control | .12 | 1.00 | | | | | | | | | | | | | | |
| X3 Routine activity | -.11 | -.01 | 1.00 | | | | | | | | | | | | | |
| X4 Access to a vehicle | -.05 | -.04 | .15 | 1.00 | | | | | | | | | | | | |
| X5 Health | -.09 | -.08 | .32 | .09 | 1.00 | | | | | | | | | | | |
| X6 Marital satisfaction | -.06 | -.05 | .13 | .12 | .14 | 1.00 | | | | | | | | | | |
| X7 Retired | .04 | -.03 | -.06 | -.04 | -.07 | .02 | 1.00 | | | | | | | | | |
| X8 Unemployed | .03 | .01 | -.04 | -.06 | -.09 | -.06 | -.31 | 1.00 | | | | | | | | |
| X9 Job satisfaction | -.05 | -.01 | .08 | .06 | .12 | .06 | -.58 | -.07 | 1.00 | | | | | | | |
| X10 Parental satisfaction | -.01 | -.05 | .06 | .02 | .10 | .17 | .07 | -.01 | .01 | 1.00 | | | | | | |
| X11 Military service | .04 | .05 | -.04 | .06 | -.01 | .12 | .06 | -.06 | -.01 | -.01 | 1.00 | | | | | |
| X12 Male | .08 | .02 | -.06 | .10 | -.02 | .18 | .00 | -.04 | .01 | -.08 | .66 | 1.00 | | | | |
| X13 Age | .08 | -.05 | -.16 | -.15 | -.11 | -.15 | .32 | -.02 | -.19 | .12 | .04 | -.05 | 1.00 | | | |
| X14 White | -.04 | -.02 | .11 | .11 | .06 | .04 | .02 | -.02 | .00 | .02 | -.01 | -.03 | -.02 | 1.00 | | |
| X15 Hispanic | .02 | .02 | -.02 | -.01 | -.02 | -.02 | .02 | .00 | .00 | -.01 | .01 | .04 | .03 | -.29 | 1.00 | |
| X16 Education | -.11 | .01 | .26 | .12 | .12 | .08 | -.05 | -.04 | .07 | -.05 | .07 | .12 | -.12 | .09 | -.02 | 1.00 |

Fidell, 2007). Not surprisingly, two sets of variables were highly correlated with one another—retired and job satisfaction ($r$ = -0.58, $p < 0.05$) and military service and male ($r$ = 0.66, $p < 0.05$). Several additional model diagnostics were conducted after estimating fully specified ordinary least-squares regression (OLS) models to determine whether harmful levels of collinearity would bias parameter estimates. These analyses revealed several important findings. First, the highest variance inflation factor (VIF) is 2.11 which is below the traditionally accepted threshold of 4.0 (Tabachnick & Fidell, 2007). Furthermore, none of the condition indices exceed 22 which is well under the commonly used threshold of 30 (Belsley, Kuh, & Welsch, 1980; Mason & Perreault, 1991). In summary, the bivariate correlations and other diagnostics provide ample evidence that harmful collinearity is not a concern in any of the analyses presented in this chapter.

## GENERAL VERSUS SPECIFIC OPPORTUNITY

Routine activity theory provides a framework for understanding the role of opportunity in criminal behavior. In recent years, two competing conceptualizations of opportunity have been used to test routine activity theory. One camp of researchers argues that criminal opportunities manifest during legal everyday activities (Osgood et al., 1996). Therefore, criminal behavior is best explained by general routine activities that people participate in on a daily basis. Another camp of scholars maintains that specific opportunities are related to specific types of crimes (Felson & Boba, 2010; Felson & Clarke, 1998). To date, the theory has been tested almost entirely on samples of adolescents (Anderson &

Hughes, 2009; Osgood & Anderson, 2004; Osgood et al., 1996). However, the competing conceptualizations of opportunity have not been subjected to empirical testing using individuals in the late years of life. The following analyses examine the influence of general routine activity and specific opportunity measures on late life offending to fill this void in the literature.

## Preliminary Hypothesis Testing

Preliminary hypothesis testing was conducted by estimating Pearson's *r* correlation coefficients (see Table 14). Consistent with expectations, the key independent variables are significantly correlated with the dependent variables. In particular, routine activity is significantly correlated in the hypothesized direction with the criminal offense outcomes. Individuals who more frequently engage in unstructured socializing away from home are likely to be involved in a greater variety of offending ($r = 0.10$, $p < 0.05$), overall driving offenses ($r = 0.12$, $p < 0.05$), traffic violations ($r = 0.10$, $p < 0.05$), illegal parking ($r = 0.09$, $p < 0.05$), and driving under the influence (DUI) ($r = 0.07$, $p < 0.05$). With respect to the specific opportunity indicator, seniors that have access to a vehicle participate in a greater variety of criminal offending ($r = 0.09$, $p < 0.05$). Not surprisingly, individuals with cars are also more likely to commit driving-related offenses ($r = 0.12$, $p < 0.05$), violate traffic laws ($r = 0.10$, $p < 0.05$), park illegally ($r = 0.05$, $p < 0.05$), and DUI ($r = 0.05$, $p < 0.05$). Of course, Pearson's *r* is only useful as a precursor to multivariate models, the latter of which provide more accurate estimates of the effect of the independent variables on the dependent variables.

Table 14

*Pearson's Correlations*

| | Offending variety | Driving offense scale | Traffic offenses | Illegal parking | Driving under the influence |
|---|---|---|---|---|---|
| Routine activity | 0.10 | 0.12 | 0.10 | 0.09 | 0.07 |
| Access to a vehicle | 0.09 | 0.12 | 0.10 | 0.05 | 0.05 |
| Health | 0.00 | 0.04 | 0.04 | 0.02 | 0.02 |
| Marital satisfaction | 0.02 | 0.04 | 0.06 | -0.01 | -0.02 |
| Retired | -0.13 | -0.15 | -0.14 | -0.08 | -0.06 |
| Unemployed | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 |
| Job satisfaction | 0.08 | 0.10 | 0.10 | 0.06 | 0.06 |
| Parental satisfaction | -0.09 | -0.07 | -0.06 | -0.05 | -0.03 |
| Military service | 0.12 | 0.15 | 0.13 | 0.06 | 0.10 |
| Male | 0.21 | 0.26 | 0.23 | 0.13 | 0.15 |
| Age | -0.19 | -0.23 | -0.23 | -0.09 | -0.12 |
| White | 0.00 | 0.04 | 0.06 | 0.00 | -0.01 |
| Hispanic/Latino | 0.00 | 0.02 | 0.02 | 0.02 | 0.00 |
| Education | 0.10 | 0.14 | 0.15 | 0.05 | 0.06 |

What is more, the variance of a correlation coefficient is vulnerable to non-normality (Kowalski, 1972). Accordingly, the bivariate correlations may be artificially weak because offending variety it is a count variable that is not distributed normally (Bollen & Barb, 1981; Kowalski, 1972; O'Brien, 1979). Negative binomial regression should be used to assess the association between independent variables and count outcomes (Land, McCall, & Nagin, 1996).

Table 14 also presents the Pearson's *r* correlation coefficients between the dependent variables and the control variables used in the regression models. Many of the control variables are correlated with the different operational forms of criminal offending. However, male and age are most strongly related to offending. Being male is positively correlated with the offending variety scale ($r = 0.21$, $p < 0.05$), driving offense scale ($r = 0.26$, $p < 0.05$), traffic offenses ($r = 0.23$, $p < 0.05$), illegal parking ($r = 0.13$, $p < 0.05$), and DUI ($r = 0.15$, $p < 0.05$). Age is negatively associated with offending variety ($r = -0.19$, $p < 0.05$), driving offenses ($r = -0.23$, $p < 0.05$), traffic violations ($r = -0.23$, $p < 0.05$), parking illegally ($r = -0.09$, $p < 0.05$), and DUI ($r = -0.12$, $p < 0.05$). From a bivariate standpoint, the data offer preliminary evidence in support of the gender-gap in offending (Lauritsen, Heimer, & Lynch, 2009; Steffensmeier & Allan, 1996) and the age-crime link (Hirschi & Gottfredson, 1983). It is important to include these two variables and other variables as statistical controls in multivariate models to rule out the possibility of spuriousness. After all, respondents' health status could influence the amount of activity they participate in away from home. Therefore, it is important to control for health in the regression models presented in this chapter in order to obtain an unbiased estimate of the effect of routine activity on criminal offending. Life course research has demonstrated that marital satisfaction, being employed, job satisfaction, and military service are inversely related to criminal activity (Giordano, Cernkovich, & Rudolph, 2002; Laub & Sampson, 2003; Sampson & Laub, 1993, 2005; Sampson, Laub, & Wimer, 2006). Gerontologists have also shown that parental satisfaction is associated with

positive life outcomes (Byers, Levy, Allore, Bruce, & Kasl, 2008; Lowenstein, Katz, & Gur-Yaish, 2007). And, finally, race and ethnicity have long been shown to be associated with criminal behavior (see, e.g., Sampson & Wilson, 1995). Provided the bivariate correlations presented in Table 14 and the results of prior literature, these variables are necessary statistical controls in the multivariate models.

## Multivariate Models

Table 15 presents the results from three negative binomial models estimated by regressing the offending variety scale onto the general routine activity and specific opportunity measures. Separate models are estimated to assess the independent and simultaneous effects of the general and specific measures. Recall that the offending variety scale variance exceeds the mean ($M$ = 0.87, variance = 1.03) which suggests the distribution of scores is overdispersed (Land et al., 1996). Moreover, the null hypothesis that the residual variance parameter is 0 (i.e., likelihood ratio [LR] test that $\alpha = 0$) can be rejected at the 0.01 level in all three models which provides evidence that a negative binomial model fits the data better than a Poisson model (Long & Fresse, 2006).

Model 1 in Table 15 examines the effect of the general routine activity scale on offending variety, net of statistical controls. The statistically significant Wald $\chi^2$ test (223.70, $p < 0.01$) shows that the model fits the data better than would be expected by chance alone. Several important relationships emerge from the analysis. To begin, the effect of the demographic characteristics on criminal

Table 15

*The Effects of General Routine Activities and Specific Opportunity on Offending Variety*

| Variables | Offending variety[a] | | | | | |
|---|---|---|---|---|---|---|
| | Model 1 | | Model 2 | | Model 3 | |
| | *b* (s.e.) [IRR] | *z*-score | *b* (s.e.) [IRR] | *z*-score | *b* (s.e.) [IRR] | *z*-score |
| Routine activity *(General)* | 0.06 (0.01) [1.06] | 4.35** | --- | --- | 0.05 (0.01) [1.06] | 4.06* |
| Access to a vehicle *(Specific)* | --- | --- | 0.34 (0.21) [1.40] | 1.57 | 0.30 (0.21) [1.35] | 1.40 |
| Health | -0.06 (0.03) | -1.99* | -0.03 (0.03) | -0.92 | -0.06 (0.03) | -2.02* |
| Marital satisfaction | -0.09 (0.05) | -1.60 | -0.08 (0.05) | -1.49 | -0.09 (0.05) | -1.73 |
| Retired | -0.16 (0.07) | -2.11* | -0.15 (0.08) | -2.03* | -0.15 (0.08) | -2.01* |
| Unemployed | -0.02 (0.15) | -0.14 | -0.02 (0.15) | -0.11 | -0.01 (0.15) | -0.03 |
| Job satisfaction | 0.04 (0.17) | 0.25 | 0.01 (0.10) | 0.13 | 0.01 (0.10) | 0.14 |
| Parental satisfaction | -0.12 (0.05) | -2.36* | -0.11 (0.05) | -2.11* | -0.13 (0.05) | -2.40* |
| Military service | 0.01 (0.07) | 0.18 | 0.01 (0.07) | 0.16 | 0.01 (0.07) | 0.14 |
| Male | 0.47 (0.07) | 7.17** | 0.44 (0.07) | 6.76** | 0.47 (0.07) | 6.97** |
| Age | -0.02 (0.00) | -6.01** | -0.02 (0.00) | -6.34** | -0.02 (0.00) | -5.88** |
| White | -0.05 (0.12) | -0.41 | -0.05 (0.12) | -0.41 | -0.08 (0.12) | -0.64 |
| Hispanic/Latino | 0.00 (0.14) | 0.01 | 0.00 (0.14) | 0.02 | -0.01 (0.14) | -0.07 |
| Education | 0.02 (0.02) | 1.00 | 0.03 (0.02) | 1.83 | 0.02 (0.02) | 0.90 |
| LR test of $\alpha$ = | 5.01* | | 5.60** | | 4.66* | |
| Wald $\chi^2$ = | 223.70** | | 180.13** | | 222.62** | |
| McFadden's $R^2$ = | 0.04 | | 0.04 | | 0.04 | |

*Note*. Entries are unstandardized partial regression coefficients (*b*), robust standard errors that adjust for clustering on 5-digit zip code in parentheses, and incidence rate ratios in brackets [IRR].
[a] All models estimated with negative binomial regression. * $p < 0.05$, ** $p < 0.01$ (two-tailed test).

offending are behaving as would be expected. The unstandardized partial regression coefficients (*b*) indicate that males ($b = 0.47$, $p < 0.01$) have a greater variety of offending than females and older people ($b = -0.02$, $p < 0.01$) have less offending variety than their younger counterparts. The data replicate the bivariate relationships and support both the gender-gap in offending and the age-crime link. Therefore, these results should bolster confidence in the rest of the findings. Three additional demographic controls exert statistically significant effects: individuals who are healthier, retired, and more satisfied as parents violate the law with less regularity than their counterparts. Individuals with better health may be exposed to less criminal opportunities because there time is consumed by participating in more prosocial activities (e.g., exercising). As discussed earlier, employment is typically inversely related to crime. Among seniors, however, being retired may be associated with less offending variety simply because this variable is tapping into the age effect. Finally, these findings inform previous gerontological research by suggesting that less criminal involvement is another positive life outcome associated with parental satisfaction (see, e.g., Byers et al., 2008; Lowenstein et al., 2007).

Turning to the theoretical hypotheses, the model reveals that engaging in general, unstructured routine activities away from home is associated with offending variety ($b = 0.06$, $p < 0.01$). The incidence rate ratio (IRR) indicates that a one-unit increase in routine activities is associated with a 1.06 factor increase in the outcome measure. The results from Model 1 are consistent with the findings from previous routine activity research (see, e.g., Maimon & Browning,

2010; Osgood et al., 1996). Accordingly, the finding contributes to this literature by showing that unstructured socializing partially explains offending among the elderly in a similar manner as it does for younger age groups.

The question that remains, however, is whether a general routine activity measure is appropriate or whether more specific opportunity indicators yield stronger effects on crime (Felson & Boba, 2010). This point is not trivial. The role of opportunity in the explanation of crime has long been contested in the social sciences (see, e.g., Cohen & Felson, 1979; Gottfredson & Hirschi, 1990; LaGrange & Silverman, 1999; Longshore, 1998). Determining whether general daily routines or specific opportunities induce crime is of critical importance in explaining criminal behavior.

Model 2 in Table 15 tests whether the specific opportunity variable (i.e., having access to a vehicle) influences a wide range of criminal offenses. Recall that Anderson and Hughes (2009) showed that the amount of time teenagers spend driving each week is positively associated with their participation in violent, property, and drug crimes. However, Model 2 shows that having access to a vehicle does not exert a significant effect on offending variety for seniors included in this sample.

Model 3 assesses the effect of the general and specific measures on offending variety (see Table 15). Not surprisingly, the results suggest that involvement in general routine activities away from home is strongly linked to criminal offending ($b = 0.05$, $p < 0.01$). The IRR in Model 3 is identical to Model

1. In contrast, having access to a motor vehicle has no bearing on a person's offending variety.

The results to this point are telling. At least among this sample of older people, offending variety is best explained when opportunity is conceptualized generally. Mundane unstructured activity away from home seems to expose elders to more situations where criminal opportunities are possible. Specific opportunity—when operationalized as having access to a car—does not explain *general* criminal activity. This finding seems to run counter to previous research on adolescents. While Anderson and Hughes (2009) showed that time spent driving provides teenagers more opportunities to engage in a broad range of offenses, the present study shows that having access to a vehicle does not have the same effect on elderly criminal behavior. While this result is important, it should be noted that the results may only appear to be different due to the different opportunity variable used in this study compared to that used by Anderson and Hughes.

Thus far the results seem to suggest that the general routine activity measure is more important than the specific indicator. But there is reason to believe that specific routine activities play a significant role in explaining specific outcomes (Felson & Boba, 2010; Felson & Clarke, 1998). For example, having access to a vehicle should explain driving-related offenses. This effect may even be stronger than the effect of general routines on motor vehicle violations.

Four models were estimated using specific driving-related offenses as dependent variables to examine the effect of general routine activities and specific

opportunity (see Table 16). In Model 1 the effect of the general and specific measures on the driving offense scale is estimated using OLS regression. Doing so determines whether having access to a vehicle (specific opportunity) is a better predictor of driving-related outcomes compared to the general routine activity measure. The driving offense scale is also disaggregated into its component parts in subsequent models to determine whether having access to a vehicle is related to specific driving offenses.

The joint association test indicates that Model 1 in Table 16 explains driving-related crime better than would be expected by chance ($F = 20.12$, $p < 0.01$) and the coefficient of multiple determination reveals that the model accounts for about 14% of the variation in driving offenses. The standardized partial regression coefficient (β) indicates that a one standard deviation increase in general routine activity is associated with a 0.09 standard deviation increase in the driving offense scale. In other words, seniors who more frequently participate in unstructured socializing away from home commit more driving-related crime. A similar result emerges for the effect of specific opportunity on the driving offense scale—elderly people with access to a vehicle are responsible for more driving-related offending ($b = 0.06$, $p < 0.05$). Having access to a vehicle seems to provide more opportunities for seniors to engage in driving offenses compared to their counterparts without vehicles. Importantly, however, the large standardized effect for the general routine activity measure suggests that activities away from home are more important in providing opportunities to violate driving laws.

Table 16

*The Effects of General Routine Activities and Specific Opportunity on Specific Driving Offenses*

| Variables | Model 1[a] Driving offense scale | | Model 2[a] Traffic violations | | Model 3[b] Illegal parking | | Model 4[b] DUI | |
|---|---|---|---|---|---|---|---|---|
| | *b* (s.e.) [β] | *t*-ratio | *b* (s.e.) [β] | *t*-ratio | *b* (s.e.) [OR] | Wald | *b* (s.e.) [OR] | Wald |
| Routine activity *(General)* | 0.11[c] (0.03) [0.09] | 3.91** | 0.02[c] (0.01) [0.05] | 2.40* | 0.13 (0.03) [1.14] | 3.96** | 0.12 (0.04) [1.13] | 2.82** |
| Access to a vehicle *(Specific)* | 0.06 (0.03) | 2.44* | 0.15 (0.07) | 2.06* | 0.49 (0.42) [1.64] | 1.18 | 0.47 (0.55) [1.60] | 0.85 |
| Health | -0.04[c] (0.07) | -0.62 | -0.09[c] (0.24) | -0.36 | -0.05 (0.07) | -0.69 | -0.01 (0.09) | -0.10 |
| Marital satisfaction | -0.03 (0.01) | -2.61** | -0.05 (0.04) | -1.26 | -0.29 (0.14) | -2.12* | -0.55 (0.17) | -3.17** |
| Retired | -0.05 (0.02) | -2.29* | -0.15 (0.07) | -2.17* | -0.31 (0.19) | -1.61 | 0.02 (0.24) | 0.10 |
| Unemployed | -0.02 (0.04) | -0.60 | -0.06 (0.11) | -0.51 | -0.40 (0.48) | -0.83 | 0.13 (0.44) | 0.31 |
| Job satisfaction | 0.01 (0.03) | 0.28 | 0.01 (0.09) | 0.06 | 0.11 (0.25) | 0.43 | 0.32 (0.30) | 1.06 |
| Parental satisfaction | -0.01 (0.01) | -1.01 | -0.03 (0.04) | -0.62 | -0.21 (0.14) | -1.58 | 0.04 (0.18) | 0.23 |

Table 16 Continued

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Military service | -0.03[c] (0.19) | -0.14 | -0.03[c] (0.62) | -0.05 | -0.17 (0.19) | -0.88 | 0.15 (0.20) | 0.75 |
| Male | 0.15 (0.02) | 7.79** | -0.39 (0.06) | 6.04** | 0.82 (0.17) | 4.71** | 1.06 (0.21) | 4.95** |
| Age | -0.06[c] (0.01) | -7.36** | -0.20[c] (0.03) | -7.82** | -0.02[c] (0.01) | -2.04* | -0.06[c] (0.01) | -4.14** |
| White | 0.03 (0.02) | 1.24 | 0.17 (0.07) | 2.44* | -0.06 (0.26) | -0.21 | -0.31 (0.31) | -1.00 |
| Hispanic/Latino | 0.05 (0.04) | 1.19 | 0.16 (0.13) | 1.22 | 0.23 (0.36) | 0.62 | -0.23 (0.53) | -0.43 |
| Education | 0.01 (0.00) | 2.46* | 0.04 (0.01) | 3.19** | -0.01 (0.04) | -0.24 | 0.02 (0.06) | 0.40 |
| | *F*-test = 20.12** | | *F*-test = 16.18** | | Wald $\chi^2$ = 92.35** | | Wald $\chi^2$ = 95.36** | |
| | $R^2$ = 0.14 | | $R^2$ = 0.12 | | McFadden's $R^2$ = 0.05 | | McFadden's $R^2$ = 0.08 | |

*Note*. Entries are unstandardized partial regression coefficients (*b*), robust standard errors that adjust for clustering on 5-digit zip code in parentheses, standardized partial regression coefficients in brackets [β] for the OLS models, and odds ratios [OR] for the logistic models.
[a] OLS regression. [b] Logistic regression. [c] Regression coefficient and standard error multiplied by 10. * $p < 0.05$, ** $p < 0.01$ (two-tailed test).

Several demographic characteristics are related to driving offenses. Elders extremely satisfied with their marriage ($b$ = -0.03, $p < 0.01$) and those who are retired ($b$ = -0.05, $p < 0.05$) break driving laws less frequently. Therefore, marital satisfaction and being retired explain driving offenses in a similar manner as general criminal offending. Interestingly, increasing levels of education corresponds with slight increases in the amount of driving offenses ($\beta = 0.01$, $p < 0.05$). Perhaps education serves as a proxy for socioeconomic status whereby wealthier seniors have more opportunities to engage in driving offenses because they leave their homes with greater regularity and have access to motor vehicles. Last, males engage in significantly more driving offenses than females ($b$ = 0.15, $p < 0.01$) while older people participate in less driving offenses than younger seniors ($\beta = -0.17$, $p < 0.01$). Once again, the results support the gender-gap in offending and the age-crime link. The significant effects between the control variables and driving offenses suggests that opportunity— measured generally and specifically—does not account for all of the variation in offending.

To determine whether these findings are constrained to a particular type of driving offense, the remaining models in Table 16 examine the effects of general routine activities and specific opportunity on the individual items used to construct the driving offense scale. Model 2 in Table 16 shows that both of the measures exert statistically significant and independent effects on traffic violations. The standardized partial regression coefficient demonstrates that a one standard deviation increase in general routine activities corresponds with a 0.05 standard deviation increase in traffic violations. Quite simply, more frequent

participation in activities away from home results in more traffic law violations. Furthermore, access to a vehicle is associated with breaking traffic laws. Although these results confirm the findings from the first model, there is one notable difference. The effects of the general routine activity and specific opportunity measures are very similar.

Models 3 and 4 are logistic regression models that shed more light on the relationship between opportunity and driving-related offending. Recall from Chapter 3 that illegal parking and DUI were nonnormally distributed. Thus, the outcomes were dichotomized and regressed onto the set of independent variables using logistic regression. Having access to a vehicle does not increase the odds of an individual parking illegally, nor does it influence DUI. Therefore, the effect of specific opportunity on the driving offense scale observed in Model 1 seems to be confined to the effect it has on traffic violations. However, the general routine activity measure still has a statistically significant effect on both illegal parking and DUI. A one-unit increase in routine activities increases the likelihood of parking illegally and DUI by 14% and 13%, respectively.

There are several differences across the models with respect to the effect demographic characteristics have on driving offenses. Marital satisfaction failed to significantly predict traffic violations but was associated with decreases in respondents' likelihood of parking illegally and DUI. Accordingly, being happily married seems to act as a social control mechanism against more socially disapproved driving offenses (e.g., illegal parking and DUI) but has no impact on more common traffic violations like speeding. Similar to Model 1, retired people

break fewer motor vehicle laws than employed individuals. However, being retired is not associated with parking illegally or DUI. It may be that retired seniors are not required to drive as often as their employed counterparts and, thus, are not exposed to as many opportunities to violate traffic laws. A similar pattern holds for the effect of education on driving offenses. Higher education translates into more frequently disobeying traffic laws but does not influence the likelihood of illegal parking or DUI. Educated seniors may be exposed to more traffic violation opportunities because this variable may be tapping into socioeconomic status. Individuals that are more financially secure may spend more time driving. Importantly, a comparison of all four models reveals robust gender and age effects. Regardless of the type of driving offense under consideration, males violate traffic laws more than females and individuals tend to violate driving laws less regularly as they age.[9]

In summary, a general conceptualization of opportunity appears to be a superior strategy for explaining *general* criminal activity among the elderly. Unstructured activity away from home provides seniors opportunities to engage in a wide range of criminal offenses as operationalized by the offending variety scale. This finding is particularly important because the same relationship has been observed many times among adolescents—teenagers that engage in more unstructured socializing are involved in more delinquency (Anderson & Hughes, 2009; Maimon & Browning, 2010; Osgood & Anderson, 2004; Osgood et al.,

[9] The effect of drinking routines on offending variety and the driving offenses was also examined. The results of these analyses are presented in Appendix B (see Tables B1 and B2).

1996; Vazsonyi, Pickering, Belliston, Hessing, & Junger, 2002). Accordingly, the generality of routine activity theory extends to the explanation of crime during late life.

Specific forms of opportunity may still play an important role, especially in the explanation of specific outcomes. These results show that access to a vehicle allows for the violation of traffic laws. This is a theoretically important finding because it suggests that when a particular type of crime is under the microscope, specific opportunity proves salient regardless of how "idiosyncratic" they may appear to some (see Osgood et al., 1996, p. 639). In the end, both general and specific opportunities matter in the explanation of late life offending. The relative importance of the different operational forms does vary, however.

## SENSITIVITY ANALYSIS

An alternative operationalization of the dependent variable was used to assess the robustness of the results shown in Table 15 (see Appendix B, Table B3). Specifically, offending frequency was regressed onto the general routine activity scale, the specific opportunity measure, and the control variables. Recall that offending frequency is an additive scale created by summing the seven offense items in their original metric (range from 1 = *never* to 4 = *frequently*). The scale was also transformed using a natural log to induce normality. Given the ordered categorical nature of offending frequency, OLS regression was used to estimate the sensitivity models.[10]

[10] Refer to Chapter 3 for a discussion of the operationalization of offending frequency.

For the most part, the results mirror the findings from Table 15. The general routine activity measure is positively associated with offending frequency in the fully specified model ($\beta = 0.05$, $p < 0.01$) (see Table B3, Model 3). Therefore, unstructured socializing away from home predicts both offending variety and frequency. One slight difference is observed between the negative binomial and OLS models. Having access to a vehicle has a statistically significant effect on offending frequency ($b = 0.04$, $p < 0.05$) in Model 2 of Table B1 whereas it does not in Model 2 of Table 15. However, similar to Table 15, the effect is rendered insignificant once general routine activities are accounted for (see Table B3, Model 3).

In the end, the story holds regardless of the operationalization of the dependent variable. General routine activities influence offending (both variety and frequency). Having access to a vehicle does not result in greater variety or frequency of criminal offending among this sample when observing fully saturated models (i.e., both opportunity measures included in the specification).

## IS THE EFFECT OF LOW SELF-CONTROL INVARIANT?

Gottfredson and Hirschi (1990) proposed that the effect of low self-control on criminal behavior is invariant across all groups of people. Put differently, low self-control operates similarly for males and females, whites and racial/ethnic minorities, and for various age groups. This contention has become known as the "invariance thesis" and has been examined several times using samples comprised of mostly younger individuals (see, e.g., Burton et al., 1998; Tittle et al., 2003b).

To date, the invariance thesis has not been subjected to empirical scrutiny using individuals from the opposite end of the life course. The analyses that follow fill the void in the literature.

The results are divided into three sections. The first section offers a preliminary examination of the relationship between low self-control and offending variety by assessing Pearson's *r* correlations and negative binomial coefficient estimates using the full sample. The next section presents a test of the invariance thesis in the bivariate context to determine whether the correlations between offending variety and low self-control significantly vary between groups. The multivariate results are presented in the third section. Specifically, three tables present the results of invariance thesis tests across gender, race/ethnicity, and age. To remain consistent with previous analyses, the multivariate models in this section are estimated using negative binomial regression although the evidence as to whether the distribution of the offending variety scale is overdispersed when using different subsamples is mixed.

The simultaneous effect of attitudinal and behavioral low self-control is assessed in each table to evaluate which measurement of low self-control has a stronger effect on offending across the groups of people. From an empirical standpoint, it should be noted that collinearity does not prohibit doing so (see Model Diagnostics at the beginning of Chapter 4).

Preliminary Hypothesis Testing

Prior to assessing the potential invariant effects of low self-control on criminal offending across groups it is necessary to examine whether low self-control is significantly associated with the offending variety scale for the full sample. In short, it must be established that a direct effect exists. The first column of Table 17 presents Pearson's *r* correlations between the independent variables and offending variety. As would be expected, lower levels of self-control—measured both attitudinally ($r = 0.13$, $p < .05$) and behaviorally ($r = 0.32$, $p < .05$)—are positively associated with the offending variety. Put simply, these estimates indicate that seniors with poor self-control participate in a greater variety of criminal offending. These results are replicated in a multivariate context. Specifically, the negative binomial model in the right-hand column of Table 17 estimates the effects of the low self-control measures on offending variety, net of statistical controls. Two important estimates emerge. First, both attitudinal ($b = 0.09$, $p < 0.01$) and behavioral ($b = 1.02$, $p < 0.01$) low self-control have significant, positive effects on criminal offending. Second, behavioral low self-control has a stronger standardized effect on offending variety than does the attitudinal measure (%StdX). A one standard deviation increase in behavioral low self-control corresponds with a 27.7% increase in the expected offending variety count whereas a similar increase in attitudinal low self-control is associated with

Table 17

*Low Self-Control and Offending Variety*

| Variables | Offending variety | | |
|---|---|---|---|
| | Bivariate correlations | Multivariate regression coefficients[a] | |
| | *r* | *b* (s.e.) [%StdX] | *z*-score |
| Attitudinal low self-control | 0.13* | 0.09 (0.02) [11.3%] | 4.19** |
| Behavioral low self-control | 0.32* | 1.02 (0.09) [27.7%] | 11.28** |
| Health | 0.00 | 0.01 (0.03) | 0.35 |
| Marital satisfaction | 0.02 | -0.02 (0.05) | -0.30 |
| Retired | -0.13* | -0.15 (0.07) | -2.06* |
| Unemployed | 0.02 | -0.01 (0.15) | -0.08 |
| Job satisfaction | 0.08* | 0.04 (0.10) | 0.43 |
| Parental satisfaction | -0.09* | -0.09 (0.05) | -1.94 |
| Military service | 0.12* | -0.02 (0.06) | -0.38 |
| Male | 0.21* | 0.43 (0.06) | 7.40** |
| Age | -0.19* | -0.02 (0.00) | -6.28** |
| White | 0.00 | 0.00 (0.11) | 0.01 |
| Hispanic/Latino | 0.00 | -0.04 (0.14) | -0.26 |
| Education | 0.10* | 0.04 (0.02) | 2.58** |
| | LR test of $\alpha$ = | 0.00 | |
| | Wald $\chi^2$ = | 432.79** | |
| | McFadden's $R^2$ = | 0.07 | |

*Note.* Entries are unstandardized partial regression coefficients (*b*), robust standard errors that adjust for clustering on 5-digit zip code in parentheses, and the percent change in expected count for a standard deviation increase in independent variable in brackets [%StdX]. [a]Negative binomial regression. * $p < 0.05$, ** $p < 0.01$ (two-tailed test).

an 11.3% increase in the expected count. This finding suggests that the behavioral indicator of low self-control is a better predictor of criminal behavior among the elderly and informs the ongoing debate regarding self-control measurement strategy (see, e.g., Marcus, 2003; Piquero, 2008; Pratt & Cullen, 2000).

Also important for the current analyses, males engage in greater offending variety than females ($b = 0.43$, $p < 0.01$) and age is negatively associated with offending variety ($b = -0.02$, $p < 0.01$). Therefore, the gender-gap in offending and the age-crime link are confirmed in these data.[11] The next step tests the invariance thesis in a bivariate context by evaluating whether the correlations between low self-control and offending variety vary across subgroups.

## Bivariate Invariance Tests

Fisher's *r*-to-*z* transformation (hereafter referred to as Fisher's *z*) is used to assess whether the strength of the bivariate correlation between the low self-control measures and offending variety vary by subgroup (Fisher, 1915). Statistically significant *z*-scores indicate that the low self-control effect varies between groups and provides evidence counter to the invariance thesis. Table 18 presents the results from Fisher's *z* analyses. For the most part, Fisher's *z* is not statistically significant indicating that the effects of low self-control on offending variety are largely invariant in a bivariate context. However, two significant differences emerged. The correlation between attitudinal low self-control and

[11] Table 17 was replicated with offending frequency serving as an alternative dependent variable. The results of this analysis are presented in Appendix C, Table C1. The results mirror the findings in Table 17 in terms of sign and significance.

Table 18

*Bivariate Analysis Testing the Invariance Thesis for Offending Variety*

| | Offending variety[a] | Fisher's *z* |
|---|---|---|
| *Gender* | | |
| Attitudinal low self-control | | |
| Male | 0.19 | 2.57** |
| Female | 0.07 | |
| Behavioral low self-control | | |
| Male | 0.33 | 0.23 |
| Female | 0.32 | |
| *Race/Ethnicity* | | |
| Attitudinal low self-control | | |
| Racial/Ethnic Minority | 0.22 | -1.22 |
| White | 0.12 | |
| Behavioral low self-control | | |
| Racial/Ethnic Minority | 0.40 | -1.22 |
| White | 0.31 | |
| *Age* | | |
| Attitudinal low self-control | | |
| Young-Old (60 to 72 years) | 0.15 | 0.37[b] |
| Old-Old (73 to 79 years) | 0.13 | -0.45[c] |
| Oldest-Old (80 years and older) | 0.16 | -0.17[d] |
| Behavioral low self-control | | |
| Young-Old (60 to 72 years) | 0.35 | 2.74**[b] |
| Old-Old (73 to 79 years) | 0.21 | -1.73[c] |
| Oldest-Old (80 years and older) | 0.32 | 0.57[d] |

*Note.* [a] Entries are Pearson's *r* correlation coefficients between offending variety and low self-control for the respective group and operationalization of low self-control. [b] Fisher's *z* for comparison between "young-old" and "old-old." [c] Fisher's *z* for comparison between "old-old" and "oldest-old." [d] Fisher's *z* for comparison between "young-old" and "oldest-old." * $p < 0.05$, ** $p < 0.01$ (two-tailed test).

offending variety is stronger for males ($r = 0.19$) than females ($r = 0.07$) (Fisher's $z = 2.57$, $p < 0.01$). Also, the correlation between behavioral low self-control and offending variety is stronger for the young-old ($r = 0.35$) than the old-old ($r = 0.21$) (Fisher's $z = 2.74$, $p < 0.01$).

The Fisher's *z* results provide mixed support for the invariance thesis but the comparison of correlation coefficients across groups suffers from two shortcomings. For starters, correlations between an independent (e.g., low self-control) and dependent variable (e.g., offending variety) are often smaller among the group of people that has greater variance in one of the variables (Baron & Kenny, 1986). Therefore, different size correlations between groups may simply be due to unequal variances. This may cause misleading correlations and Fisher's *z* values in Table 18. Additionally, offending variety is a heavily skewed count variable. Fisher's *z* can yield inaccurate results when the correlated variables are nonnormally distributed (Berry & Mielke, 2000). Given these problems it is necessary to determine whether the effects of low self-control on criminal offending are invariant using multivariate modeling techniques. Importantly, multiple regression results are not biased by group variance differences (Baron & Kenny, 1986). What is more, negative binomial regression can be used to estimate models with nonnormally distributed count dependent variables (Land et al., 1996).[12]

[12] Table 18 was replicated with offending frequency serving as an alternative dependent variable. The results of this analysis are presented in Appendix C, Table C2. The results mirror the findings in Table 18 in terms of sign and significance with one exception. The correlation between offending frequency and behavioral low self-control is stronger for females than males. The opposite is true for offending variety. Importantly, however, Fisher's *z* is not statistically significant in either analysis.

Low Self-Control and Gender

Table 19 presents results bearing on whether the effect of low self-control on offending variety is consistent for males and females, net of statistical controls. The percent change in expected offending variety count for a one standard deviation increase in low self-control is reported in brackets. These standardized values allow the effect sizes to be compared across models and variables (e.g., attitudinal and behavioral low self-control). While a statistical comparison test would be helpful, one is not available at this time. Overall, the results appear mixed. The attitudinal measure of low self-control has a statistically significant effect on offending variety for males ($b = 0.13$, $p < 0.01$) but not for females. A one standard deviation increase in low self-control among males corresponds with a 15.4% increase in expected offending variety count. The result is consistent with the bivariate analysis that showed that the effect of attitudinal low self-control on offending variety is stronger for males than females (see Table 18). Thus far the evidence indicates that the effect of attitudinal low self-control may not be uniform across gender.

The results differ with respect to the behavioral indicator of low self-control. Low self-control significantly influences offending variety for both males ($b = 0.87$, $p < 0.01$) and females ($b = 1.20$, $p < 0.01$) but, similar to the attitudinal measure, the effect magnitudes vary. However, behavioral low self-control has a stronger effect among elderly females relative to their male counterparts. A one standard deviation increase in behavioral low self-control increases the expected female offending variety count by 32.4% and the male count by 24.5%. The

Table 19

*The Effects of Low Self-Control on Offending Variety across Gender*

| Variables | Offending variety | | | |
|---|---|---|---|---|
| | Male[a] | | Female[a] | |
| | *b* (s.e.) [%StdX] | *z*-score | *b* (s.e.) [%StdX] | *z*-score |
| Attitudinal low self-control | 0.13 (0.03) [15.4%] | 4.18** | 0.05 (0.03) [6.0%] | 1.72 |
| Behavioral low self-control | 0.87 (0.12) [24.5%] | 7.26** | 1.20 (0.13) [32.4%] | 9.43** |
| Health | 0.01 (0.03) | 0.14 | 0.01 (0.04) | 0.34 |
| Marital satisfaction | 0.01 (0.07) | 0.08 | -0.06 (0.08) | -0.77 |
| Retired | -0.16 (0.10) | -1.55 | -0.11 (0.10) | -1.01 |
| Unemployed | 0.16 (0.20) | 0.79 | -0.07 (0.21) | -0.33 |
| Job satisfaction | -0.11 (0.12) | -0.92 | 0.22 (0.14) | 1.54 |
| Parental satisfaction | 0.01 (0.07) | 0.07 | -0.19 (0.07) | -2.67** |
| Military service | -0.02 (0.07) | -0.36 | -0.01 (0.17) | -0.08 |
| Age | -0.02 (0.01) | -3.78** | -0.02 (0.01) | -4.68** |
| White | 0.36 (0.15) | 2.34* | -0.26 (0.13) | -1.94 |
| Hispanic/Latino | 0.24 (0.15) | 1.61 | -0.35 (0.26) | -1.35 |
| Education | 0.04 (0.02) | 1.75 | 0.03 (0.05) | 1.43 |
| $N$ = | 695 | | 1215 | |
| LR test of α = | 0.00 | | 1.59 | |
| Wald $\chi^2$ = | 12.00** | | 235.91** | |
| McFadden's $R^2$ = | 0.06 | | 0.06 | |

*Note.* Entries are unstandardized partial regression coefficients (*b*), robust standard errors that adjust for clustering on 5-digit zip code in parentheses, and the percent change in expected count for a standard deviation increase in independent variable in brackets [%StdX]. [a] Negative binomial regression model. * $p < 0.05$, ** $p < 0.01$ (two-tailed test).

multivariate results do not coincide with the bivariate Fisher's *z* test (see Table 18). Nonetheless, the differences in effect size suggest that the influence of behavioral low self-control on criminal behavior may not be invariant across gender.

The results from Table 19 reveal qualified support for the invariance thesis across gender. On the one hand, behavioral low self-control has a reasonably strong influence on offending among male and female respondents. On the other hand, behavioral low self-control seems to have a slightly stronger effect on female criminal behavior compared to male offending. This result falls in line with Tittle and colleagues' (2003b) research showing a behavioral measure of low self-control has a stronger effect on female projected criminal activity compared to males among a general population sample of adults from one U.S. city. Furthermore, these results demonstrate that attitudinal low self-control has a statistically significant effect on late life offending among males but not females. This finding is consistent with previous research using a similar measure and a sample comprised of individuals 18 years of age and older (Burton et al., 1998).

In summary, there appear to be a few caveats with respect to the invariance thesis when it comes to gender. The sign and significance of the effects are consistent with expectations but, counter to hypotheses, the effect sizes seem to vary. It is important to emphasize, however, that these results are consistent with the extant research.

Low Self-Control and Race/Ethnicity

Table 20 presents the results from two negative binomial regression models that estimate the effect of low self-control on offending variety for whites and racial/ethnic minorities. Again, the results offer qualified support for the invariance thesis. Attitudinal low self-control is positively associated with offending variety for whites ($b = 0.08$, $p < 0.01$) and racial/ethnic minorities ($b = 0.17$, $p < 0.05$). Importantly, however, the magnitude of the effect is stronger for minorities. A one standard deviation increase in attitudinal low self-control corresponds with a 9.2% increase in expected offending variety count for whites but increases minorities' offending by 22.4%.

A similar finding is observed for the effect of behavioral low self-control on offending variety. The behavioral low self-control scale has a positive relationship with offending variety for both whites ($b = 0.97$, $p < 0.01$) and racial/ethnic minorities ($b = 1.38$, $p < 0.01$). Again, lower levels of self-control increase criminal involvement for both groups but the magnitude of the effect is stronger for racial/ethnic minorities. A one standard deviation increase in behavioral low self-control increases minorities' expected offending variety count by almost 45% whereas it increases whites' offending by about 26%.While both effects are strong, minorities' criminal activity is 20% higher compared to whites for equal increases in behavioral low self-control.

Two main findings emerge from the race/ethnicity-based analysis. First, regardless of operationalization, low self-control predicts offending variety among whites and racial/ethnic minorities. Gottfredson and Hirschi's (1990)

Table 20

*The Effects of Low Self-Control on Offending Variety across Race/Ethnicity*

| Variables | Offending variety | | | |
|---|---|---|---|---|
| | White[a] | | Racial/Ethnic Minority[a] | |
| | *b* (s.e.) [%StdX] | *z*-score | *b* (s.e.) [%StdX] | *z*-score |
| Attitudinal low self-control | 0.08 (0.02) [9.2%] | 3.55** | 0.17 (0.08) [22.4%] | 2.20* |
| Behavioral low self-control | 0.97 (0.09) [26.1%] | 10.79** | 1.38 (0.33) [44.7%] | 4.22** |
| Health | 0.01 (0.03) | 0.20 | 0.04 (0.12) | 0.30 |
| Marital satisfaction | -0.04 (0.05) | -0.84 | 0.08 (0.19) | 0.43 |
| Retired | -0.13 (0.07) | -1.80 | -0.28 (0.27) | -1.02 |
| Unemployed | 0.00 (0.15) | 0.01 | 0.03 (0.07) | 0.40 |
| Job satisfaction | 0.02 (0.10) | 0.19 | 0.13 (0.33) | 0.38 |
| Parental satisfaction | -0.10 (0.05) | -2.08* | 0.06 (0.20) | 0.30 |
| Military service | -0.05 (0.07) | -0.70 | 0.52 (0.25) | 2.08* |
| Male | 0.48 (0.06) | 8.32** | -0.39 (0.23) | -1.69 |
| Age | -0.02 (0.00) | -6.87** | -0.01 (0.01) | -1.11 |
| Education | 0.05 (0.02) | 2.61** | 0.01 (0.06) | 0.10 |
| $N$ = | 1755 | | 155 | |
| LR test of α = | 0.00 | | 1.72 | |
| Wald $\chi^2$ = | 408.55** | | 60.07** | |
| McFadden's $R^2$ = | 0.08 | | 0.09 | |

*Note*. Entries are unstandardized partial regression coefficients (*b*), robust standard errors that adjust for clustering on 5-digit zip code in parentheses, and the percent change in expected count for a standard deviation increase in independent variable in brackets [%StdX].
[a] Negative binomial regression model. * $p < 0.05$, ** $p < 0.01$ (two-tailed test).

contention that low self-control predicts criminal activity among all individuals—including whites and racial/ethnic minorities—appears correct. Second, both attitudinal and behavioral low self-control appear to have stronger effects on minorities' criminal involvement. This finding is consistent with the bivariate analyses reported in Table 18. On the face of it, the findings temper support for the invariance thesis. At the same time, however, the apparent difference in effect magnitude across race/ethnicity in the multivariate analyses may not be statistically significant. The Fisher's *z* tests from Table 18 appear to support this conclusion, because there are no statistical differences in the magnitude of Pearson's *r* between whites and racial/ethnic minorities.

### Low Self-Control and Age

In Table 21, the sample is split into three age categories: young-old (60 to 72 years), old-old (73 to 79 years), and oldest-old (80 years and older). These age groups are used because they are consistent with the age categories used by gerontologists to classify different stages of the elderly years of life (see, e.g., Suzman, Willis, & Manton, 1992). A negative binomial regression is estimated for each age group to determine whether the effect of low self-control on offending variety is invariant.

The analyses demonstrate that both low self-control measures have statistically significant, positive relationships with offending variety across all three age groups. However, the results also indicate that the low self-control effect magnitudes vary somewhat across the groups. For the young-old (60 to 72 years),

Table 21

*The Effects of Low Self-Control on Offending Variety across Age*

| Variables | Offending variety | | | | | |
|---|---|---|---|---|---|---|
| | Young-Old[a] (60 to 72 years) | | Old-Old[a] (73 to 79 years) | | Oldest-Old[a] (80 years and older) | |
| | *b* (s.e.) [%StdX] | *z*-score | *b* (s.e.) [%StdX] | *z*-score | *b* (s.e.) [%StdX] | *z*-score |
| Attitudinal low self-control | 0.07 (0.03) [8.8%] | 2.79** | 0.12 (0.04) [14.4%] | 2.72** | 0.13 (0.07) [15.3%] | 2.03* |
| Behavioral low self-control | 1.02 (0.09) [29.6%] | 10.94** | 0.83 (0.24) [17.9%] | 3.52** | 1.34 (0.21) [39.2%] | 6.34** |
| Health | 0.04 (0.03) | 1.26 | -0.04 (0.06) | -0.64 | -0.05 (0.09) | -0.57 |
| Marital satisfaction | -0.09 (0.06) | -1.42 | 0.13 (0.11) | 1.18 | 0.07 (0.16) | 0.43 |
| Retired | -0.18 (0.08) | -2.32* | -0.24 (0.20) | -1.25 | -0.28 (0.33) | -0.83 |
| Unemployed | 0.14 (0.16) | 0.89 | -0.06 (0.40) | -0.16 | -1.01 (0.48) | -2.10* |

Table 21 Continued

| | | | | | | |
|---|---|---|---|---|---|---|
| Job satisfaction | 0.05<br>(0.10) | 0.52 | -0.20<br>(0.27) | -0.74 | 0.02<br>(0.43) | 0.06 |
| Parental satisfaction | -0.07<br>(0.06) | -1.15 | -0.25<br>(0.11) | -2.34* | -0.07<br>(0.14) | -0.46 |
| Military service | -0.01<br>(0.08) | -0.12 | -0.08<br>(0.14) | -0.58 | -0.14<br>(0.23) | -0.59 |
| Male | 0.38<br>(0.07) | 5.61** | 0.59<br>(0.13) | 4.60** | 0.47<br>(0.20) | 2.40* |
| White | 0.13<br>(0.14) | 0.90 | -0.32<br>(0.21) | -1.54 | 0.22<br>(0.23) | 0.94 |
| Hispanic/Latino | -0.19<br>(0.23) | -0.83 | -0.33<br>(0.25) | -1.33 | 0.56<br>(0.25) | 2.24* |
| Education | 0.03<br>(0.02) | 1.45 | 0.08<br>(0.03) | 2.57** | 0.01<br>(0.04) | 0.36 |
| $N$ = | 1041 | | 474 | | 395 | |
| LR test of $\alpha$ = | 0.00 | | 0.00 | | 0.17 | |
| Wald $\chi^2$ = | 221.81** | | 82.82** | | 92.52** | |
| McFadden's $R^2$ = | 0.07 | | 0.07 | | 0.06 | |

*Note*. Entries are unstandardized partial regression coefficients (*b*), robust standard errors that adjust for clustering on 5-digit zip code in parentheses, and the percent change in expected count for a standard deviation increase in independent variable in brackets [%StdX]. [a] Negative binomial regression model. * $p < 0.05$, ** $p < 0.01$ (two-tailed test).

a standard deviation increase in attitudinal low self-control corresponds with an 8.8% increase in offending variety. The old-old (73 to 79 years) and the oldest-old (80 years and older) are expected to have 14.4% and 15.3% increases in offending variety for a standard deviation increase in attitudinal low self-control, respectively. While lower levels of self-control are associated with more criminal involvement in this sample, the attitudinal low self-control scale exhibits weaker effects on offending for the young-old compared to the older age groups.

The analyses also show that the behavioral low self-control scale has a stronger effect on offending variety than the attitudinal measure across all ages. This comparative assessment informs the invariance literature that typically only uses either an attitudinal or a behavioral indicator of low self-control to test the thesis (Burton et al., 1998; Tittle et al., 2003b). Nonetheless, the effect of behavioral low self-control does not appear to be uniform across the groups because the effect size varies. One standard deviation increases in behavioral low self-control are associated with increases in offending variety count for the young-old by 29.6%, the old-old by 17.9%, and the oldest-old by 39.2%. The results imply that behavioral low self-control is most important in predicting criminal activity among the oldest people in this study. While still quite strong, the effect of the behavioral low self-control scale is about 10% weaker for the youngest group of seniors in comparison to the oldest-old. These findings are slightly different from the bivariate relationships presented in Table 18. Specifically, there was only a statistically significant difference between the

Pearson's *r* coefficient magnitudes for the young-old and the old-old. Once again, the results provide mixed evidence regarding the invariance thesis.

Two results from the age-based analyses contribute to the self-control literature. First, both operationalizations of low self-control predict offending variety for each of the age groups in this senior sample. This is an important finding because it provides support for Gottfredson and Hirschi's (1990) contention that low self-control explains crime among all groups of people—including those in late life. However, the finding is inconsistent with Tittle and colleagues' (2003b) observation that low self-control does not predict criminal offending among people 65 years of age and older (also see Burton, Evans, Cullen, Ovares, & Dunaway, 1999). Tittle and associates tested the invariance thesis by splitting their general population sample into various age groups. Their sample only included 63 individuals 65 years or older and, therefore, could suffer from range restriction in the key variables. Range restriction could result in insufficient variation to observe a statistical significant relationship between low self-control and criminal behavior. This problem is less of a concern among the current sample comprised exclusively of people 60 years and older. Therefore, this study may have sufficient variation in self-control and offending to observe a significant effect that was hidden in previous research. Second, the results show that the low self-control effect sizes, while all statistically significant, vary across age groups. This finding tempers Gottfredson and Hirschi's (1990) argument that low self-control should have an equal effect across all subgroups of individuals. In this respect, the results of the current study appear consistent with the findings

observed by previous research that has revealed the effect of low self-control on criminal activity to not be uniform across age groups (Burton et al., 1999; Tittle et al., 2003b).

In the end, low self-control explains crime for individuals in the later stages of the life course but its influence on offending may differ across age groups. However, the bivariate analyses provide some indication that the effects of low self-control on offending may be largely invariant across the groups (see Table 18).

## SENSITIVITY ANALYSIS

In this section the invariance thesis is empirically evaluated using an alternative dependent variable. Specifically, offending frequency was regressed on both measures of low self-control and the control variables using OLS regression. These analyses are particularly important because the equality of OLS regression estimates can be compared to determine whether differences in effect size are statistically significant across groups. The Clogg, Petkova, and Haritou (1995) *z*-test is used to compare the effect of the low self-control coefficients across groups. The results of these sensitivity analyses are presented in Tables C3, C4, and C5 of Appendix C.

The results mirror the findings from Tables 19, 20, and 21 in terms of directional relationships. However, the *z*-tests provide critical information regarding the invariance thesis by shedding light on the apparent mixed evidence generated from the negative binomial models. With respect to the gender-based

invariance test (see Appendix C, Table C3), the effect of attitudinal low self-control on elderly female crime achieved statistical significance ($\beta = 0.09$, $p < 0.01$) where it did not in Table 19. Similar to the negative binomial regression, the standardized partial regression coefficients from Table C3 suggest that the effect of attitudinal low self-control on male offending ($\beta = 0.19$, $p < 0.01$) is about twice as strong as that for female crime ($\beta = 0.09$, $p < 0.01$). More importantly, however, a comparison of the unstandardized partial regression coefficients (*b*) reveals that the difference in effect size of attitudinal low self-control across gender is not statistically significant. In other words, the effect of attitudinal low self-control on criminal activity is invariant across gender. Similarly, there is no statistical difference between the effects of behavioral low self-control for males and females ($z = -0.94$). Taken together, the bivariate invariance tests (Fisher's *z*), the negative binomial results, and the OLS estimates provide support for the invariance thesis. For people in later years of life, the effects of attitudinal and behavioral low self-control on offending behavior are similar for males and females.

The race/ethnicity models show that attitudinal low self-control does not have a statistically significant effect on racial/ethnic minority offending whereas it did in Table 20 (see Appendix C, Table C4). The other effects observed in Table 20 are replicated in terms of sign and significance (see Table C4). Similar to what was observed in the negative binomial regression analyses, the OLS models suggest that the standardized effects ($\beta$) of both operationalizations of low self-control vary in magnitude across race/ethnicity. However, the difference in effect

size for attitudinal low self-control ($z$ = -1.15) and behavioral low self-control ($z$ = -1.63) are not statistically different across race/ethnicity. The analysis provides support for the invariance thesis. Among the elderly, low self-control has a similar effect on offending behavior for whites and minorities.

With respect to the effect of low self-control across age groups, the results from Table 21 provide mixed evidence regarding the invariance thesis. The sensitivity analysis, however, provides clarity (see Appendix C, Table C5). The unstandardized effect of attitudinal low self-control on offending frequency is identical for each of the age groups. In fact, *z*-tests confirm that the effects of attitudinal low self-control are not statistically different between the groups. Like the negative binomial models, the effects of behavioral low self-control on offending frequency seem to vary in magnitude across the age groups within the OLS models. However, *z*-tests reveal that there is no statistical difference in the effect of behavioral low self-control on criminal activity between the "young-old" and "old-old" ($z$ = 1.80), "old-old" and "oldest-old" ($z$ = 1.24), or the "young-old" and "oldest-old" ($z$ = 0.40). As such, the invariance thesis is supported.

Regardless of measurement strategy, low self-control has an invariant effect on criminal offending among seniors. Although the effect sizes vary across age groups in this sample, these differences are not statistically meaningful. The results inform the invariance literature that has shown variation in effect magnitude across ages (Burton et al., 1999; Tittle et al., 2003b).

## LOW SELF-CONTROL, ROUTINE ACTIVITY, AND OFFENDING IN LATE LIFE

The previous analyses confirmed that low self-control and routine activity are related to late life criminal offending. Some have argued, however, that low self-control and routine activities are associated with one another. For example, Gottfredson and Hirschi (1990) claimed that opportunity is meaningless in the explanation of criminal activity because routine activities are simply the consequence of individual levels of self-control. At the same time, a bulk of the research demonstrates that low self-control has an effect on victimization through its influence on routine activities (see, e.g., Forde & Kennedy, 1997; Schreck, Stewart, & Fisher, 2006). Accordingly, the final set of analyses explore whether self-control theory and routine activity theory explain criminal activity in late life. The analyses examine the independent and simultaneous effects of low self-control and routine activity on offending variety. This portion of the study will also assess whether routine activities mediate the link between low self-control and crime. The section begins by examining the relationships between offending variety and the key independent variables at the bivariate level.

### Preliminary Hypothesis Testing

Several bivariate correlation coefficients provide support for the hypothesized relationships of interest. For starters, routine activity is positively correlated with offending variety ($r = 0.10$, $p < 0.05$) (see Table 14 on page 118). Seniors who more frequently leave their homes to participate in unstructured

activities engage in a greater variety of criminal offenses. The significant correlation between routine activity and offending variety also satisfies a necessary condition to observe mediation (Baron & Kenny, 1986; MacKinnon, Krull, & Lockwood, 2000). Specifically, the presumed mediator—routine activity—is associated with the dependent variable—offending variety.

Table 13 on page 115 shows that attitudinal low self-control is negatively associated with routine activity ($r = -0.11$, $p < 0.05$). In other words, individuals with lower levels of self-control engage in fewer unstructured activities away from home. The negative correlation is counter to the positive relationship observed in some of the literature (see, e.g., Schreck et al., 2006). However, prior research tends to use risky activities to operationalize routine activities (e.g., hanging out with deviant peers) whereas the current study uses more general activities. Therefore, it is not surprising that low self-control folks participate in fewer activities away from home. Perhaps people with lower self-control find it more difficult to sustain friendships, leading to more solitary lives (see Evans, Cullen, Burton, Dunaway, & Benson, 1997). Again, this relationship is important because it shows that the independent variable (i.e., attitudinal low self-control) is associated with the potential mediator variable (i.e., routine activity), which is a necessary condition for mediation (Baron & Kenny, 1986). It is important to note that behavioral low self-control was not significantly related to routine activity.

Attitudinal low self-control ($r = 0.13$, $p < 0.05$) and behavioral low self-control ($r = 0.32$, $p < 0.05$) are also significantly correlated with the offending variety scale in the hypothesized direction (see Table 17 on page 135). As

expected, elders with lower levels of self-control are involved in a greater variety of criminal activity. While these results offer evidence regarding the generality of self-control theory and routine activity theory, bivariate correlations are limited because they do not take into consideration the possible effect of third variables. Multivariate models are required to determine whether the observed correlations withstand statistical controls. What is more, the variance of a correlation coefficient can be inaccurate when one of the correlated variables is not distributed normally (Kowalski, 1972). In this case, the distribution of offending variety is nonnormal and may lead to downwardly biased correlation coefficients (Bollen & Barb, 1981; Kowalski, 1972; O'Brien, 1979). The effect of independent variables on count outcomes is better assessed using negative binomial regression (Land et al., 1996).

## The Effects of Low Self-Control on Routine Activity

The multivariate models begin with an examination of whether low self-control accounts for variation in seniors' routine activities. This analysis is conducted to determine whether the bivariate relationship observed in Table 13 holds up to statistical controls and to establish a necessary condition to observe a mediation relationship in subsequent analyses. Accordingly, Table 22 presents OLS regression estimates for the effect of the low self-control measures on routine activity, net of statistical controls. As indicated by the statistically significant *F*-test (30.80, $p < 0.01$), the model accounts for a greater amount of variation in routine activity than would be expected by chance alone. Also, the

Table 22

*The Effects of Low Self-Control on Routine Activity*

| Variables | Routine activity | |
|---|---|---|
| | *b*<br>(s.e.)<br>[β] | *t*-ratio |
| Attitudinal low self-control | -0.09<br>(0.04)<br>[-0.05] | -2.13* |
| Behavioral low self-control | 0.13<br>(0.21)<br>[0.01] | 0.62 |
| Health | 0.65<br>(0.06) | 11.63** |
| Marital satisfaction | 0.25<br>(0.09) | 2.71** |
| Retired | -0.01<br>(0.14) | -0.05 |
| Unemployed | -0.12<br>(0.25) | -0.49 |
| Job satisfaction | 0.03<br>(0.17) | 0.18 |
| Parental satisfaction | 0.21<br>(0.10) | 2.18* |
| Military service | -0.01<br>(0.15) | -0.08 |
| Male | -0.39<br>(0.13) | -3.01** |
| Age | -0.03<br>(0.01) | -3.99** |
| White | 0.61<br>(0.20) | 3.15** |
| Hispanic/Latino | 0.22<br>(0.31) | 0.71 |
| Education | 0.28<br>(0.03) | 9.38** |
| *F*-test = | 30.80** | |
| $R^2$ = | 0.18 | |

*Note*. Entries are unstandardized partial regression coefficients (*b*), robust standard errors that adjust for clustering on 5-digit zip code in parentheses, and standardized partial regression coefficients in brackets [β]. * $p < 0.05$, ** $p < 0.01$ (two-tailed test).

coefficient of multiple determination reveals that the model explains about 18% of the variation in routine activity. Consistent with the bivariate correlation, attitudinal low self-control has a significant negative effect on routine activity ($b$ = -0.09, $p < 0.05$). Seniors with lower self-control (measured attitudinally) participate in fewer activities away from home. The results establish a necessary condition to determine whether routine activities mediate the link between attitudinal low self-control and criminal offending.[13] Behavioral low self-control does not have a statistically significant effect on routine activity, which is consistent with the bivariate estimates from Table 13. As such, routine activity does not meet the conditions necessary to act as a mediator of the behavioral low self-control measure.

The Effects of Low Self-Control and Routine Activity on Criminal Offending

Three negative binomial regression models are featured in Table 23. Model 1 assesses the independent effect of low self-control on offending variety. The statistically significant Wald $\chi^2$ (432.80, $p < 0.01$) indicates that the model fits the data better than a constant only model. Both attitudinal ($b$ = 0.09, $p <$ 0.01) and behavioral ($b$ = 1.02, $p < 0.01$) low self-control predict offending variety as indicated by the statistically significant $z$-scores. The incidence rate ratios (IRR) show that one unit increases in attitudinal and behavioral low self-control correspond with 1.10 and 2.76 factor increases in expected offending

[13] The effects of attitudinal and behavioral low self-control on drinking routines were also examined. The results of this analysis are presented in Appendix D (see Tables D1).

Table 23

*The Effects of Low Self-Control and Routine Activity on Offending Variety*

| Variables | Offending variety[a] | | | | | |
|---|---|---|---|---|---|---|
| | Model 1 | | Model 2 | | Model 3 | |
| | *b* (s.e.) [IRR] | *z*-score | *b* (s.e.) [IRR] | *z*-score | *b* (s.e.) [IRR] | *z*-score |
| Attitudinal low self-control | 0.09 (0.02) [1.10] | 4.19** | --- | --- | 0.10 (0.02) [1.10] | 4.30** |
| Behavioral low self-control | 1.02 (0.09) [2.76] | 11.28** | --- | --- | 1.01 (0.09) [2.75] | 11.64** |
| Routine activity | --- | --- | 0.06 (0.01) [1.06] | 4.35** | 0.06 (0.01) [1.06] | 4.50** |
| Health | 0.01 (0.03) | 0.35 | -0.06 (0.03) | -1.99* | -0.03 (0.03) | -0.96 |
| Marital satisfaction | -0.02 (0.05) | -0.30 | -0.09 (0.05) | -1.60 | -0.03 (0.05) | -0.59 |
| Retired | -0.15 (0.07) | -2.06* | -0.16 (0.07) | -2.11* | -0.15 (0.07) | -2.00* |
| Unemployed | -0.01 (0.15) | -0.08 | -0.02 (0.15) | -0.14 | 0.01 (0.15) | 0.06 |
| Job satisfaction | 0.04 (0.10) | 0.43 | 0.01 (0.10) | 0.15 | 0.04 (0.10) | 0.43 |
| Parental satisfaction | -0.09 (0.05) | -1.94 | -0.12 (0.05) | -2.36* | -0.11 (0.05) | -2.36* |
| Military service | -0.02 (0.06) | -0.38 | 0.01 (0.07) | 0.18 | -0.03 (0.06) | -0.41 |
| Male | 0.43 (0.06) | 7.40** | 0.47 (0.07) | 7.17** | 0.45 (0.06) | 7.65** |
| Age | -0.02 (0.00) | -6.28** | -0.02 (0.00) | -6.01** | -0.02 (0.00) | -5.84** |
| White | 0.00 (0.11) | 0.01 | -0.05 (0.12) | -0.41 | -0.04 (0.11) | -0.33 |
| Hispanic/ Latino | -0.04 (0.14) | -0.26 | 0.00 (0.14) | 0.01 | -0.05 (0.14) | -0.34 |

Table 23 Continued

| | | | | | | |
|---|---|---|---|---|---|---|
| Education | 0.04 (0.02) | 2.58** | 0.02 (0.02) | 1.00 | 0.03 (0.02) | 1.50 |
| LR test of α = | 0.00 | | 5.01* | | 0.00 | |
| Wald $\chi^2$ = | 432.80** | | 223.70** | | 463.26** | |
| McFadden's $R^2$ = | 0.07 | | 0.04 | | 0.08 | |

*Note*. Entries are unstandardized partial regression coefficients (*b*), robust standard errors that adjust for clustering on 5-digit zip code in parentheses, and incidence rate ratios in brackets [IRR]. [a]All models estimated with negative binomial regression. * $p < 0.05$, ** $p < 0.01$ (two-tailed test).

variety count, respectively. Regardless of the manner in which self-control is operationalized, individuals with less of it participate in a greater variety of criminal acts.

Several demographic characteristics from Model 1 have significant effects on criminal offending. Most importantly, male ($b = 0.43$, $p < 0.01$) and age ($b = -0.02$, $p < 0.05$) are associated with offending variety. Thus, once again the data confirm both the gender-gap in offending and the age-crime link. These findings increase confidence in the results presented in the remainder of this chapter.

Model 2 in Table 23 estimates the effect of routine activity on offending variety, net of statistical controls. The model accounts for more variation in offending variety than a constant-only model (Wald $\chi^2 = 223.70$, $p < 0.01$). Additionally, the statistically significant likelihood ratio (LR) test of α (5.01, $p < 0.05$) provides evidence that a negative binomial model fits the data better than a traditional Poisson model. As expected, the routine activity measure is positively associated with offending variety ($b = 0.06$, $p < 0.01$). One unit increases in routine activity are associated with 1.06 factor increases in expected offending

variety count. This finding is consistent with the bivariate results showing that seniors who more frequently participate in unstructured socializing away from home engage in a greater variety of criminal offenses. Additionally, this finding verifies a necessary condition for a mediation relationship—the presumed mediator (i.e., routine activity) accounts for variations in the dependent variable (i.e., offending variety).

Model 3 tests the effect of low self-control and routine activity on offending variety. Not surprisingly, the Wald $\chi^2$ is statistically significant indicating that the model fits the data better than a constant-only model (463.26, $p < 0.01$). Several important findings are observed in Model 3. For starters, attitudinal ($b = 0.10$, $p < 0.01$) and behavioral ($b = 1.01$, $p < 0.01$) low self-control have statistically significant positive effects on offending variety. These effects are observed after controlling for a host of demographic characteristics and accounting for criminal opportunities (i.e., routine activities). The results are consistent with a lengthy roster of previous studies that show a significant link between low self-control and crime after controlling for relevant correlates of offending (see, e.g., Pratt & Cullen, 2000). This study informs prior research that relies mostly on samples of adolescents by showing that low self-control predicts offending during late life as well.

Routine activity also exerts a statistically significant effect on offending variety in the expected direction ($b = 0.06$, $p < 0.01$). This result is telling because even after controlling for one of the strongest known correlates of crime—low self-control—seniors' routine activities still explain part of their variation in

criminal activity. This result is in line with research that finds opportunity matters for teenagers regardless of self-control (Hay & Forrest, 2008; LaGrange & Silverman, 1999). Opportunity is important in understanding criminal behavior committed during late life after taking into consideration criminal propensity.

Model 3 also provides evidence that the effect of attitudinal low self-control on offending variety is not mediated by routine activities. The effect size of attitudinal low self-control on offending variety does not change from Model 1 to Model 3. This finding suggests that the effect of low self-control on criminal behavior does not operate through routine activity. In other words, low self-control is not associated with greater offending variety because it opens the door for more criminal opportunities via routine activities. Along similar lines, the inclusion of low self-control into the equation does not reduce the effect that routine activity has on criminal activity, as some would suggest (see Gottfredson & Hirschi, 1990). Both low self-control and routine activity are important in understanding criminal activity among people in late life.[14]

In conclusion, the generality of both self-control theory and routine activity theory can be extended to the explanation of criminal behavior committed during the late part of the life course. The results demonstrate that low self-control has an effect on offending after taking into consideration seniors' routine activities and other demographic differences. Likewise, routine activities influence criminal activity even after controlling for individual levels of self-

[14] The effect of low self-control, routine activities, and drinking routines on offending variety was also examined. The results of these analyses are presented in Appendix D (see Table D4).

control. Consequently, criminal propensity and opportunity play independent roles in the explanation of criminal offending among the aged.

## SENSITIVITY ANALYSIS

The robustness of the above results was examined by using different operationalizations of the dependent variable. First, offending frequency was regressed onto each of the three models that were presented in Table 23 (see Appendix D, Table D2).[15] The results mirror the findings from Table 23 in terms of sign and significance. Both attitudinal ($\beta = 0.14$, $p < 0.01$) and behavioral ($\beta = 0.27$, $p < 0.01$) low self-control are positively associated with offending frequency (see Model 3 in Table D2). In short, seniors with poor self-control commit criminal acts more frequently. Unstructured socializing away from home is also associated with offending frequency ($\beta = 0.09$, $p < 0.01$). Similar to Table 23, the results presented in Table D2 show that the effects of attitudinal and behavioral low self-control do not decrease in magnitude when the routine activity scale is accounted for (compare Models 1 and 3 in Table D2). Therefore, the current study's findings are not sensitive to dependent variable operationalization. The sensitivity analyses confirm the three main findings from the negative binomial models (see Table 23)—self-control theory generalizes to the explanation of elderly offending, routine activity theory is a viable explanation of senior criminal

[15] Refer to Chapter 3 for a detailed discussion of the offending frequency variable.

behavior, and both criminal propensity and opportunity independently account for variation in crime committed in late life.[16]

Analyses were also conducted to determine whether the results hold for each of the specific crimes contained within the offending variety scale. Accordingly, each of the seven offense items was regressed separately onto the fully specified offending model (i.e., Model 3 in Table 23). Recall that logistic regression was used to estimate the simple assault, illegal drug use, check fraud, shoplifting, DUI, and illegal parking models given the dichotomous nature of these outcomes. OLS regression was used to estimate the traffic violations model.[17] The results of these regression models are presented in Table D3 (see Appendix D). Overall, the results confirm the findings presented in Table 23. Behavioral low self-control is significantly and positively associated with all of the offense items. Attitudinal low self-control has a significant effect on most of the offenses but fails to predict shoplifting. Routine activity is positively associated with simple assault, shoplifting, DUI, illegal parking, and traffic violations. However, routine activities do no predict illegal drug use or check fraud. In the end, the effects observed in Table 23 are replicated across most of the individual offending items and do not appear to be constrained to any particular offense.

The results of the present study reveal that self-control theory and routine activity theory are general frameworks that explain criminal activity among

[16] The effect of drinking routines on offending frequency was also examined. The results of these analyses are presented in Appendix D (see Table D5).

[17] Refer to Chapter 3 for a detailed description of the individual dependent variables.

elderly people. The final chapter of the dissertation explores the theoretical importance of the findings and situates them within the literature.

# CHAPTER 5

# DISCUSSION

## INTRODUCTION

The age-crime curve shows that participation in criminal offending declines as people age and is relatively rare during the late years of life (Hirschi & Gottfredson, 1983). Most social science research on offending focuses on adolescents because they commit most crime. In fact, Cullen (2011) coined the term "adolescence-limited criminology" to refer to the obsession criminologists have with teenage offending. He argues that devoting research attention almost exclusively to this group of people has consequences. Namely, social scientists have diminutive knowledge concerning crime committed during other points of the life course.

One area of research that has been largely ignored is criminal activity committed during the elderly years of life. A number of negative outcomes stem from this void in the literature (e.g., unknown extent and nature of senior crime). Most importantly, however, the lack of empirical research on a group of people from a large segment of the life course limits the ability to assess theoretical generality. Do low self-control and routine activities explain crime in late life as they do among younger people? This dissertation addressed this question.

This study had three main objectives. The first was to assess the role of opportunity in the explanation of late life offending. Specifically, the influence of general routine activity and specific opportunity on criminal offending among

seniors was examined. Testing self-control theory's invariance thesis was the second objective. To do so the elderly sample was split into various subgroups and the effect of low self-control across the groups was assessed. The final objective was to examine the simultaneous effects of opportunity (i.e., routine activity) and criminal propensity (i.e., low self-control) on elderly crime.

While any number of credible theories could have been selected, self-control theory and routine activity theory were chosen for two reasons. First, low self-control is perhaps the strongest known correlate of criminal behavior (Pratt & Cullen, 2000). Determining whether it is able to explain crime among the aged is important for assessing the generality of the theory. Second, criminal opportunity has long been considered an important component in understanding crime. Therefore, routine activity theory was examined because it offers a compelling framework for understanding the role of opportunity in criminal behavior (Gottfredson & Hirschi, 1990; Hay & Forrest, 2008).

Building on the analyses from Chapter Four, this final chapter is organized into three sections. Each section highlights the study's results, connects the findings in the literature, and suggests avenues for future research. The chapter concludes with a discussion of the policy implications that stem from the reported empirical findings.

## OPPORTUNITY AND LATE LIFE CRIMINAL OFFENDING

The extent to which opportunity matters in the explanation of criminal behavior is an ongoing debate in criminology (see, e.g., Cloward & Ohlin, 1960;

Cohen & Felson, 1979; Gottfredson & Hirschi, 1990; Osgood, Wilson, O'Malley, Bachman, & Johnston, 1996). Many criminologists concede that some form of opportunity is important to understand crime. For example, there must be the physical presence of a car to steal, a person to assault, or a marijuana cigarette to smoke in order for a crime to transpire. When conceptualized in such a specific manner, however, criminal opportunities are virtually ubiquitous (Gottfredson & Hirschi, 1990; Osgood et al., 1996). Therefore, the manner in which opportunity influences criminal activity has been conceptualized in a more general way in recent decades.

Routine activity theory has emerged as a dominant opportunity-based conceptual framework (Cohen & Felson, 1979). The theoretical argument follows that criminal opportunities stem from legal everyday activities. In recent years, two versions of the theory have emerged to account for the role of opportunity in criminal behavior. One version posits that general routine activities, such unstructured socializing away from home, are instrumental in explaining exposure to criminal opportunities (Osgood et al., 1996). The other variant of the theory holds that specific opportunities are more important (Felson & Boba, 2010). For example, having access to a car provides the opportunity to violate traffic laws. Although the general perspective has been given most of the research attention, both perspectives predict crime among adolescents (Anderson & Hughes, 2009; Maimon & Browning, 2010; Osgood & Anderson, 2004; Osgood et al., 1996). The problem is that little research has tested whether the theory explains

offending among people in late life. Three findings from the present study shed light on this lingering question.

For starters, elders who frequently participate in unstructured socializing away from home engage in a greater variety of criminal offenses and violate the law with more regularity than their less active counterparts. This finding compliments prior research on teenagers and suggests that routine activity theory explains criminal behavior during late life. General routine activities explain criminal behavior among the young and old regardless of how different life routines may be between the two groups. For example, the nature of guardianship during informal social activities varies between adolescents and seniors. Teenage unstructured socializing often takes place away from parental supervision and, therefore, has insufficient guardianship to protect against delinquency (Osgood & Anderson, 2004). For the elderly, lack of parental supervision does not play a role in the unstructured nature of their activities. Rather, the absence of significant others (e.g., spouse) may reduce guardianship during informal socializing among the elderly. The key is that participation in unstructured activities without adequate levels of guardianship is instrumental for law-breaking behavior for both groups.

General routine activity may explain criminal activity among seniors and adolescents because both groups occupy similar social roles in society (Feinberg, 1984). Both groups of people are in stages of their lives where they are relatively exempt from work responsibilities. Teenagers have simply not entered completely into the labor force, whereas the elderly are retiring. Both groups also have

relatively unstructured time schedules, freedom from familial obligations, and have lives structured around leisure. With these similarities in mind it is not surprising that unstructured socializing away from home has a comparable impact on criminal activity among groups of people at opposite ends of the life course. Unstructured socializing for both groups involves activities that are equally unguarded by authority figures.

One objective for future researchers should be to determine what specifically it is about general routine activities that provide opportunities for elders to commit crime. Recall the argument from routine activity theory that there must be convergence of a motivated offender, suitable target, and ineffective guardianship in time and space for a crime to occur (Cohen & Felson, 1979). Does informal socializing away from home bring elders into closer proximity to motivated offenders? Are suitable targets available to older people with greater frequency during unstructured activities? Does unstructured socializing offer seniors criminal opportunities because these activities take place away from capable guardianship? If so, what type of guardianship reduces the incidence of criminal activity among the aged? These are among the research questions that still need to be addressed.

The specific opportunity measure also explains elderly offending, albeit only particular types of traffic violations. The present study operationalized specific opportunity by asking respondents whether they have access to a motor vehicle. As expected, seniors who do are more likely to violate traffic laws. At the same time, however, general routine activities also predicted seniors' involvement

in driving-related offenses. Accordingly, having access to a car and informally socializing away from home are both important in providing opportunities to break traffic laws. The manner in which each activity provides driving offense opportunities varies. Having access to a vehicle is literally the opportunity for driving-related crime. Conversely, leaving home to participate in unstructured social activities exposes people to more opportunities to violate traffic laws.

Also important is the finding that having access to a vehicle is not associated with criminal offending more generally. This observation is inconsistent with the results from Anderson and Hughes (2009) who studied situations conducive to criminal activity among adolescents. They showed that the amount of time teenagers spend driving is positively associated with violent, property, and drug-related offending. However, time spent driving may simply tap into the amount of time teenagers spend with peers. In other words, Anderson and Hughes' measure is not a specific opportunity indicator. Rather, it is an activity measure that brings about access to criminal opportunities. Access to a vehicle is a specific opportunity measure and, not surprisingly, is only associated with crimes for which it provides a specific opportunity (e.g., driving-related offenses).

When taken together the results demonstrate that opportunity is best conceptualized in a general manner when one wishes to explain senior involvement in a wide range of criminal offenses. This finding is consistent with previous literature showing that unstructured activities away from home account for variation in general offending patterns among teenagers (Anderson & Hughes, 2009; Mahoney & Stattin, 2000; Osgood & Anderson, 2004). While the specific

opportunity measure used in this study explained driving-related offending, the general routine activity measure was also related to this specific type of crime. In terms of relative validity, the results suggest that Osgood and colleagues' (1996) version of routine activity theory is superior to that advocated by Felson and his associates (Felson & Boba, 2010; Felson & Clarke, 1998). Unstructured socializing accounts for general and specific forms of criminal activity whereas specific opportunity measures seem to only be useful in explaining very specific types of offenses. While conceptualizing opportunity in a specific manner may assist in creating offense-specific crime prevention strategies (Felson & Clarke, 1998), it does little in the way of understanding overall criminal behavior.

## THE INVARIANCE THESIS

Gottfredson and Hirschi's (1990) self-control theory advanced audacious claims about the causes of crime that garnered research attention for over two decades. Arguably one of the theory's boldest propositions is the invariance thesis that states the effect of low self-control on criminal offending is equal in magnitude for all groups of people. Put another way, groups may differ in their relative levels of self-control but the influence the characteristic has on crime will be invariant between males and females, whites and racial/ethnic minorities, and across various age groups. To date, the evidence regarding the invariance thesis is derived from only a hand full of studies that use samples comprised mainly of younger individuals (Burton, Cullen, Evans, Alarid, & Dunaway, 1998; Burton, Evans, Cullen, Ovares, & Dunaway, 1999; LaGrange & Silverman, 1999; Tittle,

Ward, & Grasmick, 2003b). There is a limited understanding of whether low self-control explains criminal behavior in a similar manner across groups of people who are in the later years of life. The present study addressed this concern.

The results reported in Chapter 4 confirmed that low self-control accounts for variation in senior criminal behavior regardless of measurement strategy and net of demographic control variables (e.g., age and gender). This observation is important because it suggests that low self-control accounts for seniors' criminal activity in a manner similar to teenage offending. Additionally, without a direct effect of low self-control on offending there would be no need to examine whether the invariance thesis is supported among older people.

With respect to the invariance tests, it is important to remember that both attitudinal and behavioral measures of low self-control were used. This was done to determine whether the invariance findings are constrained to a particular measurement strategy. Concerning gender, the effect of behavioral low self-control on senior offending is invariant between males and females. This finding is telling because, regardless of differences in overall offending frequency between men and women, behavioral low self-control still accounts for variation in criminal behavior in the same manner for both genders. Furthermore, this finding is consistent with previous research using a general population sample (Tittle et al., 2003b). Behavioral low self-control, therefore, seems to have an invariant effect on male and female offending at various stages of the life course.

It is important to note that attitudinal low self-control only had a significant effect on male offending variety. A similar finding was observed by

Burton and colleagues (1998) using a general population sample. However, attitudinal low self-control had an invariant effect on both male and female offending frequency in the current study. Accordingly, the invariance thesis received qualified support with respect to gender.

Turning to race/ethnicity, the analyses revealed zero difference in effect size for both the attitudinal and behavioral low self-control measures on late life offending across racial/ethnic groups. This finding informs the relatively scant literature on the invariance thesis across race/ethnicity. In fact, Vazsonyi and Crosswhite (2004) conducted the only study that compared the effect sizes of low self-control on crime between African-Americans and Whites. They found that low self-control had a consistent effect on offending for African-American males and White males. However, inconsistent effect sizes were observed between females of the two racial groups. The current study supports the invariance thesis with respect to race/ethnicity among people 60 years of age and older.

Finally, low self-control predicts criminal offending to the same degree across various age subgroups of seniors. These results were observed with both operationalizations of low self-control but this finding does not square nicely with previous research. Two studies used separate samples of people 18 years of age and older and showed that low self-control had the strongest effect on younger age groups (i.e., 18 to 25 years old) (Burton et al., 1999; Tittle et al., 2003b). In fact, these studies revealed that behavioral low self-control was not significantly related to criminal behavior for people 51 years and older (Burton et al., 1999) or 65 years or older (Tittle et al., 2003b). What is important to remember, however,

is that both samples included few respondents in each respective older age group. Therefore, it is possible that the supposed vacillating effect of low self-control across age is a methodological artifact of range restriction in variables of interest among the older people included in the samples. The present study demonstrated that low self-control has a uniform effect on offending behavior for age groups 60 years and over.

In the end, the results confirm two of Gottfredson and Hirschi's (1990) arguments. For one, low self-control predicts offending among older. Furthermore, the invariance test results show that low self-control, regardless of measurement strategy, has an invariant effect on criminal offending across various subgroups of elderly individuals. Prior research has observed less consistent results using samples of adolescents. Future researchers need to explore why the effect sizes of low self-control are uniform across subgroups of older individuals and inconsistent among younger people.

The results also bring into light another controversial topic from self-control theory—the stability thesis. Recall that Gottfredson and Hirschi (1990) posited that self-control is a stable individual characteristic after the age of 10. Some recent research has suggested that this hypothesis is incorrect and level of self-control can change throughout different stages of life (Burt et al., 2006; Muraven & Baumeister, 2000; Piquero, Jennings, & Farrington, 2010). In particular, the ability to self-regulate one's actions has been shown to increase over time (Muraven, Baumeister, & Tice, 1999). Gottfredson and Hirschi (1990) actually conceded that capacity for self-control may increase as people grow

older. The consequence of increasing self-control with age may not simply be reductions in overall criminal activity. Rather, an increased ability to foresee the long-term consequences of one's actions may help older people be selective in the types of crimes they commit. Older people may be inclined toward more offense specialization as a result of choosing crimes that are less detectable or that they are experienced at successfully completing. Future research should explore whether advanced age is associated with offense specialization after controlling for level of self-control.

## PROPENSITY, OPPORTUNITY, AND OFFENDING IN LATE LIFE

Gottfredson and Hirschi (1990) argue that all other correlates of crime are rendered meaningless once individual levels of self-control are accounted for. Accordingly, opportunity (or routine activity) is irrelevant in the explanation of criminal offending. Research suggests, however, that low self-control has an effect on criminal behavior through its influence on routine activities (Forde & Kennedy, 1997; Schreck, Stewart, & Fisher, 2006). The final section of this dissertation examined the simultaneous effects of criminal propensity (or low self-control) and opportunity on offending among older people. The analyses yielded several important findings.

The results of this study confirm that self-control theory is, indeed, a general framework that accounts for criminal activity committed during late life. This result is consistent with Gottfredson and Hirschi's (1990) expectation but is also important for other reasons. For one, even though the age-crime curve clearly

demonstrates that criminal activity is relatively rare during the elderly years of life, low self-control still accounts for variation in criminal offending. There is a significant relationship between low self-control and senior offending after controlling for important correlates of crime, such as opportunity, gender, and age. The finding is consistent with a long list of studies. Burt, Simons, and Simons (2006), for example, showed that low self-control explains teenagers' criminal offending variety. The results of the present study contribute to this literature by demonstrating that low self-control also accounts for elderly crime.

The present study offered less support for Gottfredson and Hirschi's (1990) contention that low self-control should disrupt the association between all other correlates of criminal behavior. Although the low self-control measures had stronger effects on crime than the routine activity measure, they did not wash out the influence of opportunity on criminal offending. Therefore, Gottfredson and Hirschi's claim that low self-control is the only variable that explains offending is not supported.

There were theoretical and empirical reasons to expect that routine activities should mediate the link between low self-control and criminal offending. Gottfredson and Hirschi (1990), for example, maintained that criminal opportunities are simply the result of self-selection based on individuals' levels of self-control. That is, people with poor self-control will choose to participate in risky activities where the likelihood of crime is higher. From this theoretical standpoint, low self-control should have an effect on crime through its influence

on routine activities. Routine activities have been shown to partially mediate the link between low self-control and crime (Forde & Kennedy, 1997).

Despite prior research, the mediation relationship does not hold among the present study's sample of older people. Behavioral low self-control was unrelated to routine activity and, therefore, a necessary condition for mediation was not satisfied. Two of the three conditions for mediation were satisfied with respect to the attitudinal low self-control measure. For one, attitudinal low self-control was associated with variation in routine activities. The routine activity measure also had a significant effect on criminal offending. When both measures were examined simultaneously, however, routine activity did not reduce the effect of low self-control on offending. Among older people low self-control has an independent effect on criminal activity that does not operate through routine activity.

One explanation for this finding lies in the observation that the attitudinal low self-control measure was negatively associated with the routine activity measure. Typically research shows that teenagers with low self-control engage in more unstructured socializing away from home. However, it seems that seniors' levels of self-control are not related to this type of activity in the same manner as they are for younger individuals. Unstructured socializing may involve less risky behaviors among elders than for youth. For example, previous research often lumps activities such as hanging out with delinquent peers and drinking alcohol into unstructured socializing scales (see, e.g., Schreck et al., 2006). It is not surprising that low self-control would be associated with such activities. Seniors

may engage in more prosocial activities during their time away from home (e.g., playing cards at a friend's house).

It is important to note that supplemental analyses presented in Appendix D showed that low self-control is associated with respondents going to drinking establishments. In turn, going to drinking establishments is associated with greater offending variety and frequency. However, going to drinking establishments did not drastically reduce the effects of low self-control on criminal behavior. Thus, routine activities when operationalized with risky behaviors still do not mediate the link between low self-control and criminal activity among seniors.

The results of this study provide several important theoretical advancements to the literature. The findings reveal that both low self-control and routine activity have independent effects on late life offending. Yet, these perspectives are often pitted against one another in the literature. These findings help advance self-control theory by demonstrating that, at least among elders, opportunity is important in the explanation of crime regardless of individual levels of criminal propensity. The results also suggest that self-control theory has something important to offer the neglected concept from routine activity theory—the motivated offender. Routine activity literature typical assumes an unlimited supply of offenders in society and, therefore, rarely gives theoretical consideration to the topic (see, e.g., Felson & Clarke, 1998). The findings indicate that low self-control folks are those more likely to commit crime during late life even after controlling for opportunity. These findings suggest that self-control theory and routine activity theory should not be treated as competing frameworks. Rather,

both are necessary to fully understand crime committed by seniors and future work should continue to integrate the theories.

## POLICY IMPLICATIONS

The present study tested the generality of two criminological theories using a sample of older people and generated several policy implications that flow from the results of the analyses. The finding that low self-control predicts offending in late life is important with respect to policy for several reasons. Results from this study and prior research suggest that low self-control is an important predictor of crime throughout many phases of the life course. Accordingly, establishing self-control early in childhood may have long-term consequences on behavior throughout the lifespan. Self-control studies using adolescent samples often make policy suggestions for the development of programs that help parents learn how to effectively monitor their children's behavior, recognize deviant behavior when it occurs, and effectively punish wayward acts. Assuming that self-control is stable throughout the life course (Gottfredson & Hirschi, 1990; Hay & Forrest, 2006; Turner & Piquero, 2002), such programming may help parents reduce the chances of delinquency among their children and result in positive outcomes throughout adulthood. Some research has suggested that self-control is not a stable characteristic (Burt et al., 2006) and it can be strengthened like a muscle with exercise (Muraven & Baumeister, 2000). In the event that self-control can be changed throughout a person's life, intervention programs may be used to help individuals increase self-

control. Recent research by Piquero and associates (2010) revealed that group-based interventions that focus on social skills development and cognitive coping strategies are effective at increasing children's levels of self-control. Similar programs may be useful in teaching seniors how to more effectively self-regulate their behavior.

Furthermore, crime control strategies that aim to reduce criminal opportunities through target hardening, directed enforcement, or situational crime prevention can reduce crime regardless of the age composition of the population where the policies are implemented. For example, breath alcohol ignition interlock devices are often installed on vehicles of convicted drunk drivers. These devices are intended to reduce the opportunity to drive under the influence of alcohol (DUI). Such strategies should work equally well at reducing DUI among older people and younger individuals (see, e.g., Coben, 1999). Interlock devices and other similar strategies should be used with elderly DUI offenders to reduce future opportunities for the crime.

The results also stress the importance of moving beyond exclusive reliance on the criminal justice system to reduce offending. Everyday activities away from home in settings without effective guardianship provide situations conducive to criminal opportunities. While seniors violate the law less often than teenagers, they still commit crime. Structured activities (e.g., community service clubs) are less conducive to crime among teenagers because of increased guardianship. Consequently, policies should be developed with an eye toward creating community programs, volunteer groups, and social clubs for the elderly that have

some type of leader or authority figure to provide guardianship during the activities. With more structured activity options older people may be exposed to less criminal opportunities from participating in unstructured socializing.

## CONCLUSION

This study demonstrated that criminal offending among elderly people is a relatively rare phenomenon. At the same time, however, offending among seniors is not zero. More importantly, variation in criminal offending among people in the late part of the life course can be explained by some of the same theories that have proven so useful in explaining criminal activity among younger segments of the population. Indeed, self-control theory and routine activity theory are general frameworks that explain senior criminal behavior. As is the case for most critiques of criminological theory in general, the results suggest that either framework alone offers an incomplete explanation of criminal offending. In the end, both criminal propensity and opportunity matter in the explanation of late life offending.

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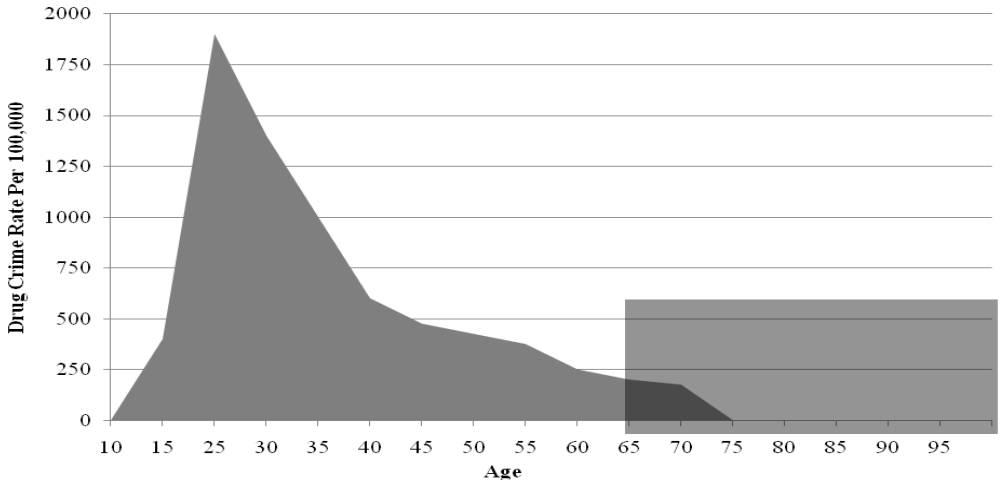
# APPENDIX A

# AGE-CRIME CURVES

Figure A1

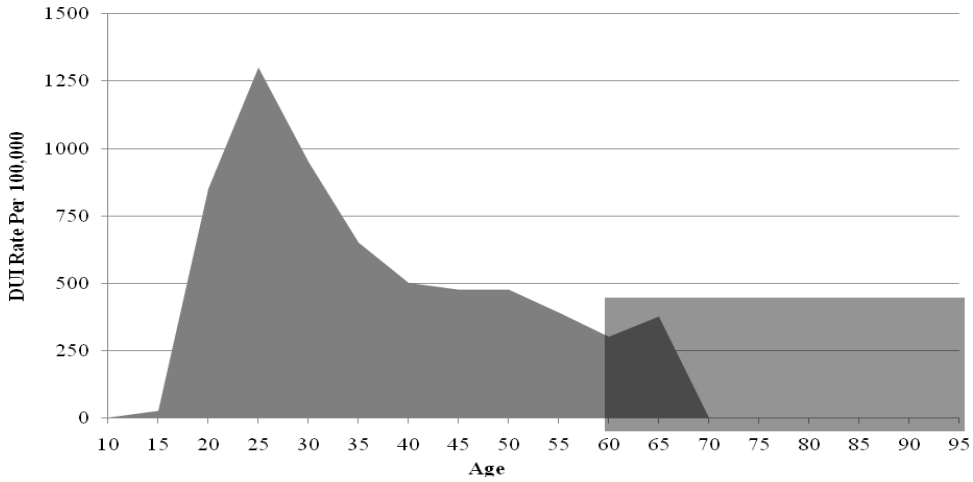
*Age-Crime Curve for Drug Crime Rates*




*Note*. The shaded region highlights the later stages of the life course that are neglected in most criminological research. Adapted from the Federal Bureau of Investigations Uniform Crime Reports 2010.

Figure A2

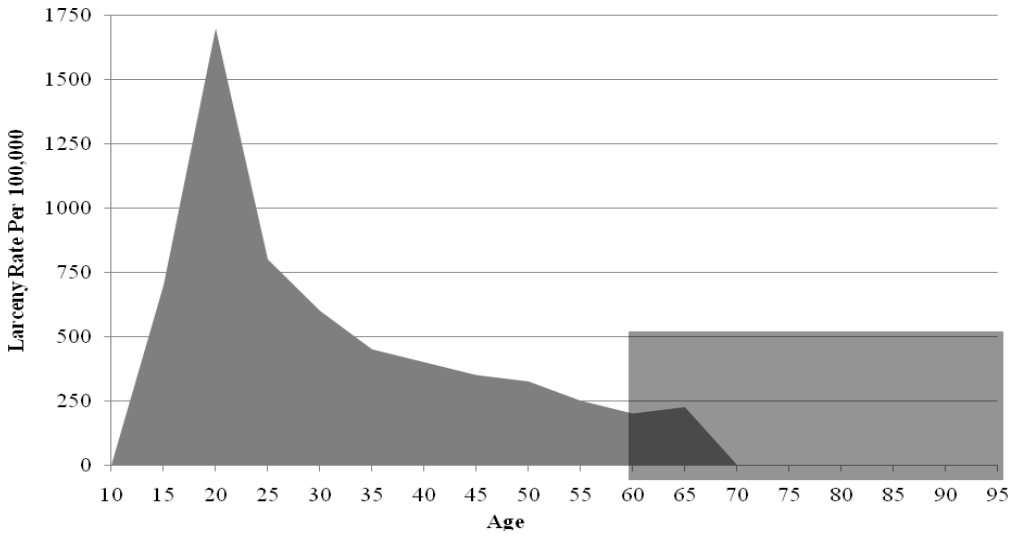
*Age-Crime Curve for DUI Rates*




*Note*. The shaded region highlights the later stages of the life course that are neglected in most criminological research. Adapted from the Federal Bureau of Investigations Uniform Crime Reports 2010.

Figure A3

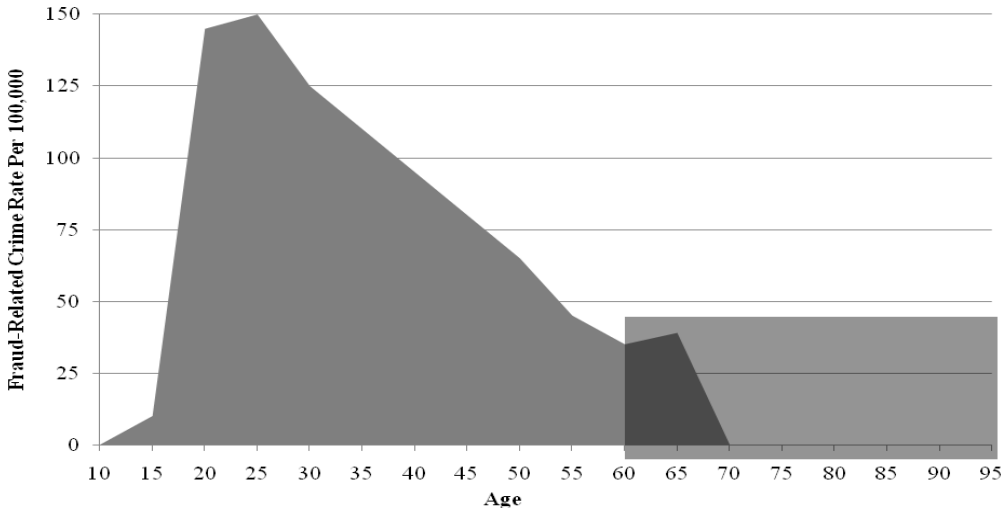
*Age-Crime Curve for Larceny Rates*




*Note*. The shaded region highlights the later stages of the life course that are neglected in most criminological research. Adapted from the Federal Bureau of Investigations Uniform Crime Reports 2010.

Figure A4

*Age-Crime Curve for Fraud-Related Crime Rates*




*Note*. The shaded region highlights the later stages of the life course that are neglected in most criminological research. Adapted from the Federal Bureau of Investigations Uniform Crime Reports 2010.

# APPENDIX B

# SENSITIVITY ANALYSES FOR

# GENERAL VERSUS SPECIFIC OPPORTUNITY

Table B1

*The Effects of General Routine Activities, Specific Opportunity, and Drinking Routines on Offending Variety*

| Variables | Offending variety[a] | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Model 1 | | Model 2 | | Model 3 | | Model 4 | |
| | *b* (s.e.) [IRR] | *z*-score | *b* (s.e.) [IRR] | *z*-score | *b* (s.e.) [IRR] | *z*-score | *b* (s.e.) [IRR] | *z*-score |
| Routine activity *(General)* | 0.06 (0.01) [1.06] | 4.35** | --- | --- | --- | --- | 0.03 (0.01) [1.03] | 2.26* |
| Access to a vehicle *(Specific)* | --- | --- | 0.34 (0.21) [1.40] | 1.57 | --- | --- | 0.30 (0.21) [1.35] | 1.41 |
| Drinking routines | --- | --- | --- | --- | 0.25 (0.03) [1.29] | 10.00** | 0.24 (0.03) [1.27] | 9.25** |
| Health | -0.06 (0.03) | -1.99* | -0.03 (0.03) | -0.92 | -0.04 (0.03) | -1.51 | -0.06 (0.03) | -2.12* |
| Marital satisfaction | -0.09 (0.05) | -1.60 | -0.08 (0.05) | -1.49 | -0.06 (0.05) | -1.20 | -0.08 (0.05) | -1.47 |
| Retired | -0.16 (0.07) | -2.11* | -0.15 (0.08) | -2.03* | -0.13 (0.07) | -1.78 | -0.13 (0.08) | -1.71 |
| Unemployed | -0.02 (0.15) | -0.14 | -0.02 (0.15) | -0.11 | 0.09 (0.16) | 0.54 | 0.10 (0.16) | 0.63 |

Table B1 Continued

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Job satisfaction | 0.04 | 0.25 | 0.01 | 0.13 | 0.02 | 0.15 | 0.02 | 0.17 |
| | (0.17) | | (0.10) | | (0.10) | | (0.10) | |
| Parental satisfaction | -0.12 | -2.36* | -0.11 | -2.11* | -0.10 | -1.98* | -0.12 | -2.24* |
| | (0.05) | | (0.05) | | (0.05) | | (0.05) | |
| Military service | 0.01 | 0.18 | 0.01 | 0.16 | -0.03 | -0.41 | -0.03 | -0.43 |
| | (0.07) | | (0.07) | | (0.07) | | (0.07) | |
| Male | 0.47 | 7.17** | 0.44 | 6.76** | 0.43 | 6.64** | 0.43 | 6.68** |
| | (0.07) | | (0.07) | | (0.06) | | (0.06) | |
| Age | -0.02 | -6.01** | -0.02 | -6.34** | -0.02 | -5.65** | -0.02 | -5.26** |
| | (0.00) | | (0.00) | | (0.00) | | (0.00) | |
| White | -0.05 | -0.41 | -0.05 | -0.41 | -0.03 | -0.27 | -0.08 | -0.63 |
| | (0.12) | | (0.12) | | (0.12) | | (0.12) | |
| Hispanic/Latino | 0.00 | 0.01 | 0.00 | 0.02 | 0.06 | 0.39 | 0.04 | 0.24 |
| | (0.14) | | (0.14) | | (0.15) | | (0.15) | |
| Education | 0.02 | 1.00 | 0.03 | 1.83 | 0.03 | 1.63 | 0.02 | 0.93 |
| | (0.02) | | (0.02) | | (0.02) | | (0.02) | |
| LR test of $\alpha$ = | 5.01* | | 5.60** | | 1.26 | | 0.92 | |
| Wald $\chi^2$ = | 223.70** | | 180.13** | | 307.22** | | 320.25** | |
| McFadden's $R^2$ | 0.04 | | 0.04 | | 0.06 | | 0.06 | |

*Note*. Entries are unstandardized partial regression coefficients (*b*), robust standard errors that adjust for clustering on 5-digit zip code in parentheses, and incidence rate ratios in brackets [IRR]. [a] All models estimated with negative binomial regression. * $p < 0.05$, ** $p < 0.01$ (two-tailed test).

Table B2

*The Effects of General Routine Activities, Specific Opportunity, and Drinking Routines on Specific Driving Offenses*

| Variables | Model 1[a] Driving offense scale | | Model 2[a] Traffic violations | | Model 3[b] Illegal parking | | Model 4[b] DUI | |
|---|---|---|---|---|---|---|---|---|
| | *b* (s.e.) [β] | *t*-ratio | *b* (s.e.) [β] | *t*-ratio | *b* (s.e.) [OR] | Wald | *b* (s.e.) [OR] | Wald |
| Routine activity *(General)* | 0.01 (0.00) [0.04] | 1.86† | 0.01 (0.01) [0.03] | 1.35 | 0.10 (0.04) [1.10] | 2.81** | 0.01 (0.05) [1.01] | 0.11 |
| Access to a vehicle *(Specific)* | 0.06 (0.02) | 2.45* | 0.15 (0.07) | 2.04* | 0.50 (0.43) [1.65] | 1.16 | 0.56 (0.66) [1.74] | 0.84 |
| Drinking routines | 0.07 (0.01) [0.21] | 8.29** | 0.10 (0.02) [0.11] | 4.56** | 0.35 (0.06) [1.42] | 5.59** | 0.97 (0.08) [2.65] | 12.01** |
| Health | -0.01 (0.01) | -0.76 | -0.01 (0.02) | -0.42 | -0.06 (0.07) | -0.74 | 0.01 (0.10) | 0.07 |
| Marital satisfaction | -0.03 (0.01) | -2.32* | -0.04 (0.04) | -1.10 | -0.27 (0.14) | -2.00* | -0.51 (0.19) | -2.65** |
| Retired | -0.04 (0.02) | -1.99* | -0.14 (0.07) | -2.02* | -0.30 (0.20) | -1.45 | 0.11 (0.25) | 0.45 |
| Unemployed | 0.00 (0.04) | 0.07 | -0.02 (0.11) | -0.15 | -0.25 (0.48) | -0.52 | 0.64 (0.49) | 1.33 |
| Job satisfaction | 0.01 (0.03) | 0.31 | 0.01 (0.09) | 0.08 | 0.11 (0.25) | 0.44 | 0.35 (0.32) | 1.06 |

Table B2 Continued

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Parental satisfaction | -0.01<br>(0.01) | -0.69 | -0.02<br>(0.04) | -0.45 | -0.20<br>(0.14) | -1.44 | 0.03<br>(0.19) | 0.13 |
| Military service | -0.01<br>(0.02) | -0.69 | -0.02<br>(0.04) | -0.32 | -0.22<br>(0.19) | -1.17 | 0.01<br>(0.22) | 0.05 |
| Male | 0.14<br>(0.02) | 7.51** | 0.37<br>(0.06) | 5.84** | 0.79<br>(0.18) | 4.46** | 0.99<br>(0.22) | 4.48** |
| Age | -0.01<br>(0.00) | -6.82** | -0.02<br>(0.00) | -7.39** | -0.02<br>(0.01) | -1.65 | -0.05<br>(0.01) | -3.37** |
| White | 0.03<br>(0.02) | 1.19 | 0.17<br>(0.07) | 2.43** | -0.07<br>(0.28) | -0.25 | -0.32<br>(0.33) | -0.94 |
| Hispanic/Latino | 0.06<br>(0.04) | 1.43 | 0.18<br>(0.14) | 1.33 | 0.29<br>(0.36) | 0.82 | -0.02<br>(0.61) | -0.03 |
| Education | 0.01<br>(0.00) | 2.36* | 0.04<br>(0.01) | 3.14** | -0.01<br>(0.05) | -0.20 | 0.03<br>(0.06) | 0.58 |
| | *F*-test = 23.62** | | *F*-test = 17.45** | | Wald $\chi^2$ = 124.47** | | Wald $\chi^2$ = 255.32** | |
| | $R^2$ = 0.18 | | $R^2$ = 0.13 | | McFadden's $R^2$ = 0.06 | | McFadden's $R^2$ = 0.19 | |

*Note*. Entries are unstandardized partial regression coefficients (*b*), robust standard errors that adjust for clustering on 5-digit zip code in parentheses, and standardized partial regression coefficients [β] for the OLS models and odds ratios [OR] for the logistic models in brackets. [a] OLS regression. [b] Logistic regression. * $p < 0.05$, ** $p < 0.01$ (two-tailed test), † $p < 0.05$ (one-tailed test).

Table B3

*The Effects of General Routine Activities and Specific Opportunity on Offending Frequency*

| Variables | Offending frequency[a] | | | | | |
|---|---|---|---|---|---|---|
| | Model 1 | | Model 2 | | Model 3 | |
| | *b* (s.e.) [β] | *t*-ratio | *b* (s.e.) [β] | *t*-ratio | *b* (s.e.) [β] | *t*-ratio |
| Routine activity *(General)* | 0.06[b] (0.02) [0.08] | 3.61** | --- | --- | 0.06[b] (0.02) [0.05] | 3.26** |
| Access to a vehicle *(Specific)* | --- | --- | 0.04 (0.02) | 2.00* | 0.03 (0.02) | 1.72 |
| Health | -0.01 (0.00) | -1.74 | 0.00 (0.00) | -0.82 | -0.01 (0.00) | -1.76 |
| Marital satisfaction | -0.01 (0.01) | -1.79 | -0.01 (0.01) | -1.76 | -0.02 (0.01) | -1.93 |
| Retired | -0.03 (0.01) | -2.15* | -0.03 (0.01) | -2.09* | -0.03 (0.01) | -2.07* |
| Unemployed | -0.01 (0.02) | -0.38 | -0.01 (0.02) | -0.31 | -0.01 (0.02) | -0.28 |
| Job satisfaction | 0.01 (0.02) | 0.30 | 0.01 (0.02) | 0.30 | 0.01 (0.02) | 0.30 |
| Parental satisfaction | -0.01 (0.01) | -1.70 | -0.01 (0.01) | -1.55 | -0.01 (0.01) | -1.77 |
| Military service | 0.00 (0.01) | -0.18 | 0.00 (0.01) | -0.25 | 0.00 (0.01) | -0.24 |
| Male | 0.09 (0.01) | 7.12** | 0.09 (0.01) | 6.93** | 0.09 (0.01) | 6.99** |
| Age | -0.03[a] (0.01) | -5.75** | -0.03[a] (0.01) | -6.03** | -0.03[a] (0.01) | -5.64** |
| White | 0.00 (0.02) | -0.19 | 0.00 (0.02) | -0.25 | -0.01 (0.02) | -0.43 |
| Hispanic/Latino | 0.02 (0.02) | 0.81 | 0.02 (0.02) | 0.78 | 0.02 (0.02) | 0.73 |
| Education | 0.00 (0.00) | 1.03 | 0.00 (0.00) | 1.73 | 0.00 (0.00) | 0.96 |
| *F*-test = | 13.96** | | 13.00** | | 13.96* | |
| $R^2$ = | 0.11 | | 0.11 | | 0.11 | |

*Note*. Entries are unstandardized partial regression coefficients (*b*), robust standard errors that adjust for clustering on 5-digit zip code in parentheses, and standardized regression coefficients in brackets [β]. [a] All models estimated with OLS regression. [b] Regression coefficient and standard error multiplied by 10. * $p < 0.05$, ** $p < 0.01$ (two-tailed test).

# APPENDIX C

# SENSITIVITY ANALYSES FOR

# IS THE EFFECT OF LOW SELF-CONTROL INVARIANT?

Table C1

*Low Self-Control and Offending Frequency*

| Variables | Offending frequency | | |
|---|---|---|---|
| | Bivariate correlations | Multivariate regression coefficients[a] | |
| | *r* | *b* (s.e.) [β] | *t*-ratio |
| Attitudinal low self-control | 0.13* | 0.02 (0.00) [0.13] | 6.06** |
| Behavioral low self-control | 0.32* | 0.20 (0.02) [0.27] | 9.39** |
| Health | 0.00 | 0.00 (0.00) | 0.66 |
| Marital satisfaction | 0.02 | -0.01 (0.01) | -0.78 |
| Retired | -0.13* | -0.03 (0.01) | -2.08* |
| Unemployed | 0.02 | -0.01 (0.02) | -0.43 |
| Job satisfaction | 0.08* | 0.01 (0.02) | 0.71 |
| Parental satisfaction | -0.09* | -0.01 (0.01) | -1.34 |
| Military service | 0.12* | -0.01 (0.01) | -0.74 |
| Male | 0.21* | 0.08 (0.01) | 7.46** |
| Age | -0.19* | -0.03[b] (0.01) | -6.36** |
| White | 0.00 | 0.01 (0.02) | 0.28 |

Table C1 Continued

| | | | |
|---|---|---|---|
| Hispanic/Latino | 0.00 | 0.01<br>(0.02) | 0.67 |
| Education | 0.10* | 0.01<br>(0.00) | 2.45** |
| | *F*-test = | 28.03** | |
| | $R^2$ = | 0.20 | |

*Note.* Entries are unstandardized partial regression coefficients (*b*), robust standard errors that adjust for clustering on 5-digit zip code in parentheses, and standardized regression coefficients in brackets [β]. [a]OLS regression. [b]Regression coefficient and standard error multiplied by 10. * $p < 0.05$, ** $p < 0.01$ (two-tailed test).

Table C2

*Bivariate Analysis Testing the Invariance Thesis for Offending Frequency*

| | Offending frequency[a] | Fisher's *z* |
|---|---|---|
| *Gender* | | |
| Attitudinal low self-control | | |
| Male | 0.22 | 2.31* |
| Female | 0.11 | |
| Behavioral low self-control | | |
| Male | 0.27 | -1.64 |
| Female | 0.34 | |
| *Race/Ethnicity* | | |
| Attitudinal low self-control | | |
| Racial/Ethnic Minority | 0.21 | -0.65 |
| White | 0.16 | |
| Behavioral low self-control | | |
| Racial/Ethnic Minority | 0.42 | -1.79 |
| White | 0.29 | |
| *Age* | | |
| Attitudinal low self-control | | |
| Young-Old (60 to 72 years) | 0.19 | 0.85[b] |
| Old-Old (73 to 79 years) | 0.15 | -0.80[c] |
| Oldest-Old (80 years and older) | 0.20 | -0.12[d] |
| Behavioral low self-control | | |
| Young-Old (60 to 72 years) | 0.33 | 2.84**[b] |
| Old-Old (73 to 79 years) | 0.19 | -2.21*[c] |
| Oldest-Old (80 years and older) | 0.33 | 0.11[d] |

*Note.* [a] Entries are Pearson's *r* correlation coefficients between offending frequency and low self-control for the respective group and operationalization of low self-control. [b] Fisher's *z* for comparison between "young-old" and "old-old." [c] Fisher's *z* for comparison between "old-old" and "oldest-old." [d] Fisher's *z* for comparison between "young-old" and "oldest-old." * $p < 0.05$, ** $p < 0.01$ (two-tailed test).

Table C3

*The Effects of Low Self-Control on Offending Frequency across Gender*

| Variables | Offending frequency | | | | |
|---|---|---|---|---|---|
| | Male[a] | | Female[a] | | |
| | *b* (s.e.) [β] | *t*-ratio | *b* (s.e.) [β] | *t*-ratio | *z*-test |
| Attitudinal low self-control | 0.03 (0.01) [0.19] | 5.54** | 0.12[b] (0.04) [0.09] | 3.21** | 1.67 |
| Behavioral low self-control | 0.17 (0.03) [0.23] | 5.53** | 0.21 (0.03) [0.32] | 7.60** | -0.94 |
| Health | 0.00 (0.01) | 0.45 | 0.01 (0.01) | 1.30 | |
| Marital satisfaction | -0.01 (0.01) | -0.88 | 0.00 (0.01) | 0.32 | |
| Retired | -0.03 (0.02) | -1.41 | -0.02 (0.01) | -1.66 | |
| Unemployed | 0.06 (0.06) | 1.02 | -0.03 (0.02) | -1.25 | |
| Job satisfaction | -0.01 (0.03) | -0.38 | 0.03 (0.02) | 1.37 | |
| Parental satisfaction | 0.01 (0.01) | 1.04 | -0.03 (0.01) | -2.92** | |
| Military service | -0.01 (0.01) | -0.64 | 0.00 (0.02) | 0.15 | |
| Age | -0.04[b] (0.01) | -4.26** | -0.03[b] (0.01) | -4.52** | |
| White | 0.06 (0.02) | 2.79** | -0.03 (0.02) | -1.53 | |
| Hispanic/Latino | 0.06 (0.03) | 1.93 | -0.02 (0.03) | -0.77 | |
| Education | 0.01 (0.00) | 2.64** | 0.00 (0.00) | 0.43 | |
| *N* = | 695 | | 1215 | | |
| *F*-test = | 9.41** | | 15.55** | | |
| $R^2$ = | 0.17 | | 0.17 | | |

*Note*. Entries are unstandardized partial regression coefficients (*b*), robust standard errors that adjust for clustering on 5-digit zip code in parentheses, and standardized regression coefficients in brackets [β]. [a] OLS regression. [b] Regression coefficient and standard error multiplied by 10. * $p < 0.05$, ** $p < 0.01$ (two-tailed test).

Table C4

*The Effects of Low Self-Control on Offending Frequency across Race/Ethnicity*

| Variables | Offending frequency | | | | |
|---|---|---|---|---|---|
| | White[a] | | Racial/Ethnic Minority[a] | | |
| | *b* (s.e.) [β] | *t*-ratio | *b* (s.e.) [β] | *t*-ratio | *z*-test |
| Attitudinal low self-control | 0.18[b] (0.03) [0.12] | 5.88** | 0.03 (0.01) [0.15] | 1.89 | -1.15 |
| Behavioral low self-control | 0.18 (0.02) [0.26] | 8.94** | 0.33 (0.09) [0.42] | 3.83** | -1.63 |
| Health | 0.00 (0.00) | 0.47 | 0.01 (0.02) | 0.32 | |
| Marital satisfaction | -0.01 (0.01) | -1.04 | -0.01 (0.03) | -0.41 | |
| Retired | -0.02 (0.01) | -1.78 | -0.04 (0.04) | -0.99 | |
| Unemployed | -0.02 (0.02) | -0.81 | 0.15 (0.08) | 1.88 | |
| Job satisfaction | 0.01 (0.02) | 0.35 | 0.09 (0.06) | 1.44 | |
| Parental satisfaction | -0.01 (0.01) | -1.72 | 0.02 (0.03) | 0.66 | |
| Military service | -0.02 (0.01) | -1.32 | 0.08 (0.03) | 2.52* | |
| Male | 0.09 (0.01) | 8.22** | -0.04 (0.03) | -1.29 | |
| Age | -0.03[b] (0.01) | -7.40** | -0.01[b] (0.02) | -0.36 | |
| Education | 0.01 (0.00) | 2.45* | 0.00 (0.01) | 0.35 | |
| *N* = | 1755 | | 155 | | |
| *F*-test = | 31.18** | | 4.07** | | |
| $R^2$ = | 0.21 | | 0.29 | | |

*Note*. Entries are unstandardized partial regression coefficients (*b*), robust standard errors that adjust for clustering on 5-digit zip code in parentheses, and standardized regression coefficients in brackets [β]. [a] OLS regression. [b] Regression coefficient and robust standard error multiplied by 10. * $p < 0.05$, ** $p < 0.01$ (two-tailed test).

Table C5

*The Effects of Low Self-Control on Offending Frequency across Age*

| Variables | Offending frequency | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Young-Old[a] (60 to 72 years) | | | Old-Old[a] (73 to 79 years) | | | Oldest-Old[a] (80 years and older) | | |
| | *b* (s.e.) [β] | *t*-ratio | | *b* (s.e.) [β] | *t*-ratio | | *b* (s.e.) [β] | *t*-ratio | |
| Attitudinal low self-control | 0.02 (0.00) [0.13] | 4.50** | | 0.02 (0.01) [0.13] | 3.01** | | 0.02 (0.01) [0.15] | 2.31* | |
| *z*-test = | | | 0.00[b] | | | 0.00[c] | | | 0.00[d] |
| Behavioral low self-control | 0.22 (0.03) [0.31] | 8.25** | | 0.13 (0.04) [0.15] | 2.96** | | 0.20 (0.04) [0.31] | 4.81** | |
| *z*-test = | | | 1.80[b] | | | 1.24[c] | | | 0.40[d] |
| Health | 0.01 (0.01) | 1.39 | | -0.01 (0.01) | -0.56 | | 0.00 (0.01) | 0.06 | |
| Marital satisfaction | -0.02 (0.01) | -2.05* | | 0.03 (0.01) | 1.87 | | 0.01 (0.02) | 0.54 | |
| Retired | -0.04 (0.01) | -2.71** | | -0.01 (0.03) | -0.45 | | -0.02 (0.04) | -0.45 | |
| Unemployed | 0.02 (0.03) | 0.60 | | 0.03 (0.06) | 0.48 | | -0.09 (0.04) | -2.11* | |
| Job satisfaction | 0.01 (0.02) | 0.67 | | -0.01 (0.04) | -0.23 | | 0.04 (0.08) | 0.53 | |

Table C5 Continued

| | | | | | | |
|---|---|---|---|---|---|---|
| Parental satisfaction | -0.01<br>(0.01) | -0.58 | -0.04<br>(0.02) | -2.35* | 0.03[a]<br>(0.14) | 0.19 |
| Military service | -0.01<br>(0.02) | -0.31 | -0.01<br>(0.03) | -0.52 | -0.01<br>(0.03) | -0.45 |
| Male | 0.08<br>(0.01) | 5.57** | 0.10<br>(0.02) | 4.35** | 0.06<br>(0.02) | 2.35* |
| White | 0.02<br>(0.02) | 0.90 | -0.03<br>(0.03) | -0.80 | -0.00<br>(0.39) | -0.01 |
| Hispanic/Latino | -0.01<br>(0.04) | -0.25 | -0.01<br>(0.04) | -0.29 | 0.07<br>(0.05) | 1.35 |
| Education | 0.01<br>(0.00) | 1.80 | 0.01<br>(0.00) | 2.20* | 0.00<br>(0.01) | 0.32 |
| *N* = | 1041 | | 474 | | 395 | |
| *F*-test = | 15.00** | | 6.85** | | 6.34** | |

*Note*. Entries are unstandardized partial regression coefficients (*b*), robust standard errors that adjust for clustering on 5-digit zip code in parentheses, and standardized partial regression coefficients in brackets [β]. [a] OLS regression. [b] Comparison between "young-old" and "old-old." [c] Comparison between "old-old" and "oldest-old." [d] Comparison between "young-old" and "oldest-old." * $p < 0.05$, ** $p < 0.01$ (two-tailed test).

# APPENDIX D

# SENSITIVITY ANALYSES FOR LOW SELF-CONTROL, ROUTINE ACTIVITY, AND OFFENDING IN LATE LIFE

Table D1

*The Effects of Low Self-Control on Routine Activity and Drinking Establishments*

| Variables | Routine activity[a] | | | | Drinking establishments[a] | | | |
|---|---|---|---|---|---|---|---|---|
| | Model 1 | | Model 2 | | Model 3 | | Model 4 | |
| | *b* (s.e.) [β] | *t*-ratio | *b* (s.e.) [β] | *t*-ratio | *b* (s.e.) [β] | *t*-ratio | *b* (s.e.) [β] | *t*-ratio |
| Attitudinal low self-control | --- | --- | -0.09 (0.04) [-0.05] | -2.13* | --- | --- | 0.07 (0.02) [0.08] | 3.58** |
| Behavioral low self-control | --- | --- | 0.13 (0.21) [0.01] | 0.62 | --- | --- | 0.22 (0.09) [0.06] | 2.45** |
| Health | 0.66 (0.06) | 11.79** | 0.65 (0.06) | 11.63** | 0.07 (0.03) | 2.75** | 0.08 (0.03) | 3.06** |
| Marital satisfaction | 0.27 (0.09) | 2.99** | 0.25 (0.09) | 2.71** | -0.05 (0.04) | -1.16 | -0.04 (0.04) | -0.89 |
| Retired | -0.01 (0.14) | -0.11 | -0.01 (0.14) | -0.05 | -0.12 (0.07) | -1.66 | -0.11 (0.07) | -1.62 |
| Unemployed | -0.15 (0.25) | -0.61 | -0.12 (0.25) | -0.49 | -0.41 (0.11) | -3.63** | -0.41 (0.11) | -3.66** |
| Job satisfaction | 0.04 (0.17) | 0.25 | 0.03 (0.17) | 0.18 | -0.01 (0.09) | -0.11 | -0.00 (0.09) | -0.01 |
| Parental satisfaction | 0.20 (0.10) | 2.05* | 0.21 (0.10) | 2.18* | -0.03 (0.04) | -0.74 | -0.03 (0.04) | -0.61 |

Table D1 Continued

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Military service | 0.00<br>(0.15) | 0.00 | -0.01<br>(0.15) | -0.08 | 0.16<br>(0.06) | 2.55** | 0.16<br>(0.06) | 2.50** |
| Male | -0.42<br>(0.13) | -3.27** | -0.39<br>(0.13) | -3.01** | 0.10<br>(0.06) | 1.77 | 0.08<br>(0.06) | 1.47 |
| Age | -0.03<br>(0.01) | -4.23** | -0.03<br>(0.01) | -3.99** | -0.01<br>(0.00) | -5.27** | -0.01<br>(0.00) | -5.30** |
| White | 0.62<br>(0.19) | 3.20** | 0.61<br>(0.20) | 3.15** | 0.09<br>(0.08) | 1.21 | 0.10<br>(0.08) | 1.31 |
| Hispanic/Latino | 0.23<br>(0.31) | 0.74 | 0.22<br>(0.31) | 0.71 | -0.13<br>(0.13) | -1.00 | -0.14<br>(0.13) | -1.09 |
| Education | 0.29<br>(0.03) | 9.83** | 0.28<br>(0.03) | 9.38** | 0.04<br>(0.01) | 2.89** | 0.04<br>(0.01) | 3.13** |
| F-test | 36.15** | | 30.80** | | 10.83** | | 10.00** | |
| $R^2$ | 0.18 | | 0.18 | | 0.06 | | 0.07 | |

*Note*. Entries are unstandardized partial regression coefficients (*b*), robust standard errors that adjust for clustering on 5-digit zip code in parentheses, and standardized partial regression coefficients in brackets [β]. [a]All models estimated with OLS regression. * $p < 0.05$, ** $p < 0.01$ (two-tailed test).

Table D2

*The Effects of Low Self-Control and Routine Activity on Offending Frequency*

| Variables | Offending frequency[a] | | | | | |
|---|---|---|---|---|---|---|
| | Model 1 | | Model 2 | | Model 3 | |
| | *b* (s.e.) [β] | *t*-ratio | *b* (s.e.) [β] | *t*-ratio | *b* (s.e.) [β] | *t*-ratio |
| Attitudinal low self-control | 0.20[b] (0.03) [0.13] | 6.06** | --- | --- | 0.21[b] (0.03) [0.14] | 6.22** |
| Behavioral low self-control | 0.20 (0.02) [0.27] | 9.39** | --- | --- | 0.20 (0.02) [0.27] | 9.51** |
| Routine activity | --- | --- | 0.06[b] (0.02) [0.08] | 3.61** | 0.07[b] (0.02) [0.09] | 3.85** |
| Health | 0.00 (0.00) | 0.66 | -0.01 (0.04) | -1.74 | 0.00 (0.00) | 0.45 |
| Marital satisfaction | -0.01 (0.01) | -0.78 | -0.01 (0.01) | -1.79 | -0.01 (0.01) | -0.97 |
| Retired | -0.03 (0.01) | -2.08* | -0.03 (0.01) | -2.15* | -0.02 (0.01) | -2.05* |
| Unemployed | -0.01 (0.02) | -0.43 | -0.01 (0.02) | -0.38 | -0.01 (0.02) | -0.38 |
| Job satisfaction | 0.01 (0.02) | 0.71 | 0.01 (0.02) | 0.30 | 0.01 (0.02) | 0.71 |
| Parental satisfaction | -0.01 (0.01) | -1.34 | -0.01 (0.01) | -1.70 | -0.01 (0.01) | -1.61 |
| Military service | -0.01 (0.01) | -0.74 | 0.00 (0.01) | 0.18 | -0.01 (0.01) | -0.73 |
| Male | 0.08 (0.01) | 7.46** | 0.09 (0.01) | 7.12** | 0.09 (0.01) | 7.60** |
| Age | -0.03[b] (0.01) | -6.36** | -0.03[b] (0.01) | -5.75** | -0.03[b] (0.01) | -5.92** |
| White | 0.01 (0.02) | 0.28 | 0.00 (0.02) | 0.19 | 0.00 (0.02) | 0.02 |
| Hispanic/Latino | 0.01 (0.02) | 0.67 | 0.02 (0.02) | 0.81 | 0.01 (0.02) | 0.60 |
| Education | 0.01 (0.00) | 2.45** | 0.00 (0.00) | 1.03 | 0.00 (0.00) | 1.52 |
| *F*-test | 28.03** | | 13.96** | | 26.83** | |
| $R^2$ | 0.20 | | 0.11 | | 0.21 | |

*Note*. Entries are unstandardized partial regression coefficients (*b*), robust standard errors that adjust for clustering on 5-digit zip code in parentheses (s.e.), and standardized regression coefficients in brackets [β]. [a] All models estimated with OLS regression. [b] Regression coefficient and standard error multiplied by 10. * $p < 0.05$, ** $p < 0.01$ (two-tailed test).

Table D3

*The Effects of Low Self-Control and Routine Activity on Individual Offending Items*

| Variables | Simple assault[a] | | Illegal drug use[a] | | Check fraud[a] | | Shoplifting[a] | | DUI[a] | | Illegal parking[a] | | Traffic violations[b] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *b* (s.e.) | Wald | *b* (s.e.) | Wald | *b* (s.e.) | Wald | *b* (s.e.) | Wald | *b* (s.e.) | Wald | *b* (s.e.) | Wald | *b* (s.e.) | *t*-ratio |
| Attitudinal LSC | 0.37 (0.10) | 3.54** | 0.18 (0.08) | 2.35* | 0.36 (0.19) | 1.88† | 0.19 (0.13) | 1.46 | 0.22 (0.07) | 3.02** | 0.12 (0.06) | 1.92† | 0.06 (0.02) | 3.85** |
| Behavioral LSC | 1.61 (0.34) | 4.67** | 1.85 (0.24) | 7.59** | 2.12 (0.47) | 4.50** | 2.98 (0.48) | 6.23** | 1.33 (0.27) | 4.94** | 1.79 (0.21) | 8.52** | 0.62 (0.10) | 6.29** |
| Routine activity | 0.13 (0.06) | 2.03* | -0.01 (0.04) | -0.34 | 0.01 (0.07) | 0.19 | 0.16 (0.09) | 1.70† | 0.14 (0.04) | 3.09** | 0.14 (0.04) | 4.11** | 0.02 (0.01) | 2.85** |
| Health | -0.30 (0.13) | -2.41* | -0.21 (0.10) | -2.17* | 0.36 (0.21) | 1.69 | -0.01 (0.18) | -0.07 | 0.05 (0.10) | 0.54 | 0.00 (0.08) | 0.04 | 0.01 (0.02) | 0.32 |
| Marital satisfaction | 0.27 (0.26) | 1.03 | 0.09 (0.19) | 0.47 | -0.29 (0.41) | -0.71 | 0.26 (0.44) | 0.59 | -0.50 (0.17) | -2.87** | -0.21 (0.14) | -1.51 | -0.02 (0.04) | -0.53 |
| Retired | 0.16 (0.40) | 0.39 | 0.16 (0.27) | 0.61 | -0.32 (0.55) | -0.57 | -0.41 (0.60) | -0.69 | 0.01 (0.24) | 0.06 | -0.29 (0.20) | -1.49 | -0.14 (0.07) | -2.13* |
| Unemployed | 0.88 (0.63) | 1.40 | 0.01 (0.48) | 0.02 | 1.19 (0.74) | 1.60 | 0.80 (0.89) | 0.90 | 0.17 (0.45) | 0.37 | -0.38 (0.47) | -0.80 | -0.08 (0.11) | -0.77 |
| Job satisfaction | 0.20 (0.49) | 0.41 | 0.07 (0.36) | 0.21 | -0.57 (0.72) | -0.78 | -0.05 (0.69) | -0.07 | 0.37 (0.31) | 1.20 | 0.17 (0.26) | 0.67 | 0.03 (0.09) | 0.34 |
| Parental satisfaction | -0.32 (0.24) | -1.35 | -0.18 (0.17) | -1.07 | -0.21 (0.37) | -0.59 | -0.77 (0.44) | -1.75 | 0.04 (0.18) | 0.23 | -0.21 (0.14) | -1.54 | -0.02 (0.04) | -0.49 |
| Military service | 0.18 (0.29) | 0.64 | -0.31 (0.27) | -1.15 | -0.39 (0.51) | -0.76 | -0.03 (0.50) | -0.06 | 0.14 (0.21) | 0.65 | -0.26 (0.19) | -1.32 | -0.02 (0.06) | -0.33 |

Table D3 Continued

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Male | 0.78<br>(0.28) | 2.84** | 0.41<br>(0.24) | 1.70 | 0.89<br>(0.51) | 1.72 | 0.23<br>(0.52) | 0.45 | 1.01<br>(0.21) | 4.79** | 0.87<br>(0.17) | 5.00** | 0.38<br>(0.06) | 6.20** |
| Age | -0.01<br>(0.02) | -0.92 | -0.01<br>(0.01) | -1.09 | 0.01<br>(0.03) | 0.24 | -0.01<br>(0.02) | -0.73 | -0.06<br>(0.01) | -4.14** | -0.02<br>(0.01) | -1.85 | -0.02<br>(0.00) | -7.99** |
| White | -0.55<br>(0.43) | -1.28 | -0.17<br>(0.27) | -0.65 | -1.34<br>(0.40) | -3.30** | -1.23<br>(0.47) | -2.64** | -0.31<br>(0.31) | -1.00 | -0.01<br>(0.28) | -0.02 | 0.21<br>(0.07) | 3.07** |
| Hispanic/<br>Latino | -0.66<br>(0.74) | -0.89 | 0.29<br>(0.40) | 0.71 | -1.01<br>(0.98) | -1.02 | ---[c] | --- | -0.32<br>(0.55) | -0.58 | 0.15<br>(0.40) | 0.37 | 0.16<br>(0.13) | 1.22 |
| Education | -0.09<br>(0.08) | -1.16 | -0.07<br>(0.05) | -1.36 | -0.21<br>(0.13) | -1.59 | -0.02<br>(0.10) | -0.21 | 0.03<br>(0.06) | 0.60 | -0.00<br>(0.05) | -0.02 | 0.04<br>(0.01) | 3.65** |
| Wald $\chi^2$ = | 94.54** | | 88.88** | | 93.34** | | 97.25** | | 119.04** | | 151.00** | | *F*-test = 24.89** | |
| McFadden's $R^2$ = | 0.11 | | 0.07 | | 0.15 | | 0.17 | | 0.11 | | 0.09 | | $R^2$ = 0.16 | |

*Note*. Entries are unstandardized partial regression coefficients (*b*) and robust standard errors that adjust for clustering on 5-digit zip code in parentheses. [a]Logistic regression. [b]OLS regression. [c]Variable was dropped from analysis because it predicted the dependent variable perfectly (i.e., all Hispanic/Latino respondents self-reported zero involvement in shoplifting). * $p < 0.05$, ** $p < 0.01$ (two-tailed test).

Table D4

*The Effects of Low Self-Control, Routine Activity, and Drinking Routines on Offending Variety*

| Variables | Offending variety[a] | | | | | |
|---|---|---|---|---|---|---|
| | Model 1 | | Model 2 | | Model 3 | |
| | *b* (s.e.) [IRR] | *z*-score | *b* (s.e.) [IRR] | *z*-score | *b* (s.e.) [IRR] | *z*-score |
| Attitudinal low self-control | 0.09 (0.02) [1.10] | 4.19** | --- | --- | 0.08 (0.02) [1.08] | 3.50** |
| Behavioral low self-control | 1.02 (0.09) [2.76] | 11.28** | --- | --- | 0.96 (0.08) [2.60] | 11.57** |
| Routine activity | --- | --- | 0.03 (0.01) [1.03] | 2.48* | 0.04 (0.01) [1.04] | 2.86** |
| Drinking routines | --- | --- | 0.24 (0.03) [1.27] | 9.33** | 0.20 (0.02) [1.22] | 8.24** |
| Health | 0.01 (0.03) | 0.35 | -0.06 (0.03) | -2.09* | -0.03 (0.02) | -1.09 |
| Marital satisfaction | -0.02 (0.05) | -0.30 | -0.07 (0.05) | -1.35 | -0.02 (0.05) | -0.47 |
| Retired | -0.15 (0.07) | -2.06* | -0.13 (0.07) | -1.78 | -0.12 (0.07) | -1.60 |
| Unemployed | -0.01 (0.15) | -0.08 | 0.09 (0.16) | 0.55 | 0.10 (0.15) | 0.66 |
| Job satisfaction | 0.04 (0.10) | 0.43 | 0.02 (0.10) | 0.16 | 0.04 (0.10) | 0.40 |
| Parental satisfaction | -0.09 (0.05) | -1.94 | -0.11 (0.05) | -2.18* | -0.10 (0.05) | -2.12* |
| Military service | -0.02 (0.06) | -0.38 | -0.03 (0.07) | -0.40 | -0.06 (0.06) | -1.01 |
| Male | 0.43 (0.06) | 7.40** | 0.44 (0.06) | 6.82** | 0.43 (0.06) | 7.54** |

Table D4 Continued

| | | | | | | |
|---|---|---|---|---|---|---|
| Age | -0.02 (0.00) | -6.28** | -0.02 (0.00) | -5.43** | -0.02 (0.00) | -5.54** |
| White | 0.00 (0.11) | 0.01 | -0.05 (0.12) | -0.41 | -0.04 (0.11) | -0.41 |
| Hispanic/ Latino | -0.04 (0.14) | -0.26 | 0.05 (0.14) | 0.33 | 0.00 (0.14) | 0.02 |
| Education | 0.04 (0.02) | 2.58** | 0.02 (0.02) | 1.07 | 0.03 (0.02) | 1.56 |
| LR test of $\alpha$ = | 0.00 | | 1.14 | | 0.00 | |
| Wald $\chi^2$ = | 432.79** | | 321.07** | | 643.45** | |
| McFadden's $R^2$ = | 0.07 | | 0.06 | | 0.09 | |

*Note*. Entries are unstandardized partial regression coefficients (*b*), robust standard errors that adjust for clustering on 5-digit zip code in parentheses, and incidence rate ratios in brackets [IRR]. [a]All models estimated with negative binomial regression. * $p < 0.05$, ** $p < 0.01$ (two-tailed test).

Table D5

*The Effects of Low Self-Control, Routine Activity, and Drinking Routines on Offending Frequency*

| Variables | Offending frequency[a] | | | | | |
|---|---|---|---|---|---|---|
| | Model 1 | | Model 2 | | Model 3 | |
| | *b* (s.e.) [β] | *t*-ratio | *b* (s.e.) [β] | *t*-ratio | *b* (s.e.) [β] | *t*-ratio |
| Attitudinal low self-control | 0.20[b] (0.03) [0.13] | 6.06** | --- | --- | 0.20[b] (0.03) [0.12] | 5.74** |
| Behavioral low self-control | 0.20 (0.02) [0.27] | 9.39** | --- | --- | 0.19 (0.02) [0.26] | 9.55** |
| Routine activity | --- | --- | 0.02[b] (0.01) [0.04] | 1.69 | 0.03[b] (0.01) [0.05] | 2.22* |
| Drinking routines | --- | --- | 0.04 (0.01) [0.20] | 7.51** | 0.03 (0.01) [0.18] | 6.98** |
| Health | 0.00 (0.00) | 0.66 | -0.01 (0.00) | -1.85 | 0.00 (0.00) | 0.64 |
| Marital satisfaction | -0.01 (0.01) | -0.78 | -0.01 (0.01) | -1.51 | -0.01 (0.01) | -0.79 |
| Retired | -0.03 (0.01) | -2.08* | -0.02 (0.01) | -1.84 | -0.02 (0.01) | -1.76 |
| Unemployed | -0.01 (0.02) | -0.43 | 0.01 (0.02) | 0.28 | 0.00 (0.02) | 0.20 |
| Job satisfaction | 0.01 (0.02) | 0.71 | 0.01 (0.02) | 0.34 | 0.01 (0.02) | 0.73 |
| Parental satisfaction | -0.01 (0.01) | -1.34 | -0.01 (0.01) | -1.39 | -0.01 (0.01) | -1.35 |
| Military service | -0.01 (0.01) | -0.74 | -0.01 (0.01) | -0.71 | -0.01 (0.01) | -1.20 |
| Male | 0.08 (0.01) | 7.46** | 0.08 (0.01) | 6.86** | 0.08 (0.01) | 7.34** |
| Age | -0.03[b] (0.01) | -6.36** | -0.02[b] (0.01) | -5.16** | -0.03[b] (0.01) | -5.41** |
| White | 0.00 (0.02) | 0.28 | -0.01 (0.02) | -0.28 | 0.00 (0.02) | 0.07 |

Table D5 Continued

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Hispanic/Latino | | 0.01 | 0.67 | 0.03 | 1.05 | 0.02 | 0.84 |
| | | (0.02) | | (0.02) | | (0.02) | |
| Education | | 0.01 | 2.45** | 0.00 | 0.92 | 0.00 | 1.37 |
| | | (0.00) | | (0.00) | | (0.00) | |
| | *F*-test | 28.03** | | 16.81** | | 28.89** | |
| | $R^2$ | 0.16 | | 0.16 | | 0.24 | |

*Note*. Entries are unstandardized partial regression coefficients (*b*), robust standard errors that adjust for clustering on 5-digit zip code in parentheses (s.e.), and standardized regression coefficients in brackets [β]. [a] All models estimated with OLS regression. [b] Regression coefficient and standard error multiplied by 10. * $p < 0.05$, ** $p < 0.01$ (two-tailed test).

# APPENDIX E

# ARIZONA STATE UNIVERSITY INSTITUTIONAL REVIEW BOARD (IRB) APPROVAL DOCUMENTS

| | | |
|---|---|---|
| Arizona State University<br>Office of Research Integrity and Assurance<br>660 S. Mill Avenue Suite 315<br>Arizona State University<br>Tempe AZ 85287-6111<br>(Mail Code 6111)<br>Phone: 480-965-6788<br>Fax: (480) 965-7772 |  | *For Office Use Only:*<br>Date Received:<br>HS Number: |

# SOCIAL BEHAVIORAL APPLICATION HUMAN SUBJECTS

## PROTOCOL INFORMATION

Protocol Title: Date:

**Financial Exploitation of the Elderly in a Consumer Context** **April 28, 2011**

## PRINCIPAL INVESTIGATOR (PI)

Please note that the PI's CV and human subject's protection training certification must be attached with this application.

Name and Degree(s): **Kristy Holtfreter, Ph.D.**

Department/Center: **School of Criminology and Criminal Justice**

Mailing Address: **411 N. Central Avenue**
**Phoenix, AZ 85004-0685**

Email: **Kristy.Holtfreter@asu.edu** Phone: **602-496-2344** Fax: **602-496-2366**

University Affiliation:
☐ Professor
**X Associate Professor**
☐ Assistant Professor
☐ Instructor
☐ Other: Please specify. ("Other" categories may require prior approval. Students cannot serve as the PI)

## CO-INVESTIGATORS (CO-I)

- A Co-I is anyone who has responsibility for the project's design, implementation, data collection, data analysis, or who has contact with study participants**.**
- If the project involves medical procedures or patient care that the PI is not certified or licensed to conduct, a responsible physician or other certified or licensed professional must be included as a Co-I. The application must include a copy of supporting documentation for this individual (CV, license, board certification etc).

| Name | Study Role | Affiliation | Department | Email/Tel/Fax | Student (yes/no) |
|---|---|---|---|---|---|
| **Michael D. Reisig** | **Co-I** | **ASU** | **Criminology & CJ** | **reisig@asu.edu**<br>**Tel: 602-496-2352**<br>**Fax: 602-496-2366** | **No** |

## PROJECT FUNDING

1a)How is the research project funded? (A copy of the grant application **must** be provided prior to IRB approval)
☐ Research is **not funded** (Go to question 2)
☐ Funding decision is pending
**X** Research is **funded**

b) What is the source of funding or potential funding? (Check all that apply)

| | | |
|---|---|---|
| **X** Federal | ☐ Private Foundation | ☐ Department Funds |
| ☐ Subcontract | ☐ Fellowship | ☐ Other |

c) Please list the name(s) of the sponsor(s): **National Institute of Justice**

d) What is the grant number and title? **2010-IJ-CX-0008, Financial Exploitation of the Elderly in a Consumer Context**

e) What is the ASU account number/project number? **BVS0013**

f) Identify the institution(s) administering the grant(s): **ASU**

## PROJECT SUMMARY

2. Provide a **brief** description of the **background, purpose, and design** of your research. Avoid using technical terms and jargon. Describe all interactions with potential study participants (e.g., how identified, how recruited) including all of the **means you will use to collect data** (e.g. instruments, measures, tests, questionnaires, surveys, interview schedules, focus group questions, observations). Provide a short description of the tests, instruments, or measures**.** (If you need more than a few paragraphs, please attach additional sheets.) **Attach copies of all instruments and questionnaires. FOR ALL OF THE QUESTIONS, WRITE YOUR ANSWERS ON THE APPLICATION RATHER THAN SAYING "SEE ATTACHED".**

**Background**
National studies document that financial exploitation (e.g., fraud victimization) of elderly consumers has become increasingly common. This problem is likely to become even more urgent as larger proportions of Americans enter the ranks of the elderly. While all 50 states have enacted elder abuse statutes, little is known about the true prevalence of elderly fraud victimization, the risk and protective factors associated with it, or what is effective in reducing it. Compared to the national average, the population of citizens age 60 and older is significantly higher in the states of Arizona and Florida. These population characteristics, coupled with crime prevention efforts by both state Attorney Generals' offices, provide a unique opportunity for research.

**Purpose**
This study's goals are to provide policymakers, practitioners, and researchers with a greater, empirically-based understanding of the distribution and causes of, as well as solutions to, financial exploitation of the elderly in a consumer context. The objectives are: (1) To determine the nature, incidence, and prevalence of fraud victimization among elderly consumers in Arizona and Florida; (2) To identify risk and protective factors associated with fraud victimization in this population; and (3) To evaluate the elderly population's awareness of and use of state-based programs, including reporting behavior to law enforcement.

**Methodology**
This study includes a telephone survey of 1,000 Arizonians and 1,000 Floridians over the age of 60, obtained via Computer Assisted Telephone Interviewing (CATI), which will be administered by Precision Research of Glendale, AZ. As noted, the elderly populations of Arizona and Florida are considerably higher than the national average. By design, the random digit dialing telephone survey will be targeting prefixes where elderly are more likely to live. The analyses sill consist of a series of descriptive, bivariate, and multivariate analyses.

## STUDY DURATION

3. What is the expected duration of the study through data analysis? **18 months** (Include a timeline, if applicable).

a. When is the expected date that you wish to begin research? (MM/DD/YY) **06/01/11** (must be after submission date) Note: Protocols are approved for a maximum of 1 year. If a project is intended to last beyond the approval period, continuing review and reapproval are necessary. Research cannot begin until you have received an approval letter.

## IRB APPROVAL

4. Has this project been reviewed by another IRB? ☐ Yes ☐ **X No** (If yes, please complete the information below and attach a copy of the IRB approval materials).

a) What is the name of the institution?

**b) What is the current IRB approval date/status of IRB application?**

## STUDY SITES

5. Where will the study be conducted? (Check all that apply)

☐ **X On campus** (Please indicate building(s) and room number (s) when known) UCENT 617 and 622E

☐ **X Off campus** (Please provide location and letter of permission, where applicable) Precision Research, 5681 W. Beverly Lane, Glendale, AZ 85306-9801

## SAMPLE SIZE/DURATION

6a) What is the expected number of individuals to be screened for enrollment? **4000+**

b)What is the **MAXIMUM** number of subjects that you plan to enroll in the study? 2000

c) What is the approximate number of: **1000** Males **1000** Females

d) Indicate the age range of the participants that you plan to enroll in your study. **60 to 100+**

e) What is the expected duration of participation for each subject? (at each contact session and total) **15-20 minutes**

## SUBJECTS

7. Will the study involve any of the following participants? (Please check all that apply if your study specifically targets these populations)

☐ Children (under 18)
☐ Pregnant women
☐ Prisoners or detainees
☐ Persons at high risk of becoming detained or imprisoned
☐ Decisionally impaired
☐ Patients- what is the status of their health?
☐ Fetuses
☐ Native Americans
☐ Non-English speakers (Include copy of all materials in language of participants and certification of the translation and back-translation: http://researchintegrity.asu.edu/humans/forms )

a) If **any** of the above categories have been checked, please state how you will protect the rights and privacy of these individuals.

b) Please provide the rationale for the choice of the subjects including any inclusion criteria. Funding agency research solicitation requested research targeting the 60+ population.

c) Will any ethnic/racial or gender groups be excluded from this study? If so, provide the rationale for the exclusion criteria. **NO**

## RECRUITMENT

8. a)Describe the process(es) you will use to **recruit participants** and inform them about their role in the study. (Attach copies of any recruitment materials.)

**Precision Research will use the Equal Probability of Selection Method (EPSEM) to produce a single state, equal probability sample of all possible 10-digit telephone numbers. A minimum 8-callback rule is used to ensure that each number dialed offers equal and ample opportunity to respond to the survey. Should more than one person fulfill the screening criteria (60 or over), Precision Research will select the respondent who has the most recent birthday.**

a) Will any of the following be used? **NO** (Check all that apply and attach copies)

☐ Internet/Email
☐ Newspapers/radio/television advertising
☐ Posters/brochures/letters
☐ Other

b) Does any member of the research team have a relationship (i.e., teacher, coach, physician, therapist, service provider, etc) with individuals who will be recruited for this study or with institutions that will be used to recruit for this study? If yes, describe this relationship in detail and explain how the research process will avoid any potential problems (e .g, coercion or appearance of possible coercion in recruiting) or conflicts of interest arising from this investigator's dual roles. **NO**

## DECEPTION

9. Does the proposed research require that you deceive participants in any way? ☐ Yes **X No**

a) If your response is "yes," describe the type of **deception** you will use, indicate why it is necessary for this study, and provide a copy of the debriefing script.

## COMPENSATION

10. Will any type of compensation be used? (e.g. money, gift, raffle, extra credit, etc)

a) ☐ Yes (Please describe what the compensation is) **No** (go to question 11)

b) Explain why the compensation is reasonable in relation to the experiences of and burden on participants.

c) Is compensation for participation in a study or completion of the study? (Note: participants must be free to quit at any time without penalty including loss of benefits).

☐ Participation ☐ Completion

d) If any of the participants are economically disadvantaged, describe the manner of compensation and explain why it is fair and not coercive.

## INFORMED CONSENT

11. Describe the procedures you will use to **obtain and document informed consent and assent**. **Attach copies of the forms that you will use.** In the case of secondary data, please attach original informed consent or describe below why it has not been included. Fully justify a request for a waiver of written consent or parental consent for minors. consent will be obtained verbally during a telephone survey. **Specifically, we will provide respondents with this follow-up introduction ensuring that the survey is anonymous: We are interviewing [Arizonans or Floridians] about different kinds of crimes on behalf of the National Institute of Justice, a research agency in the U.S. Department of Justice. There are no wrong or right answers. You can skip questions if you wish. You may choose to stop at any time. Your participation in voluntary. We will not ask for your name or any information that would allow us or others to guess who you are. The interview takes about 15 minutes. Is now a good time?**

(The ASU IRB website has additional information and sample consent and assent forms.)

## RISKS

12. What are the potential risks of the research? (Check all that apply)

☐ Physical harm
☐ Psychological harm
☐ Release of confidential information
**X Other**

a) Describe any potential risks to human subjects and the steps that will be taken to reduce the risks. Include any risks to the subject's well-being, privacy, emotions, employability, criminal, and legal status. **Some participants may feel embarrassed by a few of the questions pertaining to prior criminal behavior (e.g., shoplifting). We suspect that such concerns may be mediated by the fact that the survey is anonymous.**

## BENEFITS

13a) What are the potential benefits to the individual subject, if any, as a result of being in the study? **There are no expected direct benefits to the individual subject save for helping to contribute to a greater understanding of victimization among elderly consumers.**

b) What are the potential benefits, if any, to others from the study? **The results of this study will contribute to our understanding of the nature, incidence, and prevalence of fraud victimization among elderly consumers. The identification of risk and protective factors will contribute to future research and may also inform crime prevention efforts by law enforcement in Arizona, Florida, and elsewhere.**

## DATA USE

14. How will the data be used? (Check all that apply)

**X Dissertation**
☐ Thesis
☐ Results released to participants/parents
**X Results released to agency or organization**
☐ Other *(please describe):*

**X Publication/journal article**
☐ Undergraduate honors project
☐ Results released to employer or school
**X Conferences/presentations**

## PROTECTION OF CONFIDENTIALITY

15. Describe the steps you will take to ensure the confidentiality of the participants and data. **All information obtained from participants will be anonymous. It will not be possible to link any of the responses to participants. Case numbers will be randomly assigned to each participant during the survey data collection process. The case numbers will only be used for data management and will not be linked to individuals in any way.**

a) Indicate how you will safeguard data that includes identifying or potentially identifying information (e.g. coding). **No personal identifiers will be used.**

b) Indicate when identifiers will be separated or removed from the data. **No personal identifiers will be used.**

c) Will the study have a master list linking participants' identifying information with study ID codes, and thereby, their data? If so, provide a justification for having a master list. (Note: In many cases, the existence of a master list is the only part of a study that raises it above minimal risk, that is, places participants at risk.) **No. All information collected will be anonymous, so a master list with identifying information is not needed.**

d)If you have a master list and/or data with identifiers, where on campus will the list and/or data be kept? **(Data sets with identifiers and master lists, whether electronic or in hard copy, should be securely stored on an ASU campus except in unusual circumstances (e.g., research conducted out of the state or country).)**
**The proposed study will not use a master list.**

e) If you have a master list, when will it be destroyed? **N/A**

f) How long do you plan to retain the data? **5+ years.**

g) How will you dispose of the data? **Following the completion of the project, it is a grant requirement that data be turned into the funding agency to be housed at the National Archive of Criminal Justice Data, ICPSR.**

h) Where on campus will you store the signed consent, assent, and parental permission forms (If applicable)? (**Consent, assent, and parent permission forms should be securely stored on an ASU campus) Consent will be obtained verbally**

## INVESTIGATOR INTERESTS

16 Have all investigator filed a current annual conflict of interest questionnaire with the ASU Office of Research Integrity and Assurance? It is the COEUS module at: http://researchintegrity.asu.edu/coi **X Yes** ☐ No

a) Do any of the researchers or their family members, have a financial interest in a business which owns a technology to be studied and/or is sponsoring the research? ☐ Yes **X No** (If yes, please describe and disclose in the consent form.)

b) Are there any plans for commercial development related to the findings of this study?
☐ Yes (If yes, please describe.) **X No**

c) Will the investigator or a member of the investigator's family financially benefit if the findings are commercialized?
☐ Yes (If yes, please describe.) **X No**

d) Will participants financially benefit if the findings are commercialized?
☐ Yes (If yes, please describe.) **X No**

## BIOLOGICAL MATERIALS

17a) Will biological materials be collected from subjects or given to subjects? ☐ Yes **X No** (If no, please skip to question 18)

b) Provide a description of the material (blood, tissue, vectors, antibodies, etc.) that will be used:

c) If the study involves human blood, do you have the required ASU Biosafety disclosure on file? ☐ Yes ☐ No(If yes, what is the Biosafety Disclosure number.)

d) Will any of the material being used in the study come from a third party? ☐ Yes ☐ No (If yes, attach copy of the Material Transfer Agreement if required.)

e) Does this study involve transfer of genetic material of animal tissue into humans? ☐ Yes ☐ No (If yes, please cite the ASU Institutional Biosafety Disclosure number).

## DEVICES

18a) Does this study involve an investigational new drug (within the meaning of 21 U.S.C. 355(i) or 357(d)) or a significant risk device (as defined in 21 CFR 812.3(m)? ☐ Yes **X No** (If no, go to question 19. If unsure, go to: www.fda.gov/oc/ohrt/irbs/).

b) What is the device?

c) Is the device a significant risk device or non significant risk device: (For more information please revise: http://www.fda.gov/downloads/RegulatoryInformation/Guidances/UCM126418.pdf )

d)Has the 30-day interval required for significant risk devices elapsed, or has the FDA has waived that requirement?

e) If the 30-day interval has expired, has the FDA requested that the device be withheld or restricted for use in human subjects? ☐ Yes ☐ No

## TRAINING

**19. The research team must document completion of human subjects training from within the past 3 years.**
**(For more information see:** http://researchintegrity.asu.edu/training/humans )

**Please provide the date that the PI and co-investigators completed the training and attach the certificate.**

**June 23, 2008**

## PRINCIPAL INVESTIGATOR

In making this application, I certify that I have read and understand the ASU Procedures for the Review of Human Subjects Research and that I intend to comply with the letter and spirit of the University Policy. Changes in to the study will be submitted to the IRB for written approval prior to these changes being put into practice. **I also agree and understand that informed consent/assent records of the participants will be kept for at least three (3) years after the completion of the research**. **Attach a copy of the PI's CV unless one is already on file with the Office of Research Integrity and Assurance.**
Name (first, middle initial, last):
**Kristy Holtfreter Reisig**

Signature:  Date: **April 28, 2011**

| **FOR OFFICE USE:** | This application has been reviewed by the Arizona State University IRB:<br>☐ Full Board Review<br>☐ Expedite Categories:<br>☐ Exempt Categories:<br><br>☐ Approved ☐ Deferred ☐ Disapproved<br><br>☐ Project requires review more often than annual Every months |
|---|---|
| | Signature of IRB Chair/Member: Date: |

ASU Knowledge Enterprise Development

Office of Research Integrity and Assurance

| | |
|---|---|
| **To:** | Kristy Holtfreter |
| **From:** | Mark Roosa, Chair<br>Soc Beh IRB |
| **Date:** | 05/13/2011 |
| **Committee Action:** | **Exemption Granted** |
| **IRB Action Date:** | 05/13/2011 |
| **IRB Protocol #:** | 1104006396 |
| **Study Title:** | Financial Explotation of the Elderly in a Consumer Context |

The above-referenced protocol is considered exempt after review by the Institutional Review Board pursuant to Federal regulations, 45 CFR Part 46.101(b)(2) .

This part of the federal regulations requires that the information be recorded by investigators in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects. It is necessary that the information obtained not be such that if disclosed outside the research, it could reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation.

You should retain a copy of this letter for your records.