

EXAMINING THE RELATIONSHIP BETWEEN RISK,
PROTECTION, SELF-CONTROL AND RESILIENCE

By

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To the Faculty of Washington State University:

The members of the Committee appointed to examine the dissertation of JEFFREY W. ROSKY find it satisfactory and recommend that it be accepted.

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When I returned to school in 2005 to finish my Ph.D. that I began more than a decade earlier, I had no idea of the professional, financial, and personal toll that it would take on my life. Given that my research is examining resilience, it is worth noting that this journey was the most difficult thing I have ever had to do. Life threw so many things at me these past two years — the death of a close friend, family illness, financial difficulties, unemployment (twice!), moving (five times!), even the failure of my hard drive — that for every step forward, I seemed to get knocked back two, forever consigned to that lamentable group of doctoral students who start but never finish. But I kept at it, and while time will tell whether this was the right decision for me I take great comfort in the fact that I finished despite these hardships.

While this period has been difficult, I am also comforted that I found out how much I really had when I thought I had lost everything — real wealth that only family can provide. My brother Mark and my sister Nancy both provided me with a sympathetic ear and encouragement to keep at it, but it is my parents Judy and Jerry who are the main reasons behind the successful completion of this work. Quite simply, I was able to finish due not only to the safety net they provided when the bottom literally fell out of my life, but also their unshakable belief in me that finally silenced the whispers of my own self-doubt. Mom and Dad, I know I don't express it often enough but I love you both and I am deeply grateful that I am your son. And I apologize for taking so long.

With regard to my dissertation I thank my chair, Leana Bouffard, for her patience, her understanding, and her guidance not only through this process but also through my travails. Additionally, I thank my other committee members, Travis Pratt and Nick Lovrich, who both also provided invaluable assistance and guidance for this research.

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Now, with my Ph.D. finally — and firmly — in hand, I am looking forward to the next part of my life, wherever it may lead, because there will always be people along the way who can point me in the right direction; I just have to be smart enough to listen. It took me 42 years and a Ph.D. to figure that out but that was the real lesson in this all along. I am a lucky man.

-J.W.R., December 11, 2009

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Abstract

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This research examines the effect of cumulative risk, cumulative protection and self-control for the outcomes of binge drinking, problems from drinking, property crime, assaultive behavior, adult arrests, and adult convictions.

Findings from the bivariate analyses were mixed. Binge drinking and problems from drinking were not positively associated with increasing number of risk factors, nor were they negatively associated with increasing number of protective factors. Binge drinking was not negatively associated with protection-risk difference, but the outcome of problems from drinking was negatively associated with risk-protection difference. Those with a deficit were most likely to report problems and those with a surplus were least likely to report these problems.

The other four outcomes — property crime, assault, adult arrest, and adult conviction — positively correlated with risk and negatively correlated with protection. Additionally, bivariate analyses results showed that increasing numbers of risk factors increased the likelihood of these outcomes, increasing numbers of protective factors decreased their likelihood, and those with a higher number of risks than protective factors had an increased likelihood of these outcomes.

In examining resilience — experiencing exposure to criminogenic influences yet remaining crime free — the results revealed no consistent patterns of protection or

risk beyond the finding that those who amassed more protective factors than risk factors reduced the likelihood for the outcomes. This suggests that while each risk and protective factor served to enhance or diminish the likelihood of crime and deviance, the totality of items, both favorable and unfavorable, that an individual experienced was more salient than considering each factor individually.

Lastly, results from logistic regressions showed that interactions between cumulative protection-risk difference and self-control were salient in predicting some but not all of the outcomes. These findings question the salience of self-control for all types of crime and deviance in the presence of cumulative risk and protection. However, these results also demonstrate that self-control is an important predictor for most crime and delinquency, but that there are apparent interactions with cumulative risk and protection that moderate the effect of self-control in certain contexts. Relevant policy implications and future research are also discussed.

Contents

Acknowledgments	iii
Abstract	v
List of Tables	xi
List of Figures	xii
Chapter 1: Introduction	1
Introduction	1
Resilience	3
Criminological Theory	7
Research Questions	13
Chapter 2: Theoretical Framework	15
Background	15
Origins of Resilience Research	18
Resilience Theory	20
Conceptualization of Protective Factors	23
Risk and Protective Factors	26
Cumulative Risk and Protection	29
Social Disorganization Theory	31

Self-Control Theory	34
Conceptualizing Self-Control	38
The Relationship between Social Disorganization, Self-Control and Resilience and the Rationale for the Current Study	43
Chapter 3: Analytic Strategy	47
Add Health Data	47
Methods	48
Control Variables	50
Research Question 1: What is the prevalence of deviance among individuals exposed to varying degrees of criminogenic influences?	51
Research Question 2: What is the relationship between risk, protection and self-control?	72
Research Question 3. What are the effects of cumulative risk and cumulative protection on deviant outcomes when controlling for demographics and self-control?	76
Chapter 4: Results	79
The Relationship between the Outcome and Control Variables	79
The prevalence of deviance among individuals exposed to varying degrees of criminogenic influences	80
The Relationship between Risk and Protective Factors and Self-Control	85
The Effects of Cumulative Risk and Cumulative Protection on Deviant Out- comes when Controlling for Demographics and Self-Control	89
Chapter 5: Conclusions and Policy Implications	99
Discussion	99

Policy Implications	104
Future Research	106
References	108
Appendices	127
A: Variables	128
B: SAS Code	133

List of Tables

1	Control Variable Descriptive Statistics	51
2	Deviance Prevalence by Outcome	54
3	Risk Factor Descriptive Statistics	60
4	Parental Bonding Statistics	62
5	Parental Control Statistics	64
6	Connectedness with Others Statistics	66
7	General Health Statistics	67
8	Self-Esteem Statistics	68
9	Future Aspirations Statistics	68
10	Religiosity and Attractiveness Statistics	70
11	Protective Factor Descriptive Statistics	73
12	Self-Control Statistics	77
13	Outcome by Control Variable Bivariate Results	80
14	Outcome by Risk Factor Correlations	81
15	Deviance Prevalence by Cumulative Risk Factors	82
16	Outcome by Protective Factor Correlations	83
17	Deviance by Cumulative Protective Factors	84
18	Deviance Prevalence by Protection-Risk Difference	85
19	Self-control - Risk Factor Correlations	86
20	Self-control - Protective Factor Correlations	87

21	Self-control - Outcome Correlations	87
22	Mean Self-control by Cumulative Risk, Cumulative Protection, and Protection-Risk Difference	88
23	Binge Drinking Main Effects Model	90
24	Binge Drinking Interaction Model	90
25	Problems from Drinking Main Effects Model	92
26	Property Crime Main Effects Model	93
27	Property Crime Interaction Model	95
28	Assault Main Effects Model	96
29	Adult Arrest Main Effects Model	97
30	Adult Arrest Interaction Model	97
31	Adult Conviction Main Effects Model	98

List of Figures

1	Protective factor concepts. (I) Protective; (II) Protective stabilizing; (III) Protective enhancing; (IV) Protective reactive; (V) Vulnerable stable; and (VI) Vulnerable reactive. Adapted from Luthar et al. (2000)	25
2	Parental Connectedness Hypothesized Construct	63
3	Connectedness with Others, General Health, and Self Esteem Hypothesized Constructs	65
4	Future Aspirations, Intelligence, Religiosity, and Attractiveness Hypothesized Constructs	69
5	Self-Control Hypothesized Construct	76
6	Predicted Probabilities from Binge Drinking Interaction Model by Self-Control and Risk-Protection Difference for a White, 22-year-old Male	91
7	Predicted Probabilities from Property Crime Interaction Model by Self-Control and Risk-Protection Difference for a White, 22-year-old Male	94

Dedication

For K.H., one cool cat

For D.A.Y., the most resilient person I ever met

“Numbers add up to nothin’.”

- Neil Young, *Powderfinger*

“And if my dreams treat me badly,

And I cry out at night,

Shake me to my senses,

And I will be alright.”

- John Gorka, *Down in the Milltown*

Chapter 1

Introduction

Criminological theory suffers from the same paradox confronting epidemiologists who study disease incidence and transmission. Namely, some people exposed to the same infectious or disease-causing *agents*, and *fate* and *transport* never get the disease. In epidemiology, disease transmission is a complex, dynamic system involving risk and protective factors and disease resistance is understood to be a result of demographics, current health status, the degree and number of exposures, good genes, and idiopathic interactions amongst these items. Additionally, cultural and environmental factors are known to play a significant role in disease transmission (Gordis, 1996).

Criminologists attempt to explain crime causation and deviance within a similar framework, but they struggle to cope with the same complexities with which epidemiologists must deal. Within the context of criminology, the paradox of exposure to criminogenic influences coupled with resistance or desistance is acknowledged, but most of the literature focuses on the criminogenic risk rather than protective factors and their influence on risk (Elliott et al., 2006; J. Warner, 2007). Often, individuals whose behavior the theory failed to predict correctly are treated as error rather than being seen as having potential explanatory power. However, there is a small but grow-

ing body of research on the paradoxical side of criminology to understand why some people who are exposed to known criminogenic factors never commit crime. Within sociology and psychology, individuals who exhibit resistance to deviance or adverse outcomes in the presence of risk factors are called *resilient*. These resilient individuals are able to escape or overcome family, social, and individual characteristics known to systemically increase the likelihood of deviant or criminal behavior and attain a crime-free lifestyle.

The bulk of resilience research comes from the psychology and education fields, and that literature largely considers criminological influences as factors that have to be accounted for within a statistical model rather than useful theoretical constructs. These fields also largely ignore the bulk of macro- and micro-level criminological theory that could enhance the understanding of resilience within the context of the life course.

This research adds to the attempts to more fully incorporate resilience within the scope of criminological theory by using the *Longitudinal Survey of Adolescent Health*¹ (Harris et al., 2008) to examine resilient youth within the context of self-control theory. It will concentrate particularly on identifying cumulative risk and protection that interact with self-control and affect resilience and resilient outcomes. By focusing on resilience, this research hopes to understand and explain the mechanisms underlying development and maintenance of resilient individuals with the goal of identifying policy that can augment current treatment practices and educational

¹ This research uses data from Add Health, a program project designed by J. Richard Udry, Peter S. Bearman, and Kathleen Mullan Harris, and funded by a grant P01-HD31921 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development, with cooperative funding from 17 other agencies. Special acknowledgment is due Ronald R. Rindfuss and Barbara Entwisle for assistance in the original design. Persons interested in obtaining data files from Add Health should contact Add Health, Carolina Population Center, 123 W. Franklin Street, Chapel Hill, NC 27516-2524 (addhealth@unc.edu). No direct support was received from grant P01-HD31921 for this analysis.

programs. Relevant public policy implications will also be discussed.

The rest of this chapter lays the framework for this research. Resilience, pertinent criminological theories, and relevant prior research will be discussed in further detail. Finally, the research questions that this dissertation is attempting to examine within the scope of resilience and criminological theory will be outlined.

Resilience

All humans experience trauma or exposure to stressful events at some point in their lives. In childhood, poverty, sexual and physical abuse, and divorce are some of the more common negative experiences; in adolescence, parental divorce, bullying, relationship difficulties, rejection by peers, or academic struggles are common; and in adulthood, divorce, mental illness, unemployment, and financial difficulties are common. Across the entire life span, natural disasters, social and economic upheaval, terrorist acts, and war affect all humans in some fashion. It has been argued that people who adapt successfully to these events are resilient through protective factors that enable resistance to the detrimental effect of these events. The concept of resilience appeals to human optimism that one can overcome hardship and succeed in life despite one's initial station, shortcomings, or tragic past. It resonates deeply that we can overcome the odds, that we can escape our past, and that we can reach the American dream in spite of tragic circumstances.

Given the variety of events that can result in resilience, the literature demonstrates that this process of recovery from adverse circumstances takes many forms and is operationalized in different ways. In the sociology and psychology literature pertinent to this research, resilience can be viewed as the capacity for people to recover after experiencing catastrophic or extremely stressful life events. It has also been concep-

tualized as an innate characteristic that allows people to resist future negative life events (Luthar, Cicchetti, & Becker, 2000). The most commonly accepted definition of resilience in individuals is that a person is currently functioning at a normal level and that there was or is some significant exposure to adversity or risk (Masten & Powell, 2003).

While the outcome of displaying resilience or resilient adaptation to criminogenic influences is discrete (i.e., the person did or did not commit crime or deviance after exposure), resilience itself is not a discrete condition and the literature recognizes that there is likely a *vulnerability-resilience spectrum* (Luthar et al., 2000). Where resilient individuals display positive adaptation to traumatic life events or stressful situations, vulnerable individuals succumb to traumatic life events or stressors by engaging in maladaptive behavior or suffer resultant mental or physical illnesses that prevent normal functioning. Following this concept, Carver (1998) identified four potential responses to adverse events: succumbing, impaired, resilience, and thriving. All of his categories assume that an initial deterioration of functioning occurs at the onset of the event, and then an individual responds to the event in one of the four ways identified.

The first category, succumbing, occurs when a person's functioning continues to deteriorate below the initial level of deterioration incurred by the adverse event. The second category, impaired, occurs when a person's functioning improves but not to the same level prior to the adverse event. The third, resilience, the person returns to the same level of functioning prior the adverse event. The last, thriving, occurs when a person's functioning surpasses the prior level. Additionally, Carver (1998) notes that these categories are not mutually exclusive; in some domains of a person's life they may thrive such as in his or her career, while in others they may be impaired or broken, such as in their relationships with family and friends. He also notes that an

individual may progress and regress through states of recovery and relapse throughout the life course. What this vulnerability-resilience spectrum concept suggests is that neither resilience nor vulnerability is a single innate factor. Additionally, otherwise healthy people are neither completely vulnerable² nor entirely resilient.

The bulk of the social science resilience research which exists lies within the educational and psychological fields, and this literature largely approaches resilience as a developmental process that exists as an interaction between risk factors that increase the likelihood of health and behavior problems and protective factors that mitigate or mediate risk and encourage prosocial behavior. Research has demonstrated that children who have difficulties and problems in one area of their lives are more likely to have difficulties and problems in multiple areas of their lives (Donovan & Jessor, 1985). Additionally, there is solid research that demonstrates that these difficulties have a common etiology and are the result of the same risk factors that include both individual and ecological characteristics (Dryfoos, 1990). Included in this list are such factors as unstable residency, poverty, divorce, abusive parenting, personality disorders, delinquent peers, and antisocial personality which all have been shown to increase the risk of experiencing health and behavior problems (Howell, Krisberg, Hawkins, & Wilson, 1995). Offsetting and mitigating these risk factors are a number of individual and social factors such as high intelligence, prosocial bonding with an adult, and stability within at least one social institution with expectations of success within that institution (Elliott et al., 2006; Rutter, 1985; Werner & Smith, 1989, 1992).

Research has examined the influence of macro-level life events and dynamic factors on criminal careers. For example, Sampson and Laub (1993) have shown that when

² Individuals with cognitive or physical impairments such as severe autism are completely vulnerable, but they present different problems than what this research is attempting to examine.

people engage in and become attached to conventional social norms and institutions (i.e., turning points) such as marriage and employment that they become less likely to commit crime. Additionally, their research demonstrated that the decline in the age-crime curve is associated with those experiencing or engaging in these conventional social norms as these offenders mature from adolescence into young adulthood and middle age (Laub & Sampson, 2003).

With respect to crime and delinquency, resilience might be viewed as simply the 0 in a dummy variable where 1 is delinquency. However, this view is somewhat limited as it conceptualizes crime as merely an outcome from an exposure to factors that are thought to contribute directly or indirectly to it. Other factors, which may be common to various social phenomena as causes and solutions, tend to be ignored due to discipline specialization and are what Antonovsky (1984) termed “thinking pathogenically” (p. 115). In his studies of Holocaust survivors, Antonovsky (1984) discovered that while these Shoah victims as a group fared worse in a variety of outcomes including health and well-being, there were still a substantial portion of them who were functioning well and were even happy despite enduring the horrors of Nazi concentration camps. This finding turned his attention from pathogenesis or the origins of disease to what he termed “salutogenesis” which, rather than categorizing people as either healthy or diseased, states that people fall on a continuum somewhere between these two end points (Antonovsky, 1998). In other words, pathogenesis asks how factors cause an outcome where salutogenesis asks why do some remain healthy when exposed to the same risk factors as those who are sick.

Within this salutogenesis paradigm, this research is studying resilient individuals who are able to escape or overcome family, social, and individual characteristics known to increase the likelihood of deviant or criminal behavior and attain a crime-free lifestyle and reconciling it with (partially) the pathogenic criminological view.

Chapter 2 will discuss the literature associated with resilience research in greater detail and frame resilience and pertinent criminological theories within the context of protective and preventive processes.

Criminological Theory

Crime is a complex and dynamic phenomenon involving both static and dynamic factors that exist as individual and social characteristics. While it is difficult to explain crime causation solely by individual or social characteristics, the one factor that exists in both micro (i.e., individual) and macro (i.e., society) criminological theories is that crime is quite age-dependent (Lilly, Cullen, & Ball, 2002). Multiple studies show that the age-crime curve begins in prepubescence, rises rapidly around the onset of puberty, peaks in adolescence, declines rapidly through early adulthood and tapers off in middle age (Gottfredson & Hirschi, 1990; Lilly et al., 2002; J. Q. Wilson & Herrnstein, 1985). What this means to criminology is that longitudinal research should be able to identify factors, both distal and proximal, which are associated with crime and which are mediated or moderated by the aging process and a variety of important life events.

Resilience within the context of criminological theory would be identifying protective factors that mitigate the risk of engaging in crime either through a mediating effect related to both crime and risk factors for crime or a moderating effect that negates or mitigates the criminogenic influence of risk factors. Given the age-crime curve, it is apparent that there are two potential types of resilience factors. The first is static or distal in nature and reduces the odds that people will engage in crime to begin with. The second is dynamic or proximal and creates resistance or desistance

from criminal and deviant behavior as people age.

Hence, resilience can be explored within several areas of criminological theory including social disorganization, self-control, and life-course analysis. Social disorganization theory holds that variation in crime and delinquency over time and across areas is caused by the absence or breakdown of local social institutions such as families, schools, and churches that traditionally encourage mutually beneficial relationships that help foster social control (Bursik, 1988). Self-control is hypothesized to be a static individual characteristic that regulates a person's predisposition to engage in criminal or analogous acts (Gottfredson & Hirschi, 1990). Life-course analysis is a broader subject that encompasses both theory that recognizes that there are certain types of offenders (i.e., life course persistants and adolescent-limiteds) based on the age-crime curve (Moffitt, 1993) and theory that recognizes that dynamic life events (e.g., unemployment) and adult life experiences (e.g., marriage) can affect a person's trajectory along the age-crime curve (Nagin & Paternoster, 1994; Sampson & Laub, 1993). While understanding these two types of resilience factors and reconciling them within these areas of criminological theory is important, the main goal of this research is to focus on understanding resilience and its relationship with social disorganization, self-control, risk and protection.

Social Disorganization Theory

As resilience is the result of exposure to criminogenic influences yet remaining crime- or deviance-free, social disorganization theory states that changes in crime and delinquency over time and among areas occurs due the the absence or breakdown of institutions that foster local social control such as families, schools, and churches. The concept is defined in terms of types of relationships people have between themselves and their communal groups, and the theory holds that the scope and strength of

these relationships are measures of how organized or disorganized social or communal groups are in solving problems (Bursik, 1988). Hence, crime and delinquency are viewed as being due to changes in and disruptions of local social institutions that normally would foster social control and conforming behavior.

This conception of crime and delinquency originated in the Chicago School of Sociology under Shaw and McKay (Shaw, Zorbaugh, McKay, & Cottrell, 1929), these scholars sought to describe the distribution of a variety of social problems in the city of Chicago in the 1920s. Among their many noteworthy findings they showed that the amount of truancy, delinquency and adult crime was inversely proportional to the distance from the city center, that communities with the highest amounts of delinquency had on average the highest amounts of truancy and adult crime, and that these high rates occurred in areas marked by extreme poverty, urban blight, and high transiency. Due to these observations and the fact that high delinquency and crime rates remained despite changes in types of ethnicities within these areas, they posited that crime and delinquency were the result of the social conditions experienced by these groups rather than by any genetic or biological predisposition, that the existence of these problems is perpetuated through interaction among new and established members of social areas. They then argued that “when business and industry invade a community, the community thus invaded ceases to function effectively as a means of social control. Traditional norms and standards of the conventional community weaken and disappear. Resistance on the part of the community to delinquent and criminal behavior is low, and such behavior is tolerated and may even become accepted and approved.” (Shaw et al, 1929: 204-205).

The main critique of social disorganization theory is related to the concept of resilience — namely, if social disorganization explains crime and deviance, why aren't all those who grow up in these environments criminals (Cohen, 1955; Merton, 1957)?

Other critiques were methodological as, oftentimes, crime and delinquency were measures of social disorganization rather than resulting from disorganization (Pfohl, 1985; Bursik, 1988). Due to these critiques and the rise of individual level criminological theories, social disorganization theory fell somewhat out of favor (Bursik, 1988). Recent research, however, has reformulated the concept of social disorganization to include social capital and collective efficacy as measures of social disorganization that are predictive of crime and delinquency rather than crime and delinquency as a measure of social disorganization (Bellair, 1997, 2000; Morenoff, Sampson, & Raudenbush, 2001; Pratt, Turner, & Piquero, 2004; Sampson, Raudenbush, & Earls, 1997).

Within the context of resilience, social disorganization theory posits that higher levels of residential instability, population heterogeneity, and greater poverty will result in fewer social interactions among residents which, in turn, reduces collective efficacy, social capital, and, by extension, social control, resulting in increased crime and delinquency. Hence, neighborhoods, poverty, and low social capital are risk factors for crime and delinquency and serve as an exposure to criminogenic influences and those individuals who remain crime- and deviance-free within these contexts are to be viewed as resilient. Chapter 2 will explore the relationship between resilience and social disorganization, along with the empirical status of social disorganization and its relationship with self-control in considerably greater detail.

Self-Control Theory

A related concept to resilience is Gottfredson and Hirschi's (1990) general theory of crime which states that a person's self-control ability regulates their predisposition toward deviancy including crime and other behavioral analogs such as excessive alcohol abuse, smoking, or recreational drug-taking. They base their theory on the observation that not all people become criminals or maladjusted adults and that

crime and other analogs provide easy fulfillment of immediate needs. Following from this logic, self-control is an individual trait which regulates a person's predisposition toward crime and deviance. Thus, individuals with low self-control are more likely to make decisions impulsively and prefer such things as simple and easy tasks and physical activities instead of mental pursuits. Individuals with low self-control would also be self-centered, selfish, and lose their temper rather easily. Because of these characteristics, individuals with low self-control are also likely to ignore or disregard the long-term effects of their decisions for themselves and for others.

Gottfredson and Hirschi (1990) also argue that the effectiveness of early parenting influences an individual's developed level of self-control. From this, they also hypothesize that individuals with low self-control most likely had ineffective or poor parenting which created emotional attachment deficits with their child and made attempts to monitor and regulate their child's behavior difficult. Any difficulties monitoring the child's behavior then reduced the likelihood of recognizing their child's deviant behavior and meant that these parents were less likely to punish this behavior or teach their child appropriate behavior effectively. Hence, quality of parenting is a factor in determining one's level of self-control.

Additionally, Gottfredson and Hirschi (1990) argue that longitudinal research is largely unnecessary because self-control is the predominant explanation of crime. Given this presumption, they argue that any age-related mediation is simply a maturation process and that changes in life circumstances are caused by static self-control levels rather than any dynamic or proximal cause other than parenting. However, additional research (Pratt & Cullen, 2000) has clearly shown that while low self-control is an important predictor of crime, it is far from the sole predictor of crime. Rather, there is clear evidence that other factors, such as the social bonds associated with marriage and stable employment, influence desistance to crime (Sampson & Laub,

1993). Additionally, there is some evidence that criminal behavior might be related to major changes in life circumstances such as unemployment (Nagin & Paternoster, 1994).

Other recent research challenges Gottfredson and Hirschi's (1990) assertion that self-control is a fixed trait and demonstrates that self-control levels can be depleted temporarily after individuals are subjected to an initial task that requires self-control and then subsequently subjected to an additional task that also requires self-control (Baumeister & Muraven, 2000; Baumeister, Vohs, & Tice, 2007; Muraven, Baumeister, & Tice, 1999). In these studies, self-control capacity was lower in the subsequent were lower in the subsequent task even when the two tasks were unrelated. The contention drawn from this research is that self-control is akin to a muscle that can be weakened by constant use, but also strengthened by moderate exercise (Baumeister & Muraven, 2000; Baumeister et al., 2007; Muraven et al., 1999; Muraven, Shmueli, & Burkley, 2006).

Within the context of resilience, self-control is an important construct because the idea that a person can be resilient in the face of adversity would suggest under Gottfredson and Hirschi's (1990) theory that people with high self-control will be most resilient regardless of the type of traumatic life event or stressor. If there is a relationship between self-control and other protective factors, it is important to reconcile these. Additionally, identification of factors related to both resilience and self-control could synthesize these concepts into one construct with isignificant mplications for social policy. Literature examining the empirical status of self-control theory will be discussed further in Chapter 2.

Research Questions

As stated previously, this research seeks to understand and explain the relationships of factors involved with the development and maintenance of resilient individuals with the goal being to inform public policy as to how we can augment current treatment practices and educational programs to promote resilience. Following the same argument as Luthar et al. (2000), resilience is defined as remaining crime or deviance-free,³ after exposure to one or a combination of criminogenic risks or influences. With that objective in mind, this research endeavors to answer three main questions:

Question 1. What is the Prevalence of Deviance for Individuals Exposed to Varying Degrees of Criminogenic Influence? While this research is concerned with understanding resilience, i.e. positive adaptation in the presence of risk factors, behavioral outcomes must be defined. Six specific outcome measures will be used in this research: *binge drinking*, *problems from drinking*, *property crime*, *assaultive behavior*, *adult arrests*, and *adult convictions*. Chapter 2 and 3 will discuss these outcomes in greater detail, but at this point it is sufficient to note that these outcomes were selected because they give a wide range of problems including substance abuse, petty crime, and violence to understand the risk and protective factors that are potentially involved with resilience. These outcomes also provide the basis for determining if previously identified risk and protective factors for crime and deviance hold true for this study's sample population. Additionally, identifying the prevalence of deviance within at-risk and lower risk populations prepares a basis for the other research questions.

³ Crime and deviance are related concepts, however not all deviant acts involve the criminal justice system. Therefore, this research needs to broadly define deviance to include crime as well as other acts such as drug and alcohol abuse, etc. that may not involve the criminal justice system.

Question 2. What is the Relationship between Risk and Protective Factors and Self-Control? Within the context of resilience, self-control is an important construct because the idea that a person can be resilient in the face of adversity would suggest under Gottfredson and Hirschi's (1990) theory that people with high self-control will be most resilient regardless of the type of traumatic life event or stressor involved. In other words, how is self-control related to the identified risk and protective factor domains that exist at the individual, family and neighborhood levels? Reconciling self-control within risk and protective factors will allow the synthesis of one of the main criminological theories into the wider scope of human development.

Question 3. What are the Effects of Cumulative Risk and Cumulative Protection on Deviant Outcomes when Controlling for Demographics and Self-Control? Identifying the interrelationships between the outcomes, cumulative risk, cumulative protection, and self-control variables is the main goal of this research. Interrelationships among these phenomena would imply that one's risk for criminality could be attenuated by the accumulation of risk and protective factors and tempered by self-control. Additionally, is there evidence of self-control depletion in the presence of accumulated risk through an interactive effect? In other words, how important is self-control in the presence of cumulative risk and protection?

Chapter 2: Theoretical Framework

Background

As noted in Chapter 1, while the outcome of displaying resilience or resilient adaptation to criminogenic influences is discrete, i.e. the person did or did not commit crime or deviance after exposure, resilience itself is not a discrete condition and the literature recognizes that there is a vulnerability-resilience spectrum (Luthar et al., 2000). Where resilient individuals display positive adaptation to traumatic life events or stressful situations, vulnerable individuals succumb to traumatic life events or stressors by engaging in maladaptive behavior or suffer resultant mental or physical illnesses that inhibit normal functioning.

Following this concept, Carver (1998) identified four potential responses to adverse events: succumbing, impaired, resilience, and thriving. All of his categories assume that an initial deterioration of functioning occurs at the onset of the stressful event, and then an individual responds to the event. The first category, succumbing, occurs when a person's functioning continues to deteriorate below the initial level of deterioration incurred by the adverse event. The second category, impaired, occurs when a person's functioning improves but not to the same level prior to the adverse event. In the third response category, resilience, the person returns to the same level of functioning prior the adverse event. The last, thriving, occurs when a person's

functioning surpasses the prior level. Additionally, Carver (1998) notes that these categories are not mutually exclusive as some domains of a person's life may thrive, such as one's professional career, while others may be impaired or broken, such as intimate relationships. He also notes that an individual may progress and regress through states of recovery and relapse throughout the life course. What this discussion of reactions to stress implies is that resilience is not the end point of an outcome, rather it is a sojourn that has the potential for permanency and that there are multiple pathways that lead to thriving, resilience, vulnerability, and intermediate stages of development and regression.

Carver (1998) and Luthar (2000) demonstrate the difficulty in defining successful adaptation and highlight the limitation in any study of human behavior — that is, focusing solely on success or failure for one outcome potentially ignores other salient outcomes. While this research is examining risk and protective factors involved with crime and deviance, individuals who are identified as having a positive outcome result may have other negative results within a range of other domains such as employment opportunities, physical and mental health, or intimate relationships that result from the same risk and protective factors examined for crime and deviance in this study.

With this important limitation in mind, the most commonly accepted definition of resilience is that a person is currently functioning at a normal level and that there was or is some significant exposure to adversity that requires a significant reaction (Luthar et al., 2000; Joseph, 1994; Simeonsson, 1994; McGloin & Widom, 2001; Masten & Powell, 2003; Werner & Smith, 1989, 1992). Following the same argument as Luthar et al. (2000) and noted in McGloin and Widom (2001), resilience is defined as *positive adaptation*, i.e. remaining crime or deviance-free after exposure to one or a combination of criminogenic risk factors or influences. Additionally, protective

factors are broadly defined as internal and external characteristics that enhance an individual's ability to withstand or resist the influence of one or a combination of criminogenic risk factors or influences. In other words, resilience is an adaptation outcome to an exposure to criminogenic influences made possible by one or a combination of protective factors.

Additionally, risk factors are stressors or conditions that increase the likelihood that a person will exhibit maladaptive behavior or negative outcomes. These negative outcomes can range across a variety of domains, including poor physical and mental health, low scholastic achievement, or criminal behavior. Similar to risk factors are *vulnerabilities*, conditions which intensify the effect of risk factors and may predispose someone to a risk but do not lead to it unless the risk factor is present (Luthar et al., 2000). Protective factors, on the other hand, are the characteristics of the individual, family, and social systems that mitigate or reduce the effects of potential risk factors. Hence, protective factors serve to moderate or mediate the effects of risk factors. A related concept, asset, is similar to a protective factor. However, where protective factors serve to counteract risk, *assets* merely increase the likelihood of success independent of the risk (Luthar et al., 2000).

What determines if something is risk factor, vulnerability, asset, or protective factor? The literature is not completely clear on this as risk and protective factors are oftentimes described in similar ways. Some scholars have argued that risk and protective factors should be seen as separate variables (Rutter, 1990). Others treat risk and protective factors as mutually exclusive categories in one variable. For instance, is having a single parent a risk factor for deviance while having intact parents a protective factor? What if the single parent is deeply involved in their child's life and the intact parents are largely absent? Where does quality of parenting fit in? Thus, the operationalization of risk and protection factors is important because it

needs to address not only exposure to risk or protective factors, but also the degree of exposure.

Finally, while there are operational difficulties in how risk and protective factors are measured, three salient domains are identified in resilience research. The first domain contains the individual's characteristics, some of which have a strong biological component such as intelligence, temperament and neuropsychological deficits while others are closely linked to an individual's social environment such as the instilling of confidence and self-esteem. The second domain contains family characteristics such as cohesiveness, parental warmth, and parental expectations. The third domain contains extra-familial support systems such as social networks and school systems (Luthar et al., 2000). These domains will be discussed further in identifying the salient risk and protective characteristics investigated in this study.

Origins of Resilience Research

Resilience research began with the work of Garmezy in the 1940s (Garmezy & Rutter, 1983). Originally, Garmezy was searching for precursors of schizophrenia and other serious mental illness, but the main focus of his research centered on how well schizophrenics functioned prior to the onset of their disease (Garmezy & Rodnick, 1959). His interests then shifted to understanding how some children of schizophrenics and others with severe mental illness were able to avoid future pathology despite the presence of significant risk factors, including such things as parental mental illness, poverty, and other traumatic experiences (Garmezy, Masten, & Tellegen, 1984). What Garmezy was explicitly interested in was the development of *competence* which he and others broadly defined as whether or not an individual has met social expectations for his or her age (Phillips, 1968; Garmezy & Tellegen, 1984). This interest also rooted

itself in understanding factors underlying both adaptive and maladaptive behavior.

As a result of his interest in competence, in the mid-1970s Garmezy designed an initial cross-sectional study of 205 children entitled “Project Competence” to understand and identify the relationships between competence, risk exposure, family attributes and individual factors (Garmezy & Tellegen, 1984). The original cohort was a normative sample of children attending the third through sixth grades in two Minneapolis elementary schools. The original study did not have an explicit high-risk sample, so Garmezy and his colleagues initiated a series of other studies to target high-risk cohorts such as children born with congenital defects and physical handicaps (Garmezy & Tellegen, 1984).

Around the same time as Garmezy’s work being carried out in the late 1970s, Werner began her classic study of Hawaiian children (Werner & Smith, 1989, 1992) which found that a substantial portion of the children with risks such as chronic poverty, low maternal education, and moderate to severe perinatal stress exhibited adjustment problems at later stages of development. However, one third of these disadvantaged children did not develop such problems and were psychologically healthy at ages 10, 18, and 30. A comparison of these resilient children with those with adjustment problems showed that resilient children received substantially more attention as infants and, according to their mothers, presented as more active and socially responsive infants.

Garmezy’s and Werner’s respective research projects challenged certain established ideas within psychology and social work prevalent at the time. The most important of these ideas is that there are fixed and inevitable stages of development when exposed to risk factors, and more specifically trauma endured in childhood inevitably leads to the onset of adult psychopathology. Following this first wave of resilience research, subsequent research expanded to examine exposure to multiple

adverse events and conditions. These adverse conditions included poverty and violence (Luthar, 1999; Richters & Martinez, 1993), maltreatment (Beeghly & Cicchetti, 1994; Cicchetti & Rogosch, 1997), socioeconomic disadvantage (Garmezy, 1991; Rutter, 1979; Werner & Smith, 1992) and natural catastrophe (O'Dougherty-Wright, Masten, Northwood, & Hubbard, 1997). Most of these early studies sought to identify invulnerable or invincible individuals and discover resiliency attributes. However, research has since shifted away from these terms because they implied that the ability to overcome risk was a fixed trait. Hence, most research now refers to at-risk individuals with positive adaptation as resilient because it more accurately refers to the processes that surround positive adaptation given the fact that new risks and strengths constantly emerge over a person's life-course (Luthar et al., 2000). Additionally, these early and middle-stage studies were predicated on finding individual, family, and extrafamilial characteristics and processes that are associated with resilience. Left out of these early attempts to understand resilience was how these processes and characteristics worked to foment and sustain resilience.

Resilience Theory

As the previous section demonstrated, initial resilience research was not as concerned with theory building as it was in identifying the characteristics of resilient individuals who resisted succumbing to trauma with maladaptive behavior. Most of this early literature describes resilient qualities that help to cope with high-risk situations or trauma. The next stage of resilience research was also not overly concerned with theory building and focused on identifying the processes of attaining successful adaptation in the presence of risk. Hence, the focus of resilience research shifted from discovering a trait to promoting an adaptive outcome to traumatic conditions. But

how do these factors and processes work together to give rise to resilience or maladaptation? Currently, the theoretical understanding of resilience is that protective factors have an ability to counteract the effects of high-risk environments and these protective factors serve to inure individuals from high-risk status through a variety of biological and social processes (Luthar et al., 2000).

Most resilience research within social work and sociology relies on the balance model (Werner & Smith, 1989, 1992) as the principal theoretical framework. This framework views resilience as a response when the protective factors exceed the risk factors in the presence of adverse life events. In other words, when the balance⁴ between risk and protective factors is manageable, i.e. balanced, individuals will successfully cope with adverse events; in contrast, when risk factors outweigh protective factors maladaptation will ensue.

Another resilience theory in sociology is Antonovsky's (1979, 1984) "Sense of Coherence" theory. Its underlying framework holds that child-rearing practices and types of social roles, filtered by individual characteristics such as personality and intelligence, create generalized resistance resources which are lessons taken from prior life experience. These resources, in turn, provide meaningful present-time life experiences which shape a person's sense of coherence. He defined sense of coherence as "the extent to which individuals perceive the stimuli that confront them as making cognitive sense, as information that is ordered, consistent, structured, and clear and, hence, regarding the future, as predictable rather than as noisy, chaotic, disordered, random, accidental, and unpredictable" (Antonovsky, 1984, p. 118). Hence, accord-

⁴ While Werner's balance model (Werner & Smith, 1989, 1992) has a similar name, it bears little resemblance to control balance theory in criminology (Tittle, 2004). CBT states that the control an individual uses relative to the control an individual experiences give way to specific forms of deviance. When the exercised control is larger than the control experienced, autonomous forms of deviance such as drug use tend to occur. When the converse happens, i.e., when control experienced is greater than control exercised, repressive forms of deviance such as rape and assault tend to occur.

ing to Antonovsky, sense of coherence is the lynch pin for resilience and adaptive behavior.

How sense of coherence then works, according to Antonovsky (1979, 1984), is that when a person is exposed to elevated stress or adverse events, he or she enters into a state of tension. His model then proposes that a strong sense of coherence turns to the generalized resistance resources that are available. These, in turn, interact with the tension to manage the elevated stress and overcome the adverse event. Successful management of the tension boosts an individual's sense of coherence and maintains stability towards the positive end of behavior. Unsuccessful management reduces sense of coherence, which in turn leads to maladaptive behavior.

Within the psychological literature, J. P. Wilson (1989, 2004) proposed one significant model that describes resilience or the resilience process. His model, which identified allostatic (i.e., stabilization) stress response patterns to trauma, included five separate but connected areas of psychological functioning: style of coping, emotional balance and stability, personality, ego-defensive processes, and the marshaling and use of protective factors within one's coping behaviors. This model then views the outcome of the response triggered by a traumatic life event as one along a continuum of adaptation and resilience that provide feedback to either master or succumb to stress.

These three models⁵ share several key features. The first is that a set of coping mechanisms is hypothesized to exist in response to adverse events. Second, there are resources of protection within individuals that allow them to cope in a positive

⁵ One other peer-reviewed theory of resilience was found in carrying out this literature review, in what the author, Richardson (2002), called "biopsychospiritual homeostasis" and supported with quantum mechanics, Eastern medicine's Tao chi or life force, and God Almighty. Regrettably, it is omitted as space precludes the necessary review of the mathematics underlying quantum theory, the philosophical basis for Eastern metaphysical thought, and proof of God's existence to properly explain this theory in a manner it so justly deserves.

manner, but these resources can be overwhelmed if there is emotional instability or an excess of negative feedback (i.e. risk factors). Third, maladaptation and resilience are states along a continuum, similar to Carver's (1998) conceptualization.

Conceptualization of Protective Factors

As stated previously, some researchers are concerned with the oftentimes confusing manner in which resilience and protective factors are described in the literature. Specifically, Luthar et al. (2000) point out how researchers conceptualize resilience and protective factors inconsistently (see also Luthar (1993)), with some viewing protective factors as interactions that ameliorate risk (Garmezy et al., 1984) and others viewing these factors as direct effects (Werner & Smith, 1992). They also point out that literature reviews on resilience often do not distinguish between interactions and main effects when describing protective factors (see Haggerty, Sherrod, Garmezy, and Rutter (1994)). Following this logic, Rutter (1985) conceptualized protective factors as influences that reduce or mitigate responses to some risk that lead to a maladaptive outcome. He suggested that protective factors take effect following risk exposure and mediate or moderate the likelihood of adverse events. He also suggests that a factor can only be considered protective if it differentiates between successful and maladaptive groups who are both exposed to the same level of risk. Additionally, Rutter (1987) also argued that the effects of the protective factor be measured at a later point than the risk exposure.

To avoid confusion over the direct or interactive effect of protective factors, Luthar (1993) argued that protective factors need to be conceptualized in a more refined manner to distinguish how the protective factor affects risk. The first factor she described as “protective” is a direct effect where the protective factor increases the likelihood

of positive adaptation regardless of risk-level. The second, “protective stabilizing,” is an interactive effect where the factor creates stability in positive adaptation regardless of risk-level. The third, “protective enhancing,” is an interactive effect where the protective factor increases the likelihood of positive adaptation when risk-level increases. The fourth, “protective reactive,” is an interactive effect where the factor merely lessens the effect of increasing risk on positive adaptation. The fifth, “vulnerable stable,” is an interactive effect where the factor conveys no protection when risk is low, but its absence decreases the likelihood of positive adaptation when risk is high. The last, “vulnerable reactive,” is an interactive effect where the factor decreases the likelihood of positive adaptation when risk level increases. Figure 1, adapted from Luther et al. (2000), demonstrates these direct and interactive effects graphically.

Luther (2000) also indicates that protective factors do not have the same effect equally across various populations and may vary according to a number of demographic characteristics including age, gender, and class (also see Masten and Powell (2003)). For example, Masten, Morrison, Pellegrini, and Tellegen (1990) showed that under similar high pressure situations, boys will be more disruptive or aggressive while girls will exhibit higher levels of anxiety and depression. Other research shows that while individual characteristics such as temperament and self-esteem are important for high-risk teenage females to cope with adversity, outside sources of social support are particularly important for high-risk boys (Werner, 1993). These results suggest that gender greatly affects the role of risk and protective factors in fostering well-adaptive behavior.

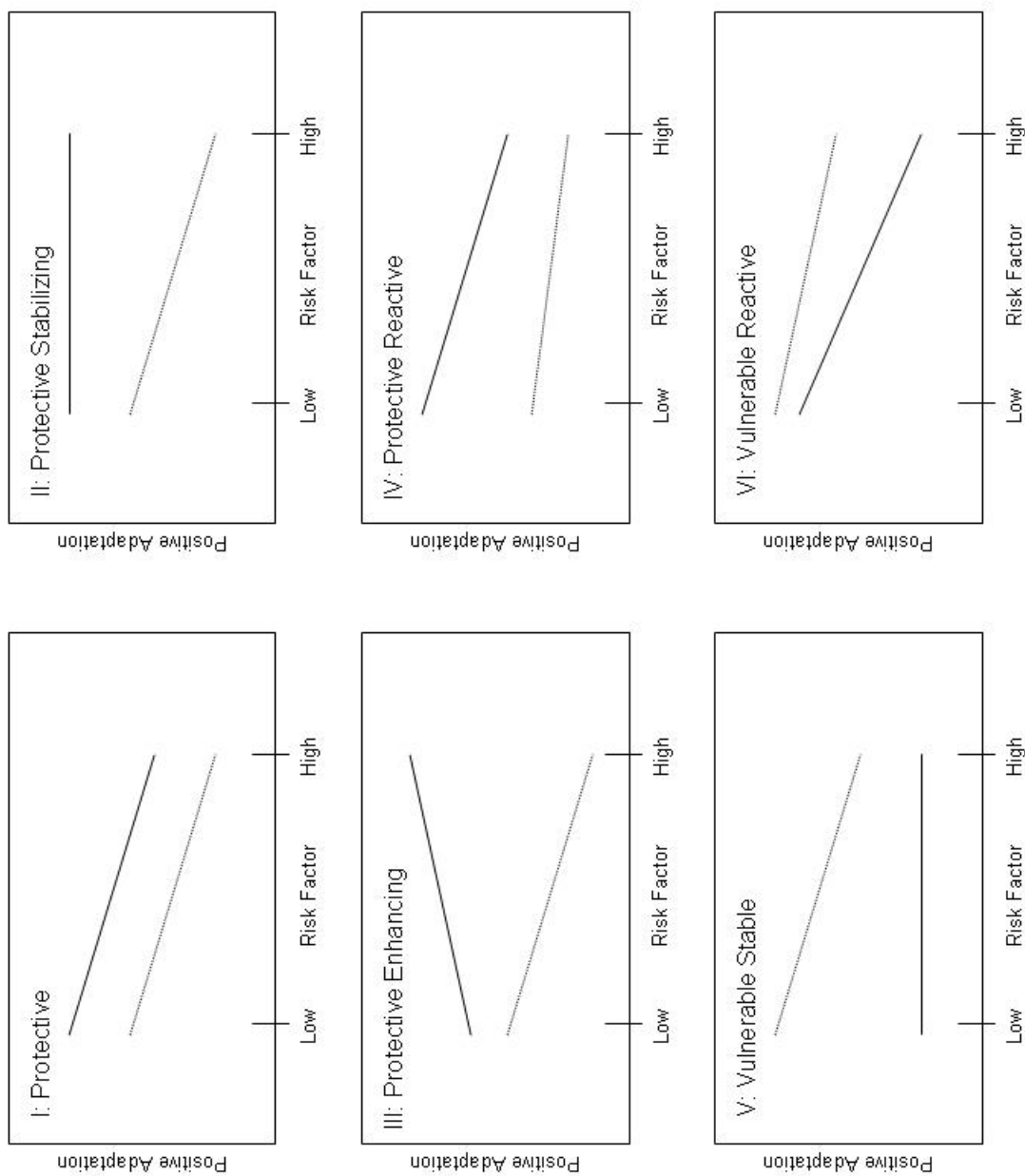


Figure 1: Protective factor concepts. (I) Protective; (II) Protective stabilizing; (III) Protective enhancing; (IV) Protective reactive; (V) Vulnerable stable; and (VI) Vulnerable reactive. Adapted from Luthar et al. (2000)

Risk and Protective Factors

So what are the principal risk and protective factors identified in the research literature? As stated previously, three salient domains emerge from the literature — individual, family, and extrafamilial — each of which contain both risk and protective factors. Individual risk factors for crime and deviance include attention deficits, hyperactivity or learning disorders (Babinski, Hartsough, & Lambert, 1999; Pratt, Cullen, Blevins, Daigle, & Unnever, 2002), history of violent victimization (Maxfield & Widom, 1996; C. Smith & Thornberry, 1995), and history of emotional problems (Jonson-Reid, Williams, & Webster, 2001). Others have shown that serious offenders tend to suffer from a variety of neuropsychological deficits (Moffitt, Lynam, & Silva, 1994; Piquero, 2001; Piquero & White, 2003). This body of research supports the view that biologically-based risks produce neuropsychological deficits which can manifest behaviorally as poor temperament and, eventually, deviance and crime.

Several individual protective factors emerge from the research on resilience and serve to either potentially insulate an individual from external risk factors, decrease the risk of deviant behavior, or present more opportunity to engage in prosocial behaviors. The first of these that is consistent across most studies of resilience is *above average or higher intelligence*. In general, intelligence is negatively correlated with crime and deviance. Studies that included cross-sectional, panel, and longitudinal sampling designs have shown lower IQ and lower verbal skills in both those with official criminal records and those with self-reported delinquency (Moffitt, 1993; Rutter, 1993; Ward & Tittle, 1994). Additionally, the low intelligence-delinquency relationship continues to exist as a main effect even after controlling for other factors such as race and socioeconomic status (Lynam, Moffitt, & Stouthamer-Loeber, 1993). A number of other studies show above average or higher intelligence as a protective factor against

crime and delinquency (Farrington, 1994; Garmezy et al., 1984; Kandel et al., 1988; Lösel & Bliesner, 1990; Werner & Smith, 1992). In addition to being a main effect, above average or higher intelligence also reduces the effect of other risk factors such as parental criminality (Kandel et al., 1988) and poor neighborhoods (Werner & Smith, 1992). The positive affect of above average and higher intelligence is hypothesized to allow for better decision making, improve the ability to recognize and avoid risk, and create the opportunity for scholastic achievement (Garmezy et al., 1984; Masten et al., 1990; Masten & Powell, 2003).

Other individual protective factors include *physical attractiveness and amiability*, which serves to elicit positive responses from others to create social bonds that foster prosocial behavior (Werner & Smith, 1992); *an absence of serious health problems*, which allows those at-risk to better cope with adversity (Garmezy & Tellegen, 1984); *realistic self-esteem*, grounded in respect for others and an understanding of one's level of competence, which serves to create a desire for prosocial behavior (Cicchetti & Rogosch, 1997); *religiosity*, which provides clear standards and expectations of behavior (Werner & Smith, 1992) and also fosters prosocial behavior by limiting opportunity for deviance (Masten et al., 1990); *future aspirations* or time perspective, which serves as motivation towards goals and achievement (Aronowitz & Morrison-Beedy, 2005); and an *internal locus of control* or a person's sense of dominion over their life, which allows them to see how their actions can shape potential outcomes (Garmezy & Tellegen, 1984).

Within the family domain, parents, families, and family-like groups can also serve as risk or protective factors. The family is where a child first learns about and experiences informal social control, norms, and expectations. Studies have consistently shown that secure bonds between children and their parents or guardians reduce the risk of crime delinquency. Family protective factors demonstrated in prior research to

be important include *parental connectedness* such as the ability to discuss problems with parents (Bank, Forgatch, Patterson, & Fetrow, 1993) and *high parental expectations about school performance* (Astone & McLanahan, 1991), *adequate parental control* such as frequent shared activities with parents and the consistent presence of parent when awakening, when arriving home from school, at evening mealtime or going to bed (Aronowitz & Morrison-Beedy, 2005). These factors all serve to teach, inculcate, and reinforce informal social norms and behaviors, provide opportunity for prosocial bonding, and create a sense of cohesion with others outside of oneself.

Family risk factors, on the other hand, serve to disrupt this sense of cohesion with others through various mechanisms including poor parental control, lack of warmth, and negative reinforcement such as physical punishment or neglect (Masten et al., 1990; Garmezy & Tellegen, 1984; Werner & Smith, 1992). Other indicators of family risk, while not universal in all situations, nonetheless raise the risk of adversity and include *adolescent mother* which may indicate immature parenting style (Maxfield & Widom, 1996), *nonintact parents* including divorce or single parenting which may serve to disrupt cohesion and present differing expectations and informal social norms (Amato & Keith, 1991; Amato, Loomis, & Booth, 1995; Amato, 2000), *parental criminality* which may indicate family-level anti-social norms (Kandel et al., 1988; Farrington, 1989), and a *parental history of mental health problems*, which again disrupts the ability to foster prosocial bonding and reinforcement of social norms (Garmezy & Tellegen, 1984).

Lastly, extra-familial protective factors serve to reify those norms and behaviors learned within the family and provide opportunity to create external prosocial bonds. These include *connectedness to adults* outside the family, involvement in social activities, and decent schools (Werner & Smith, 1989, 1992; Masten & Powell, 2003). Extra-familial risk factors, on the other hand, can disrupt norms and behav-

iors learned within the family and foment antisocial or diminished opportunity. These include *delinquent peers* (Elliott & Menard, 1996; Haynie, 2001) and socially disorganized neighborhoods including *high levels of neighborhood transiency*, and *diminished economic opportunities* (Garmezy, 1991). Social disorganization will be discussed in further detail later on in this chapter.

Cumulative Risk and Protection

While identifying specific risk and protective factors and processes is important, in reality these factors and processes are not compartmentalized in human development. Indeed, research has shown that delinquency and criminality are more highly correlated with individuals who experienced multiple risk factors. In other words, the likelihood that crime and deviance will occur increases with a person's accumulation of risk factors. An example of this likelihood is shown in Rutter's (1979) study that assessed the prevalence of psychiatric disorders in children. He found six factors that were associated with mental disorders, including marital discord, low socioeconomic status, large family size, paternal criminality, maternal psychiatric disorder, and child welfare intervention. More interestingly, he concluded that the rates of mental illness were directly related to the number of risks to which the child had been exposed. Those with one risk factor were no more likely to suffer from psychiatric illness than those with no risk factor. When two or more of these factors were present, however, the prevalence rate quadrupled, and when four or more risk factors were present, there was an order of magnitude increase in the prevalence rate.

Other research in the literature shows similarly that the effects of cumulative risk greatly increase the risk of victimization, crime and deviance. Garmezy (1991) examined traumatic stressors that potentially put children at risk for the development

of psychopathology. He studied disadvantaged children in urban environments who were subjected to some form of extreme stress. Among the noteworthy findings he reported were the observations that these children were twice as likely to die in the first year of life, be born prematurely, suffer low birth weight, have mothers who had little or no prenatal care, and have unemployed parent(s). Additionally, these children were three times more likely to have mothers die during their delivery, be forced to live in foster homes, or die from abuse. They were also four times more likely to live without a biological parent, be supervised by a child welfare agency and four times more likely to be the victims of murder. Garmezy (1991) noted that these combinations of maternal, social, biological, and environmental disadvantages and stressors clearly increased the risk of future pathology in children in a compounding manner, including crime and delinquency.

In addition to evidence of the effects of cumulative risk, researchers have also begun to look at the evidence of cumulative protection. Jessor, Van Den Bos, Vanderryn, Costa, and Turbin (1995) examined how psychosocial protective factors were related to involvement in problem behavior (e.g., alcohol and drug abuse, delinquency, and promiscuity) using a longitudinal sample of early adolescents in a large, urban school district. They found that among this sample of youths cumulative protective factors were more significant with high risk levels and less significant or non-significant with low risk levels. In other words, cumulative protection reduced the likelihood of involvement in problem behaviors. In another study, C. Smith, Lizotte, Thornberry, and Krohn (1995) demonstrated the compounding effects of cumulative protective factors with individuals in high-risk family environments. They found that individuals having at least eight protective factors were four times more likely to avoid problem behavior than those exposed to fewer than five protective factors.

More recently, Turner, Hartman, Exum, and Cullen (2007) also examined cumula-

tive protective factors using the National Longitudinal Survey of Youth. They found that high risk individuals (i.e., those with four or more risk factors) who had three or more protective factors were less likely to engage in drug use and delinquency than high risk individuals with three or fewer protective factors. Hartman, Turner, Daigle, Exum, and Cullen (2009), also using data from the NLSY, examined the variation by gender in individual protective factors that indicate a lack of involvement in serious delinquency and drug use. Their results suggest that while there are gendered differences in factors involved with resilience, cumulative protection seemed to be equally important for both genders.

What these studies demonstrate is that research must examine the cumulative effects of both risk and protective factors and *their potential interaction*, and that cumulative risk and protective factors are as important, and often more important, than singular risk and protective factors in predicting successful adaptation or maladaptation. Additionally, Hence, it follows that any meaningful study of resilience should account for and identify the cumulative effect and combination of risk and protective factors that serve to either insulate an individual from engaging in maladaptive outcomes or elevate the risk of such outcomes.

Social Disorganization Theory

As discussed in the previous chapter, social disorganization theory postulates that changes in crime and delinquency over time and across areas occurs due to the absence or breakdown of institutions that foster local social control such as families, schools, and churches. The concept is defined in terms of types of relationships people have among themselves and with their communal groups, and the theory holds that these relationships are a measure of how organized or disorganized social or communal

groups are in solving problems (Bursik, 1988). Hence, social disorganization theory claims that crime and delinquency are due to changes in and disruptions of local social institutions that normally would foster social control and reinforce conforming behavior.

Originating from the Chicago School in the early 1920s, Shaw and McKay (Shaw et al., 1929), sought to describe and explain the distribution of a host of social problems present in the city of Chicago in the 1920s. Among their many noteworthy findings, they demonstrated that the amount of truancy, delinquency and adult crime was inversely proportional to the distance from the city center, that communities with the highest amounts of delinquency had on average the highest amounts of truancy and adult crime, and that these high rates occurred in areas marked by extreme poverty, urban blight, and high transiency. Due to these observations and the fact that high delinquency and crime rates remained despite changes in types of ethnic and minority populations residing within these areas, they posited that crime and delinquency were the result of the social conditions experienced by these groups rather than by any genetic or biological predisposition. They argued further that existence of these problems was perpetuated through interaction between and among the new and the established members of social areas.

A major critique of social disorganization theory is premised on the concept of resilience — namely, if social disorganization explains crime and deviance, why aren't all those who grow up in these environments criminals (Cohen, 1955; Merton, 1957)? Other critiques of social disorganization theory are methodological as some measures of social disorganization used crime and delinquency as its measure rather than crime and delinquency resulting from disorganization and some viewed the theory as a tautology (Pfohl, 1985; Bursik, 1988). Because of these critiques and the subsequent rise of individual-level criminological theories, social disorganization theory largely fell

out of favor for a time (Bursik, 1988). Recent research, however, has reformulated the concept of social disorganization to include social capital and collective efficacy as measures of social disorganization that are predictive of crime and delinquency rather than crime and delinquency as a measure of social disorganization (Bellair, 1997, 2000; Morenoff et al., 2001; Pratt et al., 2004; Sampson et al., 1997).

Bursik (1998) initiated the renewed contemporary interest in social disorganization by pointing out that Shaw and McKay were not using blight, poverty, and rapid social change to be direct causes of crime and delinquency. Rather, he argued that Shaw and McKay were proposing that social disorganization disrupts formal and informal social controls within communities and neighborhoods, and it is this disruption that causes crime and deviance to occur. Additionally, Bursik (1988) contends that this absence or breakdown of social control is the key concept of social disorganization, arguing essentially that it is a “group-level analog of control theory and is grounded in very similar processes of internal and external sources of control (p. 521).” Hence, social disorganization is a measure of a community’s level of formal and informal social control.

Since Bursik’s (1988) publication, several tests of social disorganization using this conceptual redefinition have been performed. Sampson and Groves (1989), using data from the British Crime Survey, found that crime rates were higher in areas with weak friendship ties, low organizational participation, and higher numbers of unsupervised youth. Additionally, they found that these measures also mediated the effect of structural characteristics such as socioeconomic status, residential stability, and family disruption on crime and victimization in these areas. Using the same data with a different modeling approach, Veysey and Messner (1999) show moderate support of Sampson and Groves’ (1989) argument with respect to the mediating effect of social disorganization factors. They found that social disorganization factors did mediate

the effects on the relationship between crime and low socioeconomic status, residential mobility, and racial heterogeneity, but found no impact on the association between family disruption and crime. Similarly, Sampson et al. (1997) found that neighborhoods with limited social cohesion have less collective efficacy and that concentrated disadvantage was mediated by collective efficacy in its effect on interpersonal violence in Chicago neighborhoods. Others studies exploring social disorganization have shown that residents of neighborhoods with extreme socioeconomic disadvantage have less social contact with each other (Bellair, 1997; Hipp, 2007b, 2007a; Morenoff et al., 2001; Sampson et al., 1997; W. R. Smith, Frazee, & Davidson, 2000). Others scholars have also shown a positive association between neighborhood instability and crime rates (Bellair, 1997, 2000; Heitgerd & Bursik, 1987; McNulty & Holloway, 2000; B. Warner & Roundtree, 1997).

What these various empirical studies demonstrate is that social disorganization — with its higher levels of residential instability, population heterogeneity, and greater poverty — will result in fewer social interactions among resident which, in turn, will reduce collective efficacy, social capital, and, by extension, social control. These social dynamics result in increased crime and delinquency. Hence, disorganized neighborhoods, poverty, and low social capital are documented risk factors for crime and delinquency and residence in such neighborhoods serves as an exposure to criminogenic influences and those who remain crime- and deviance-free within these contexts can be said to be resilient.

Self-Control Theory

As stated in the previous chapter, Gottfredson and Hirschi's (1990) self-control construct is an individual-level trait hypothesized to be a significant cause of crime

and deviance. Given their declared belief that self-control is the sole cause of crime, it has been one of the most widely tested theories in criminology since the publication of their book (see Pratt & Cullen (2000)).

Gottfredson and Hirschi (1990) base their theory on the observation that not all people become criminals or maladjusted adults and that crime and other analogs provide easy fulfillment of immediate needs. Based on this foundational observation, they argue that self-control is the individual trait which regulates a person's predisposition toward crime and deviance. Simply stated, individuals with low self-control are more likely to make decisions impulsively and prefer such things as simple and easy tasks and take greater pleasure in physical activities instead of mental pursuits. Individuals with low self-control would also be self-centered, selfish, and lose their temper rather easily. Because of these characteristics, individuals with low self-control are also likely to disregard the long-term consequences of their decisions for themselves and for others.

Gottfredson and Hirschi (1990) theorize that one's level of self-control is primarily the result of parental socialization occurring before the age of ten. They argue that parents who monitor their child's behavior in a responsible fashion can nearly always recognize when their child is acting inappropriately, and correct their child's inappropriate behavior in a positive fashion. By doing this, they will most likely instill a sufficient level of self-control in their child. Parents who do not engage in responsible parenting, either through an inability or unwillingness to do so, will fail to instill a sufficient level of self-control in their child.

Among the most controversial aspects of Gottfredson and Hirschi's (1990) theory is that self-control is stable across the life course and, further, that other known salient external factors such as delinquent peers or social context are the result of those with low self-control seeking those factors rather than those factors having any

explicit causal relationship to their behavior. That is, people with low self-control will seek people, places, and things that are conducive to crime and deviance so that low self-control is one of the prime causes for crime and deviance and these other types of factors appear to be criminogenic spuriously.

According to Gottfredson and Hirschi (1990), the primary characteristics of low self-control are both attitudinal and behavioral. These characteristics include an inability to delay gratification, a preference for simple tasks and avoidance of activities that require any sort of planning, engagement in exciting and risky situations rather than mundane or intellectual endeavors, an inability to bond appropriately with social institutions, an inability to perform tasks that require skill or planning, and an ill-tempered, selfish and narcissistic persona.

Additionally, Gottfredson and Hirschi (1990) stated that the generality of self-control theory would be evident in a variety of acts in which its characteristics are observed. Hence, those with low self-control will be attracted to and engage in criminal acts along with a variety of deviant acts such as smoking, drug and alcohol abuse, and sexual promiscuity. They also claim that those with low self-control will be indifferent to others including family and peers, fail to engage prosocially in school, work, and other social institutions. Lastly, they claim that those with low self-control will have an accumulated history of a wide variety of deviant and criminal acts, stating that “[e]vidence has accumulated that people who tend to lie, cheat, and steal also tend to hit other people; that the same people tend to drink, smoke, use drugs, wreck cars, desert their spouses, quit their jobs, and come late to class.” (p. 261)

Given the breadth of Gottfredson and Hirschi’s (1990) claims, the construct of self-control has garnered significant attention with multiple tests of the theory having been carried out since its publication in 1990. A meta-analysis conducted by Pratt & Cullen in 2000 reviewed these studies and found that self-control was one of the

strongest predictors of crime even when controlling for other known correlates of criminal behavior. They also found that irrespective of how self-control was measured (i.e., whether behavioral or attitudinal indicators were used) it remained a strong predictor.

Recent research on self-control has continued to document and flesh out its importance in criminology and its relationship with other theories and predictors of crime. Harbin Burt, Simons, and Simons (2006), using longitudinal data on a sample of African-American children and their caregivers, found that while level of self-control was important in predicting delinquency, other factors such as type of parenting (i.e., authoritative vs. permissive) and prosocial peers also had a demonstrable effect on delinquency. They also found evidence that the presumptive stability of self-control over the life-course was not well supported. Eggleston Doherty (2006), using a sample of incarcerated serious juvenile offenders, showed that both level of self-control and level of social integration predicted adult desistance from crime, and that social integration predicted desistance from crime independently of level of self-control. Vazsonyi and Belliston (2007) examined self-control using a cross-cultural and cross-national test of self-control theory that showed similar relationships between family processes, low self-control, and youthful deviance across cultures. They also found that family processes had both direct and mediated effects on delinquency when controlling for self-control. Finally, Welch, Tittle, Yonkoski, Meidinger, and Grasmick (2008), using a cross-sectional sample from a major Midwestern city, examined the link between self-control and social bonds and found that low self-control was a predictor of deviance independent of social bonds. They also found that interpersonal social bonds were associated with deviance, but community social bonds were not.

Conceptualizing Self-Control

Within criminology, there has been a great deal of debate on how to measure self-control. Gottfredson and Hirschi's (1990) original conceptualization had six main characteristics of low self-control: impulsivity, selfishness, ill-tempered, a preference for trivial tasks, a preference for physical tasks, and proclivity toward risk-taking behavior. The initial debate over the measurement of self-control centered on whether using attitudinal questions that tapped a person's opinion on how they would likely behave over a variety of conditions was a better measure of self-control than using behavioral reporting scales that captured how a person actually acted over a variety of conditions. Gottfredson and Hirschi (1990) asserted that behavioral measures were the most reliable measure of self control and they have remained stalwart in this assertion (Hirschi & Gottfredson, 1993, 2000; Hirschi, 2004). The main criticism of behavioral measures is that they constitute a tautology, i.e., using delinquency to predict delinquency. Akers (1991) initially raised the tautology issue involved with behavioral measures and criticized self-control theory for using behaviors because there was no independent measure of low self-control other than the act itself. Hirschi and Gottfredson (1993), however, view the apparent tautology as a benefit and argue that the tautology can simply be avoided by not using crime measures within scales but rather other analogous acts that measure propensity.

In contrast to behavioral measures, attitudinal scales have also been used to assess self-control theory. The most influential of these scales was developed by Grasmick, Tittle, Bursik, and Arneklev (1993) and entails the use of a 24 question Likert scale for specifically measuring the six main characteristics described by Gottfredson and Hirschi (1990). Grasmick et al. (1993) used this scale on a sample of respondents from Oklahoma City and found that low self-control was predictive of crimes of fraud, but

not of force. They also found that low self-control interacted with opportunity and increased the likelihood of both force and fraud, yet there remained a significant proportion in the variance unexplained. Using the same scale, Arneklev, Grasmick, Tittle, and Bursik (1993) demonstrated that attitudinal self-control was linked to drinking alcohol and gambling, but not smoking. Other work carried out in this time period questioned whether the Grasmick scale forms a multidimensional measure or if it measures a singular self-control construct. Longshore, Turner, and Stein (1996), using a criminal sample, showed that a modified version of the scale is not unidimensional; however, Piquero and Rosay (1998) used the same data as Longshore et al. (1996) and demonstrated that the modified version of the Grasmick et al. scale is unidimensional. Other work in this area has produced similar mixed results; some have found multidimensional differences in the Grasmick scale for sex (Higgins, 2004; Higgins & Tewksbury, 2006), culture (Vazsonyi, Pickering, Junger, & Helsing, 2001; Wang, Karns, & Meredith, 2003) and race (Morris, Wood, & Dunaway, 2007). Some have speculated that the difference between uni- and multidimensional qualities of self-control may be due to different interpretations of what Gottfredson and Hirschi (1990) originally proposed (Arneklev, Grasmick, & Bursik, 1999).

Given these and other results, Hirschi took issue with the way that self-control was operationalized, and in 2004 he redefined self-control as the tendency to calculate the costs of an immediate act. Hirschi (2004) contended that self-control consisted of both the ability to recognize the implications of an act (i.e., how others will perceive this act) and the ability to optimally choose the best course of action within that act. In other words, a person will not engage in crime and deviance due to inhibitions that he or she has due to his or her opinion of what others may think of them. Piquero and Bouffard (2007) examined this redefinition of self-control using a convenience sample of college students and found that Hirschi's (2004) redefined self-control measure (i.e.,

considering the immediate costs of a particular action) had better predictive power for crime and delinquency than Gottfredson and Hirschi's (1990) previous definition of self-control which was typically operationalized as attitudinal predispositions involving consideration of long term costs.

Other research done in this area questions the stability hypothesis of self-control. For instance, Tittle, Ward, and Grasmick (2004) separated the capability for self-control from the desire for self-control. They noted that people with high self-control may choose not to use it and commit crime and indulge in deviance while others may not have high self-control yet maintain a high desire for self-control refrain from crime and deviance. In a survey of Oklahoma City of adults 18 and older, Tittle and his colleagues found that both measures of self-control *ability* and self-control *desire* were independently associated with conformity. As Muraven et al. (2006) noted, this separation of self-control as both a trait and situational factor was ignored by the initial theory.

Related to this premise of situational self-control is the concept of self-control depletion, which reflects the possibility that self-control is akin to a muscle that can be weakened by constant use but also strengthened by moderate exercise (Baumeister & Muraven, 2000; Baumeister et al., 2007; Muraven et al., 1999, 2006). In other words, exerting self-control reduces the reservoir of available self-control in subsequent situations that require it unless some time period has elapsed to allow the reservoir of self-control to replenish and reinforce the resolve.

Several tests of the self-control depletion hypothesis have been reported in the literature. In the first of these studies on self-control depletion, (Muraven, Tice, & Baumeister, 1998) measured the length of time subjects could tightly squeeze a hand grip sufficiently enough that it could hold a wad of paper. Prior to the task, subjects were shown scenes of sick and dying animals from a disturbing video about

environmental disasters. Those in the study who were told to suppress their emotional response during the clip did not squeeze the grip as long as the control group who were given no instructions. A second experiment in Muraven et al. (1998) timed how long subjects tried to solve word anagrams before giving up. In a two-step process, subjects who were given a task were told to write down their current thoughts and then solve word anagrams. The test group was told not to think about a white bear during the first stage, and the control group was told nothing other than to write down their thoughts. The test group gave up on the word anagrams more quickly than the control group.

Following the white bear scenario from Muraven et al. (1998), Muraven, Collins, and Nienhaus (2004) tested the effect of alcohol on self-control depletion. In this study, subjects were randomly assigned to one group where they were told to suppress the thought of a white bear or another group where they were given simple math problems. Subjects were then given an opportunity to drink and told that after drinking, they would take a driving test on a simulator. To create the opportunity for exertion of self-control, both groups were told that they might win a prize if they performed well on the subsequent driving test. The results of this experiment showed that the white bear group drank more alcohol and had higher blood alcohol content than the math problem group. Additionally, the level of self-control subjects reported in the first stage of the experiment was positively correlated with the amount of alcohol the subjects drank.

Other studies have tested self-control depletion over a variety of test conditions with various types of subjects. Vohs and Heatherton (2000) found that dieters were less likely to resist tempting snacks and more likely to break their diets and eat fattening foods after being subjected to a depleting task. Finkel and Campbell (2001) found that subjects who were exposed to an emotion-suppressing task relinquished

their self-control in unrewarding ways. Muraven and Slessareva (2003) found that depleted subjects were less likely to complete a frustrating maze task than a control group. Schmeichel, K. D. Vohs, and Baumeister (2003) found that self-control depletion also had an impact on reading comprehension scores. Inzlicht, L. McKay, and Aronson (2006) found that subjects who were given a Stroop task⁶ had reduced self-control after implementing the task. Other recent studies have replicated these findings or extended them to other areas, and irrespective of how the depletion occurs they all show a consistent self-control depletion effect after exposure to other tasks requiring self-control or self-regulation. (Fischer, Greitemeyer, & Frey, 2007, 2008; Gailliot & Baumeister, 2007; Moller, Deci, & Ryan, 2006; Vohs et al., 2008; Vohs & Faber, 2007).

Given these consistent results from a wide range of tests, it is apparent that self-control is not simply a fixed trait that influences a person's propensity towards crime and delinquency but that there are situational and opportunity factors involved and that self-control is most likely a multidimensional construct rather than a single innate factor. Thus, future research needs to distinguish between situational and trait self-control and determine what dimension of self-control is being measured.

⁶ Stroop tasks are fascinating psychological tests that show a type of cognitive bias that suggests that we may not be in control of things to which we pay attention (Stroop, 1935). A type of Stroop task is a list of colors where the font representing the word of the color is different than the color that the word represents. Subjects are then told to quickly say the color of the word rather than the word itself. Most subjects mistakenly say at least one of the words rather than the color of the word because they have been conditioned that the word itself is more meaningful. These tasks require an enormous amount of focus to avoid making mistakes.

The Relationship between Social Disorganization, Self-Control and Resilience and the Rationale for the Current Study

Chapter 1 outlined the three main questions this research is trying to answer. The first is estimating prevalence of deviance for individuals exposed to varying degrees of criminogenic influence. While this research is concerned with understanding resilience, i.e. positive adaptation in the presence of risk factors, behavioral outcomes must be clearly defined. Six specific outcome measures will be used in this research: *binge drinking, problems from drinking, property crime, assaultive behavior, adult arrests, and adult convictions.*

The justification for the use of binge drinking is because the use of alcohol is ubiquitous in American society and abuse of alcohol and concomitant problems are quite commonplace. Within the medical community, alcohol use disorder is defined as a set of chronic diseases that are characterized by an inability to control consumption of alcohol coupled with continued use despite adverse consequences and cognitive distortions about its effects (Morse & Flavin, 1992). According to the National Center for Health Statistics (2007), in 2006 approximately 61 percent of American adults consumed alcohol within the past year and 33 percent consumed 5 or more drinks on a least one day during that period. Additionally, in a study by the National Institute of Health, more than 17.6 million Americans suffered from alcohol-related disorders in 2001-2002 (Grant & Dawson, 2006) and approximately 6 million adults drove drunk in this same time frame (Chou et al., 2005). Given the prevalence of alcohol abuse, binge drinking is clearly one of the most common types of deviance in American society and would be an ideal candidate as an outcome measure to test the

relationship between risk and protective factors and self-control. Similarly, problems from drinking, i.e. alcohol abuse that adversely affects employment, friendships, and intimate relationships also serves as an ideal candidate for this study.

With regard to the the other measures, there is ample evidence to support their use as appropriate outcome measures. According to the FBI, property offenses are the most common type of crime reported to the police, with nearly 10 million incidents reported in 2007 and a prevalence rate of 3,263.5 offenses per 100,000 people (Federal Bureau of Investigation, 2008). Similarly, assault offenses are the most common type of violent crime reported to the police, with over 900,000 incidents reported in 2007 and a prevalence rate of 372.2 offenses per 100,000 people (Federal Bureau of Investigation, 2008). Given the prevalence rate, property crime and assaultive behavior also serve as an ideal outcome to test the relationship between risk and protective factors and self-control. Lastly, two measures will be used to identify formal involvement with the criminal justice system — namely, adult arrests and adult convictions. These outcomes also provide the basis for determining if previously identified risk and protective factors for crime and deviance hold true for this study's sample. Additionally, identifying the prevalence of deviance within at-risk and lower risk populations prepares a basis for the other research questions under consideration in this dissertation.

The second research question entails examining how self-control is related to the identified risk and protective factor domains that exist at the individual, family and neighborhood levels. Reconciling self-control within risk and protective factors will allow the synthesis of one of the main criminological theories into the wider scope of human development. The connection between self-control and social disorganization has been explored in a somewhat limited fashion in the literature. Gottfredson and Hirschi's (1990) hypothesis regarding how individuals develop their level of self-control

through parental socialization has found broad support in the literature (Hay, 2001; Hope, Grasmick, & Pointon, 2003; Pratt et al., 2004). Most importantly, various empirical studies have found that a parent's education, how he or she supervises his or her child, and the level of parental attachment all predict individual level of self-control (Hope et al., 2003) with parents who use consistently fair discipline and adequate levels of monitoring having children with higher levels of self-control (Hay, 2001).

On the other hand, the literature regarding the link between neighborhood characteristics and self-control is much more sparse. Lynam et al. (2000) found a moderate relationship between low self-control and concentrated disadvantage. Pratt et al. (2004) examined the relationship between self-control and neighborhood context and found a significant association while controlling for parenting practices. Teasdale and Silver (2009), using the Add Health data, also found a significant association between self-control and neighborhood context after controlling for demographics, family structure, and other social characteristics. These studies show that there is some support for the idea that the larger environment in which one grows up and resides beyond family and peer groups is linked to one's level of self-control. Within the context of resilience, social disorganization therefore serves as an exposure to a risk factor for criminality and deviance.

Why are self-control and its exigent factors such as parenting and neighborhood context important to resilience? Within the context of resilience, level of self-control is an important construct because the idea that a person who is resilient in the face of adversity or trauma would suggest under Gottfredson and Hirschi's (1990) theory and Hirschi's (2004) redefinition would have high self-control irrespective of the type of traumatic life event, stressor or criminogenic factor. However, self-control depletion theory, which dovetails with theories of resilience, would imply that self-control should

serve as resource and a coping mechanism in response to adverse events and depletion would ensue with the presence of emotional instability or excess stressors and either maladaptation or resilience would ensue dependent on the level of excess stress or emotional instability. Additionally, given the consistent but moderate support for low self-control as a risk factor for crime and delinquency in the literature, it serves as an exposure to a criminogenic influence. What is the relationship between self-control and the other identified protective and risk factors that have been documented in the human development and psychology literature? Do higher levels of self-control decrease the chances of crime and deviance in the presence of risk factors, or are other protective resources needed to permit self-control to prevent crime and deviance?

The last research question, and the main goal of this study, examines the effects of cumulative risk and cumulative protection on deviant outcomes when controlling for demographics and self-control; this analysis serves to identify the interrelationships between the outcomes, cumulative risk, cumulative protection, and self-control variables being studied. Recently, research conducted by Turner et al. (2007) and Hartman et al. (2009), among others, shows that those with higher cumulative protective factors had better outcomes than those with higher cumulative risk factors for serious delinquency and drug use. Hence, interrelationships between these phenomena would imply that one's risk for criminality could be attenuated by the reinforcement of protective factors and tempered by the enhancement of self-control. Finally, how important is self-control in the presence of cumulative risk and protection? Does it behave as a predictor for crime and deviance when adjusted for varying levels of cumulative risk and protective factors, or is there a moderating effect from the accumulation of risk and protective factors?

Chapter 3: Analytic Strategy

Add Health Data

To study the questions posed in chapters 1 and 2, this research makes use of data extracted from *The National Longitudinal Study of Adolescent Health* (Add Health). The Add Health study was initiated through a legislative mandate from the U.S. Congress (1993) to provide information about factors involved with adolescent health and health behaviors. Because of its scope and size, Add Health contains a rich array of information about risk and protective factors and salient health and social outcomes that make it a highly valuable resource for testing criminological and other social and behavior theories.

Funded by the National Institute of Child Health and Human Development and 17 other Federal Offices and Institutes, the Add Health data constitute a nationally representative sample of adolescents with respect to geography, population density, ethnicity, school type, and size. Three waves of sampling took place, with Wave I beginning in 1995 and included adolescents sampled from grades 7 to 12 from 132 randomly selected U.S. schools (Udry & Bearman, 1998; Resnick et al., 1997). Wave II began in 1996 using respondents from the Wave I interview. Wave I respondents excluded from Wave II were those who were in the 12th grade at that time and had graduated by the time of the Wave II interview. Waves I and II response rates were

78.9 percent and 88.2 percent, respectively. Wave III began in 2001 and included respondents from Waves I and II and achieved a response rate of 77.4 percent. Wave III excluded respondents from Waves I and II who were located outside the United States. Appendix A contains the Add Health variable names, descriptions and datasets used in this analysis.

Because of the rich variety of items contained within Add Health and its longitudinal structure, its use within criminology has generated a small but growing set of literature that covers a wide array of criminological constructs. These include examining the effects of friends' gender and exposure to peer violence on adolescent involvement in serious violence (Haynie, Steffensmeier, & Bell, 2007); gene and environmental interactions (Beaver, Wright, & DeLisi, 2007); the effect of early puberty on violent victimization (Haynie & Piquero, 2006; Schreck, Burek, & Stewart, 2007); the effect of nonshared family environments on delinquency involvement (Beaver, 2008); and the relationship between adult criminal behavior, levels of self-control, and contact with antisocial peers (Haynie, 2001).

Methods

Reliability

Several of the proposed measures consist of multiple items and are combined to create single variables for use in later statistical models. Chronbach's alpha is used to determine if individual items represent the same hypothetical construct (Cronbach, 1951). Additionally, this statistic can be used to determine whether these items measure a single latent construct. This is the case if the value of alpha is relatively large (Johnson & Wichern, 2001).

Factor Analysis

Factor analysis and principal component analysis are methods for investigating whether a number of variables of interest X_1, X_2, \dots, X_i , are linearly related to a smaller number of unobservable factors F_1, F_2, \dots, F_k (Johnson & Wichern, 2001). The single latent construct calculated from the principal components results is a measure with mean 0 and unit variance. These latent constructs can then be used in other statistical methods such as descriptive statistics or more sophisticated methods such as general linear models.

Logistic Regression

Logistic regressions will be used to model the six outcomes against the risk and protective factors. However, the Add Health data sampling strategy has students nested within schools. Since the ordinary logistic regression model assumes that the observations are independent, this sampling strategy violates the assumption of independence given that observations from the same school are likely to be correlated. This means that the estimated standard errors from ordinary logistic regression are incorrect and can lead to incorrect inferences (McCullagh & Nelder, 1990). Consequently, generalized estimating equations (GEE) will be used to analyze the logistic regression models to adjust for the nested design of Add Health. The GEE method estimates the regression parameters assuming that the observations are independent, uses the residuals from this model to estimate the correlations among subjects nested within a school, and then uses these correlation estimates to obtain new estimates of the regression parameters. This process is repeated until the change between two successive estimates is very small, thereby leading to more robust estimates that take into account the nesting of observations (Lipsitz, Kim, & Zhao, 1994).

Data Quality and Analytic Software

Each of the questions used in the Add Health dataset have some values that are outside the data range defined for these variables. If a particular value is out of range (e.g., refused to answer, missing, or not applicable) that value was set to missing. Additionally, some items included values that are legitimate skips or not applicable; some of these values were coded to the lowest level for that particular variable because they indicated useful information regarding that item (e.g., if a respondent reports that they were never arrested causes other variables to be skipped. In these cases, this value indicated that several subsequent variables should be coded never). All such variable adjustments were made in the final dataset featuring over 12,000 cases.

SAS System 9.1 was used for all data management and statistical analyses. The code developed for the analyses is included as study documentation in Appendix B.

Control Variables

The Add Health dataet used for this study was restricted to adolescents between the ages of 14 and 18 in the Wave I data who were also interviewed in Wave III of the study. The final sample size attained in the data extraction process was 12,616 subjects. The sample had an average age of 22.4 years in Wave III, with a gender breakdown of 52.3 percent female and 47.7 percent male. It also was 51.3 percent White and 48.7 percent Non-White; the Non-White proportion was 21.6 percent Black, 16.6 percent Hispanic, and 10.6 percent “Other” in race/ethnicity. Table 1 summarizes these descriptive statistics in further detail.

Table 1: Control Variable Descriptive Statistics

Variable		Mean	Std. Dev
Age at Wave III		22.4	1.40
Variable	Category	n	%
Gender	Female	6,600	52.3
	Male	6,016	47.7
Race/Ethnicity	White	6,470	51.3
	Non-White	6,146	48.7
	Black	2,720	21.6
	Hispanic	2,095	16.6
	Other	1,331	10.6
Sample Size=12,616			

Research Question 1: What is the prevalence of deviance among individuals exposed to varying degrees of criminogenic influences?

Six specific outcome measures are used in this research: *Binge Drinking, Problems from Drinking, Property Crime, Assaultive Behavior, Adult arrests, and Adult convictions*. The previous chapter discusses why these outcomes were selected in greater detail, but generally stated these particular outcomes provide a wide range of negative outcomes to life stress coping, within problems ranging from substance abuse, petty crime, violence and criminal justice domains to understand the risk and protective factors that are potentially involved with resilience and adaptive behavior to stress and trauma.

Alcohol Problems

The Wave III in-home survey contains multiple questions relating to a person’s self-reported alcohol use and concomitant problems, including the following survey

items:

- Over the past 12 months, how many days did you drink five or more drinks in a row?
- Over the past 12 months, how many times have you had problems at school or work because you had been drinking?
- Over the past 12 months, how many times have you had problems with your friends because you had been drinking?
- Over the past 12 months, how many times have you had problems with someone you were dating because you had been drinking?

The first alcohol measure, binge drinking, is designed to determine if a person has engaged in significant alcohol consumption frequently. If a respondent indicated consuming five or more drinks in a row 2 to 3 times or more per month, binge drinking is coded 1, and 0 otherwise. The second alcohol outcome measure, problems from drinking, is designed to determine if a respondent has had problems with work, school, friends, and significant others because of their drinking. It is coded 1 if a respondent reported any problems in these three questions, and 0 otherwise.

Property Crime

The Wave III in-home survey contains questions relating to a respondent's self-reported involvement with non-violent crime, including the offenses of vandalism, theft and burglary. It consists of the following questions:

- In the past 12 months, how often did you damage property that did not belong to you?
- In the past 12 months, how often did you steal something worth less than \$50?
- In the past 12 months, how often did you steal something worth more than \$50?

- In the past 12 months, did you go into a house or building to steal something?

The property crime measure is coded 1 if a person responded yes to any question, and 0 if a person responded no to all of the questions.

Assault

The Wave III in-home survey contains questions relating to a respondent's self-reported involvement with seriously assaulting another person. It consists of the following questions:

- In the past 12 months, how often did you hurt someone badly enough to need bandages or care from a doctor or nurse?
- In the past 12 months, how often did you pull a knife or gun on someone?
- In the past 12 months, how often did you shoot or stab someone?

The assault measure is coded 1 if a person responded yes to any question, and 0 if a person responded no to all of the questions.

Adult Criminal Justice System Involvement

Regarding adult interactions with the criminal justice system, Wave III also asked respondents how many times they were arrested after the age of 18, whether they had been convicted of crime, and whether they had been sentenced to probation, jail, or prison. The first, ever arrested as an adult, is coded 1 if they had one or more arrests, and 0 if they had no arrests. The second, has adult convictions, is coded 1 if they had any criminal justice supervision as an adult (i.e., probation, jail or prison), and 0 if they had no criminal justice supervision.

Table 2: Deviance Prevalence by Outcome

Outcome	n	%
Binge Drinking	2,628	20.8
Problems from Drinking	1,850	14.7
Property Crime	1,638	13.0
Adult Arrests	1,105	8.8
Assaultive Behavior	764	5.6
Adult Convictions	617	4.9
Sample Size=12,616		

Overall Prevalence of Deviance

Table 2 summarizes the overall prevalence of the six outcome measures for the sample. Of these, Binge Drinking had the highest prevalence with 20.8 percent of the sample reporting this behavior followed by Problems from Drinking at 14.7 percent, Property Crime at 13 percent, Adult Arrest at 8.8 percent, Assaultive Behavior at 5.5 percent, and Adult Convictions at 4.9 percent.

Individual Risk Factors

While the number of risk factors described in the following are by no means meant to serve as all of the potential risk factors that an individual might experience throughout his or her life course, they are consistently connected to a variety of negative outcomes as demonstrated in the literature review set forth in Chapter 2. They also represent a broad spectrum of possible risks that represent the individual, family, and extra-familial domains identified in that literature and should be able to demonstrate the effect of cumulative risk on each of this study's six outcomes.

Attention deficits, hyperactivity or learning disorders (Babinski et al., 1999; Pratt et al., 2002) have been shown to be risk factors for crime and deviance. The Wave III dataset includes an ADHD scale consisting of eighteen retrospective questions about ADHD symptoms (Resnick et al., 1997). These questions included Likert scale

items that tapped *inattention* such as “you failed to pay close attention to details or made careless mistakes in your work” or “you had difficulty organizing tasks and activities,” and items relating to *hyperactivity* such as “you blurted out answers before the questions had been completed” or “you talked too much.” Using an identical ADHD scale from Fletcher and Wolfe (2008) and Vaughn, Beaver, DeLisi, Perron, and Schelbe (2009), a measure of ADHD was calculated as the sum of the scores from these several retrospective questions. In addition to the ADHD scale and to facilitate integration with the other risk factors, a dichotomized ADHD variable was specified to indicate if a respondent had above average self-reported ADHD. This variable is coded 1 if the individual’s score was at least one standard deviation above average, and 0 otherwise. Additionally, low birth weight has also been shown to be associated with poor developmental outcomes Garmezy (1991). The CDC National Center for Health Statistics (2005) defines low birth weight as a newborn weighing less than 5.5 lbs. The Wave I dataset included responses from parents to estimate their child’s birth weight, and similar to the dichotomous ADHD variable, low birth weight is coded 1 if a response indicated a birth weight lower than 5.5 lbs., and 0 otherwise.

Additionally, a history of violent victimization (Maxfield & Widom, 1996; C. Smith & Thornberry, 1995) and history of emotional problems (Jonson-Reid et al., 2001) have also been shown to be a risk factor for crime and deviance. Wave III contains a series of questions that retrospectively ask about a respondent’s prior victimization. These questions included the following:

- By the time you started 6th grade, how often had your parents or other adult care-givers left you home alone when an adult should have been with you?
- How often had your parents or other adult care-givers not taken care of your basic needs, such as keeping you clean or providing food or clothing?

- How often had your parents or other adult care-givers slapped, hit, or kicked you?
- How often had one of your parents or other adult care-givers touched you in a sexual way, forced you to touch him or her in a sexual way, or forced you to have sexual relations?
- How often had Social Services investigated how you were taken care of or tried to take you out of your living situation?
- How often had you actually been taken out of your living situation by Social Services?

If a respondent indicated that a particular type of victimization occurred at least one time, then the respective variable is coded 1, and 0 otherwise.

A history of serious juvenile criminal involvement has also been shown to be a risk factor for future adult criminality. Wave III asked respondents questions about the extent of their involvement with the criminal justice system as a juvenile. Specifically, they were asked how often they were arrested before the age of 18 and, as a result of a subsequent conviction, sentenced to probation or to a juvenile or youth detention center. Two separate outcomes will be calculated from these particular items. The first, juvenile arrests, is coded 1 if they had one or more arrests, and 0 if they had no arrests. The second, juvenile convictions, is coded 1 if they had any criminal justice supervision (i.e., probation or detention), and 0 if they had no criminal justice supervision.

Family Risk Factors

Family risk factors include adolescent mother (Maxfield & Widom, 1996), divorce or single parenting (Amato & Keith, 1991; Amato et al., 1995; Amato, 2000), and

parental criminality (Kandel et al., 1988; Farrington, 1989).

To determine single parenting or divorce, the Add Health dataset at Wave I had twenty questions regarding a respondent's household members. These questions were combined to determine the type of parental combination, i.e. single parent, step-parents, parents intact. The variable for nonintact parents is coded 1 if the combination of these fields did not indicate that a respondent's biological parents were living together, and 0 if the biological parents were part of the household. While this variable misses combinations of parents, step-parents, and other types of guardians that might serve as risk factors unto themselves, it serves to consistently measure nonintact parents across all subjects rather than trying to parse each potential combination.

Having an adolescent mother is calculated by subtracting the age in years of the respondent at the time of the survey from the age in years of the respondent's mother. Differences less than 18 years indicate if the respondent had an adolescent mother. Parental criminality will be measured by the Wave III question which asked whether the respondent's father had served time in prison or jail.

Extra-Familial Risk Factors

Extra-familial risk factors include delinquent peers (Elliott & Menard, 1996), socially disorganized neighborhoods, high levels of neighborhood transiency, and diminished economic opportunities (Garmezy, 1991).

Following the approach featured in Haynie (2001), delinquent peers will be identified using the Wave I friendship nomination data. Every student was asked about his or her involvement in a series of six minor delinquent acts. As per Haynie (2001), a measure of peer delinquency is calculated as the average response of all identified friends with regard to minor delinquency including cigarette smoking, alcohol use, drunkenness, skipping school, and engaging in dangerous acts on a dare. Similar to

the approach for ADHD and low birth weight, an additional dichotomous variable will indicate significantly delinquent friends if a respondent has a delinquent friend measure one standard deviation above the overall mean, and no significantly delinquent friends otherwise.

Variables for socially disorganized neighborhoods including high levels of transiency and poverty are contained in the Wave I contextual files.⁷ Similar to the other continuous measures, if a respondent has a neighborhood with greater than average transiency then transiency is coded 1, and 0 otherwise. Additionally, if a respondent has a neighborhood with greater than average poverty for the sample then poverty is coded 1, and 0 otherwise.

Summary of Risk Factors

The most often reported common risk factor was non-intact parents, with 47.2 percent of respondents indicating that their birth parents did not live together. Other significant risk factors included 28 percent reporting a history of corporal punishment, 29.4 percent having significantly delinquent friends, and 13.3 percent having a biological father who served time in prison. Table 3 contains these results.

Cumulative risk is the sum of each dichotomized risk factor. A secondary cumulative risk variable is calculated by grouping cumulative risk into four categories: no risk factors, 1 to 2 risk factors, 3 to 4 risk factors, and 5 to 13 risk factors. Cumulative risk factors showed that 14.4 percent of the sample had no risk factors, 43.9 percent had 1 or 2 risk factors, 28.9 percent had 3 to 5 risk factors, and 13.1 percent had 5 to 13 risk factors. Table 3 contains descriptive statistics for all risk factors and

⁷ In the Add Health data, transiency and poverty are measured at the census block level. Transiency is the Proportion Occupied Housing Units Moved into Between 1985 and March 1990. Poverty is the Proportion Persons with Income in 1989 Below Poverty Level.

cumulative risk. The rationale behind these groupings is to identify subjects with *no risk*, *low risk*, *moderate risk*, and *high risk*. While grouping and dichotomization often result in a loss of information, these groupings were also done per the Add Health contract to minimize the risk of identifying individuals who participated in the survey. Additionally, the groupings were designed to maximize the percentages within low and moderate risk and minimize the percentages in the extremes of no and high risk while still retaining some degree of granularity in the measure.

Protective Factors

Similar to the risk factors described previously, a number of protective factors are consistently shown to foster success or reduce risk; some were gleaned from the review of literature for use in this study. Again, they are not intended to cover all of the potential protective factors that might insulate individuals from risk or lessen risk over the life course. Rather, this broad array of factors operating at the individual, family, and extra-familial domains should be able to demonstrate the effect of individual and cumulative protection for each of this study's six outcomes. Each factor is developed from a multi-item scale to assess its relationship with the outcomes. To assess the cumulative effect of these protective factors on the outcomes, indicator variables are created from the items that make up a particular scale. While dichotomizing variables often entails a loss of information, at the same time it facilitates the calculation a cumulative protective factor measure.

Parental Bonding and Control

Family protective factors demonstrated in prior research to be important include parental connectedness, such as the ability to discuss problems with parents (Bank

Table 3: Risk Factor Descriptive Statistics

Risk Factor	Mean	Std. Dev
Birth Weight (oz.)	7.3	1.42
Friend Delinquency	4.7	7.54
ADHD Scale	13.2	8.91
Proportion Occupied Housing Units Moved into Between 1985 and March 1990	0.46	0.16
Proportion Persons with Income in 1989 Below Poverty Level	0.14	0.14

Level	Dichotomous Risk Factor	n	%
Individual	Corporal Punishment	3,530	28.0
	ADHD	1,730	13.7
	Basic Needs Not Met	1,388	11.0
	No HS Diploma or GED	1,145	9.1
	Low Birth Weight	1,105	8.8
	Sexual Abuse	571	4.5
	Juvenile Arrests	516	4.1
	Juvenile Convictions	232	1.8
Familial	Nonintact Parents	5,962	47.2
	Father was in prison	1,705	13.5
	Public Assistance	936	7.42
	Social Service Investigation	562	4.5
	Teenage Mother	420	3.3
	Foster Home	297	2.4
	Social Service Removal	227	1.8
Extra-familial	Delinquent Friends	3,711	29.4
	Transiency > 60%	2,229	17.7
	Poverty > 30%	1,639	13.0

	Number of Factors	n	%
Cumulative Risk	None	1,816	14.4
	1 to 2	5,544	43.9
	3 to 5	3,603	28.6
	5 to 13	1,653	13.1

Sample Size=12,616

et al., 1993), and the maintenance of high parental expectations about school performance (Astone & McLanahan, 1991). In addition, evidence of adequate parental control can be seen in activities such as frequent shared undertakings with parents and the consistent presence of parent when awakening, when arriving home from school, at evening mealtime or going to bed (Aronowitz & Morrison-Beedy, 2005).

Given this prior research, the parental protective factors are hypothesized to be three separate constructs: *mother bond*, *father bond*, and *parental control* (Figure 2). These scales are intended to measure the connectedness or bond that an individual has with each of his or her parents and the level of supervision that parents exercise; then these measures will serve as a proxy for the broader concept of appropriate parental involvement and childrearing.

For the parental connectedness measures, the Add Health Wave I In-home dataset contained variables that pertained to how a respondent felt toward their parents. The mother and father bond measures both consist of two similar questions. The first question asked the respondent how close he or she felt toward their mother or father. The second asked if the respondent thought that their mother or father cared about them. The scale responses to these included “not at all,” “very little,” “somewhat,” “quite a bit,” or “very much.” Table 4 summarizes the results of the reliability and factor analyses for these questions. The results indicate that reliability for the measures is moderate, and these questions do load well onto a single factor. For the dichotomous variables, if the respondent indicated “quite a bit” or “very much” to the parent bonding scale items, then the mother and father bond measures respectively are coded 1, and 0 otherwise.

For the parental control measure the Add Health Wave I In-home dataset contained variables that asked about how a respondent felt parents exercised control over their lives. The hypothesized measure contains seven yes/no questions. The questions

Table 4: Parental Bonding Statistics

Question	Factor Pattern	Alpha
Close to Mother	0.87	0.68
Mother Cares	0.87	
Close to Father	0.89	0.74
Father Cares	0.89	

were each preceded by the phrase “Do your parents let you make your own decisions about ...”. The specific questions are:

- the time you must be home on weekend nights?
- the people you hang around with?
- what you wear?
- how much television you watch?
- which television programs you watch?
- what time you go to bed on week nights?
- what you eat?

For the dichotomous variable, if a subject reports that his or her parent decides 3 or more of the scale items, then parental control is coded 1, and 0 otherwise. Table 5 summarizes the results of the reliability and factor analyses which indicate moderate reliability and a set of factor loadings indicating that these questions all load on a single construct.

Connectedness with Others

Werner and Smith (1989, 1992) showed that connectedness with others was a protective factor against risk. Four questions from the Add Health Wave I dataset

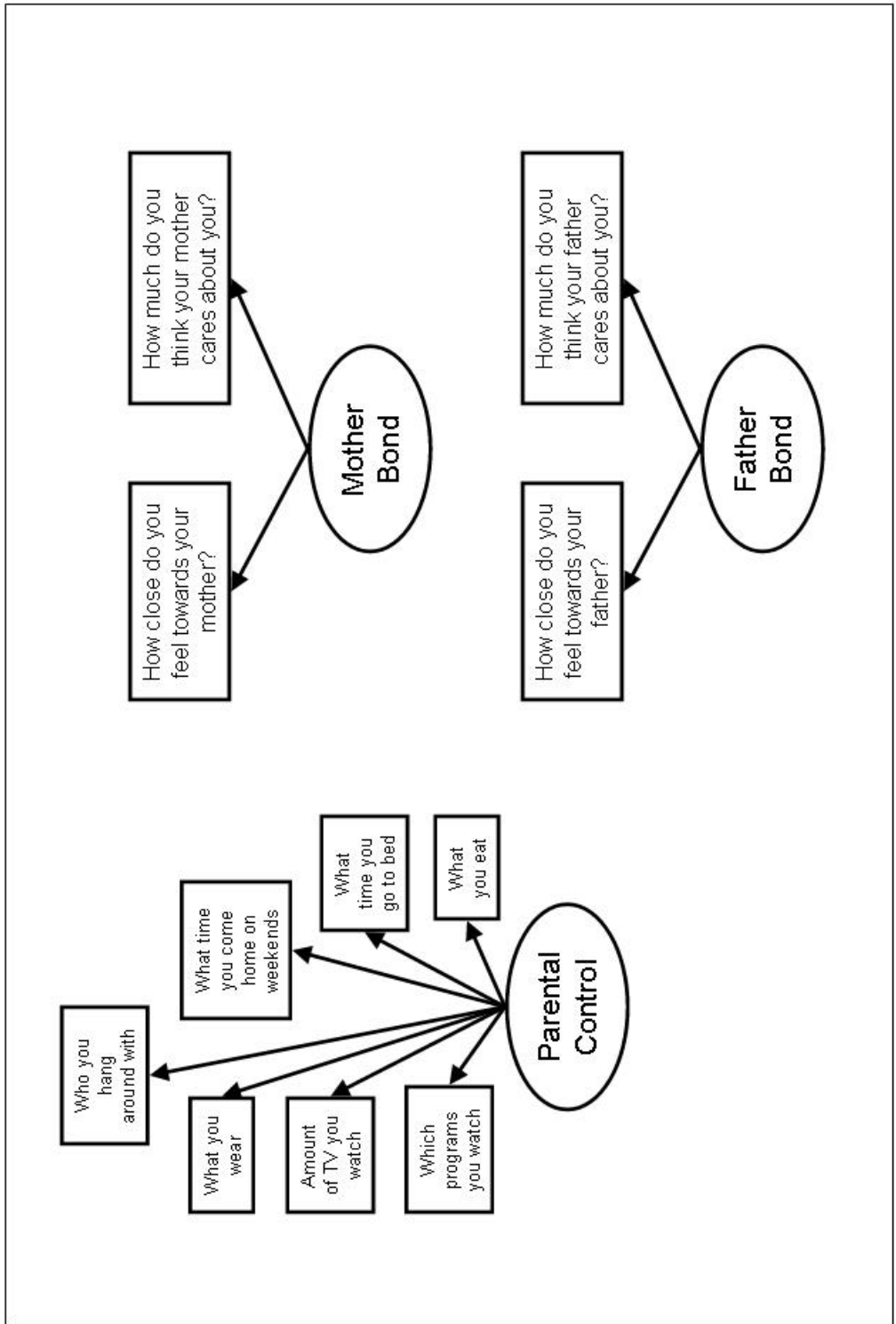


Figure 2: Parental Connectedness Hypothesized Construct

Table 5: Parental Control Statistics

Question	Factor Pattern	Alpha
Curfew	0.37	
Friends	0.53	
Clothing	0.58	0.63
Amount of TV	0.67	
TV Shows	0.66	
Bedtime	0.54	
Eating Habits	0.54	

make up the connectedness with others scale (Figure 3), and they ask how the respondent thinks others feel about him or her. The questions were Likert scale (1 to 5) items and valid responses included “not at all,” “very little,” “somewhat,” “quite a bit,” or “very much.” The questions were each preceded by the phrase “How much do you feel...”. The specific questions are:

- that adults care about you?
- that your teachers care about you?
- that your friends care about you?
- close to people at your school?

For the dichotomous variable, if a respondent indicated very much to any of the bonding questions, then bonding with others is coded 1, and 0 otherwise. Table 6 summarizes the results of the reliability and factor analyses conducted and shows moderate reliability and factor loadings, indicating that these several questions load on a single underlying construct.

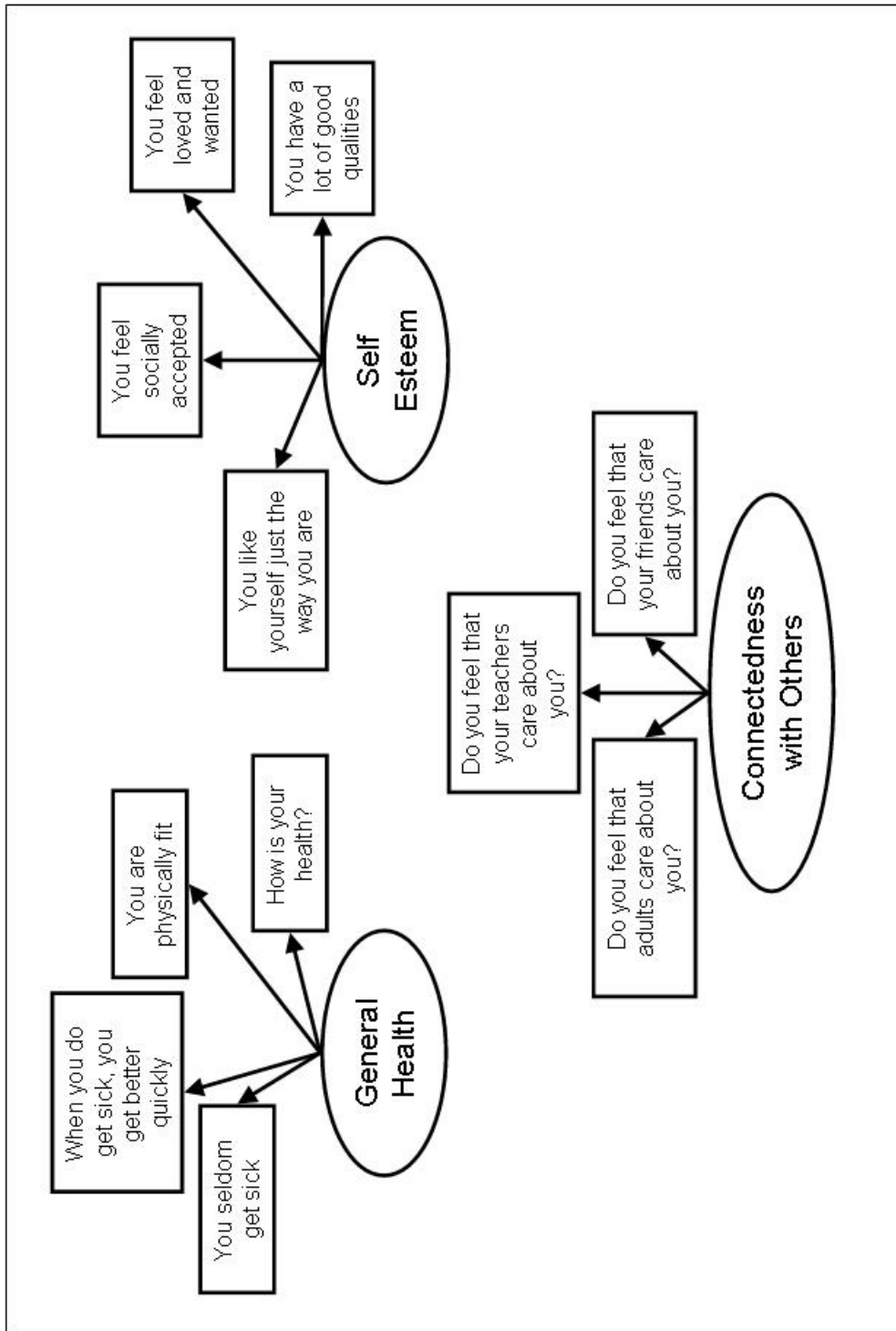


Figure 3: Connectedness with Others, General Health, and Self Esteem Hypothesized Constructs

Table 6: Connectedness with Others Statistics

Question	Factor Pattern	Alpha
Adults	0.59	
Teachers	0.67	0.65
Friends	0.54	
Schoolmates	0.71	

General Health

Garnezy and Tellegen (1984) documented in their work that absence of serious health problems increased the likelihood of resilience. Rather than determining if a respondent has serious medical problems, a general health measure (Figure 3) is formed from three questions from Wave I that determine how a respondent views his or her general health. The questions were Likert scale items (1 to 5) and valid responses included “strongly agree,” “agree,” “neither agree nor disagree,” “disagree,” “strongly disagree.” The specific questions are as follows:

- You seldom get sick
- When you do get sick, you get better quickly
- You are physically fit

For the dichotomous variable, if a respondent answered “strongly agree” or “agree” on all three health questions, then general health is coded 1, and 0 otherwise. Table 7 summarizes the results of the reliability and factor analyses and shows moderate reliability and the presence of factor loadings indicating that these questions load on a single underlying construct.

Table 7: General Health Statistics

Question	Factor Pattern	Alpha
Seldom Get Sick	0.65	
Heal Quickly	0.69	0.65
Physically Fit	0.74	

Self-Esteem

Cicchetti and Rogosch (1997) had presented strong evidence that average to high self-esteem was protective against risk factors. Five questions from Wave I make up the self-esteem measure used in this study (Figure 3). The questions were Likert scale items (1 to 5) and valid responses included “strongly agree,” “agree,” “neither agree nor disagree,” “disagree,” “strongly disagree.” The specific questions are:

- You like yourself just the way you are
- You feel socially accepted
- You feel loved and wanted
- You have a lot of good qualities

For the dichotomous variable, if a respondent answered “strongly agree” or “agree” on all four esteem questions, then self esteem is coded 1, and 0 otherwise. Table 8 summarizes the results of the reliability and factor analyses and shows adequate reliability and the presence of factor loadings indicating that these questions also load on a single underlying construct.

Future Aspirations

Aronowitz and Morrison-Beedy (2005) reported empirical evidence that future aspirations were protective against risk. Three questions from Wave I make up the

Table 8: Self-Esteem Statistics

Question	Factor Pattern	Alpha
Like yourself	0.75	
Socially Accepted	0.75	0.77
Feel loved	0.79	
Have good qualities	0.60	

Table 9: Future Aspirations Statistics

Question	Factor Pattern	Alpha
Will Live to 35	0.40	
Want to Attend College	0.89	0.65
Will Attend College	0.91	

future aspirations measure (Figure 4). The first question is whether or not the respondent believes they will live to age 35. The last two questions were Likert response items (1 to 5) that ask the respondent to rate on a scale of 1 (low) to 5 (high), how much they want to attend college and how likely they think they are to go to college. For the dichotomous variable, if a respondent indicated high on all three measures, then the future aspirations measure is coded 1, and 0 otherwise. Table 9 summarizes the results of the reliability and factor analyses and shows adequate reliability and factor loadings indicating that these questions also load on a single underlying construct.

Intelligence

Above average to high intelligence has also been shown to be protective against risk factors and reduce criminality in numerous studies (Garmezy et al., 1984; Kandel et al., 1988). The Wave I dataset includes the Picture Vocabulary Test (PVT) standardized score⁸ as its measure of intelligence; the PVT is highly correlated with

⁸ The PVT was standardized on the Wave I sample (Resnick et al., 1997).

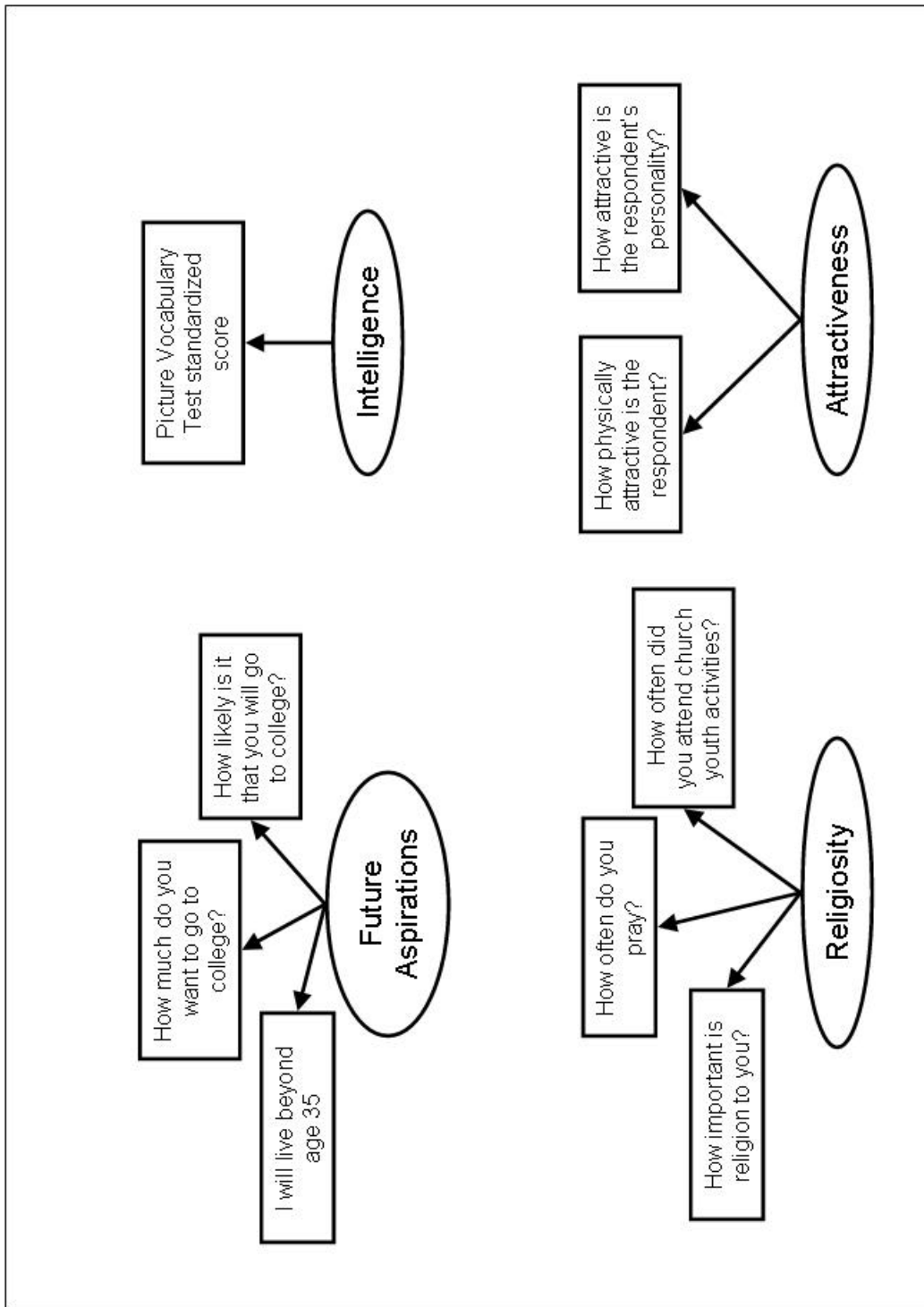


Figure 4: Future Aspirations, Intelligence, Religiosity, and Attractiveness Hypothesized Constructs

Table 10: Religiosity and Attractiveness Statistics

Question	Factor Pattern	Alpha
Frequency of Religious Attendance	0.95	
Importance of Religion	0.95	0.95
Frequency of Prayer	0.93	
Participate in Church Activities	0.91	
Physical Attractiveness	0.89	0.74
Attractive Personality	0.89	

standardized intelligence tests and can be administered without highly specialized training (Resnick et al., 1997). For the dichotomous variable, if a respondent had a PVT score greater than one standard deviation above the mean, then intelligence is coded 1, and 0 otherwise.

Religiosity

Religiosity has also been shown to be protective against risk (Werner & Smith, 1992; Masten et al., 1990). The religiosity measure (Figure 4) consisted of four Wave I dataset questions regarding the frequency of attendance at religious services (weekly, monthly, rarely, and never), how important religion is in their life (not important to important), how often they prayed (daily, weekly, monthly, rarely, never) and how often they participated in church youth activities (weekly, monthly, rarely, never). For the dichotomous variable, if a respondent indicated attending church services at least weekly, participated in youth activities at least monthly, and prayed at least weekly, then religiosity is coded 1, and 0 otherwise. Table 10 summarizes the results of the reliability and factor analyses showing excellent reliability and factor loadings indicating that these questions load on a single underlying construct.

Attractiveness

Attractiveness was also shown to be protective against risk factors (Werner & Smith, 1992). The attractiveness measure consists of two questions from Wave I of that asked the person administering the survey whether he or she thought the respondent was physically attractive and had an attractive personality. Responses for both questions included very unattractive, unattractive, about average, attractive, and very attractive. For the dichotomous variable, if a respondent was judged to be attractive or very attractive in appearance and personality, then the attractiveness is coded, 1 and 0 otherwise. Table 11 summarizes the results of the reliability and factor analyses, showing excellent reliability and factor loadings indicating that these two questions load on a single construct.

Other Individual Protective Variables

Three other individual variables are included that measure life-course experiences because these experiences have been shown to be associated with reduced risk for criminality and deviance (Nagin & Paternoster, 1994; Sampson & Laub, 1993). The first is level of educational attainment, including whether a person attained a high school (HSD) or general equivalence diploma (GED), an associate's degree, or a bachelor's degree. The second is whether a person is currently working or attending school. The third is whether a person has been married.⁹

⁹ Military experience in the past has been shown to be a significant life course event as well but the Add Health data had few respondents who indicated military service by Wave III.

Summary of Protective Factors

Table 11 contains the summary descriptive results for the protective factors. For individual protective factors, having a high school diploma or GED was the most common at 90.9 percent of the sample followed by good self-esteem at 52.2 percent, being healthy at 46.6 percent, attractiveness at 38.4 percent, having future aspirations at 31.4 percent, religiosity at 30.8 percent, above average intelligence at 13.2 percent, having a bachelor's degree at 13.2 percent and an associate's degree at 8.9 percent.

With respect to family and social bonds, the results showed that 82.8 percent of the sample reported a strong maternal bond, 74 percent reported having a strong bond with others outside his or her family, 74.5 percent reporting strong parental control, and 55.5 percent reported the presences of a strong paternal bond.

Cumulative protective factors showed that 8.7 percent of the sample reported 0 to 3 protective factors, 27 percent reported 4 or 5 protective factors, 48.4 percent reported 6 to 8 risk factors, and 15.8 percent reported 9 to 14 protective factors. Table 12 summarizes these findings in further detail.¹⁰ As with the cumulative risk factor groupings, the cumulative protective factor groupings were designed to maximize the percentages within moderate and medium cumulative factors in order to minimize the percentage of cases falling into in the two extremes.

Research Question 2: What is the relationship between risk, protection, and self-control?

Self-Control Construct

Several previous studies have used the Add Health data to create a self-control measure. Cretacci (2008), for example, created a 25-item self-control scale that in-

¹⁰ Complete results of all reliability and factor analyses are contained in Appendix C

Table 11: Protective Factor Descriptive Statistics

Level	Factor	n	%	Alpha	Mean	SD
Individual	Diploma/GED	11,471	90.9	-	-	-
	Self-esteem	6,586	52.2	0.81	0	1
	Healthy	5,878	46.6	0.66	0	1
	Attractive	4,841	38.4	0.73	0	1
	Future Aspirations	3,966	31.4	0.65	0	1
	Religiosity	3,886	30.8	0.95	0	1
	Marriage	2,622	20.8	-	-	-
	Above Average Intelligence	1,778	14.1	-	-	-
	Intelligence	-	-	-	100.5	14.5
	Bachelor's Degree	1,664	13.2	-	-	-
	Associate's Degree	1128	8.9	-	-	-
Familial/Social	Mother Bond	10,356	82.1	0.68	0	1
	Other Bond	9,338	74.0	0.66	0	1
	Parental Control	9,183	74.5	0.64	0	1
	Father Bond	6,996	55.5	0.74	0	1
Number of Factors		n	%			
Cumulative Protection	0 to 3	1,101	8.7			
	4 to 5	3,406	27.0			
	6 to 8	6,107	48.4			
	9 to 14	2,002	15.8			
Sample Size=12,616						

cluded behavioral, attitudinal, and deviance items; however, the usefulness of his scale is limited in this study because it included some of this current study's outcome measures. Perrone, Sullivan, Pratt, and Margaryan (2006), in their study examining the relationship between parental efficacy, self-control, and delinquency, used a six-item self-control scale that covered five of the six dimensions described in self-control theory (Gottfredson & Hirschi, 1990), combining both attitudinal and behavioral measures. The Perrone et al. (2006) scale is appealing to this study because it had adequate reliability and was able to demonstrate the effect of self-control on deviant outcomes. It has also been used successfully in other studies that also utilized the Add Health data for examining the genetic basis of criminal and aggressive behaviors (Beaver, 2008; Vaughn et al., 2009). However, recent research (Piquero & Bouffard, 2007) showed that Hirschi's (2004) redefined self-control measure, i.e. considering the immediate costs of a particular action, had better predictive power for crime and delinquency than Gottfredson and Hirschi's (1990) previous definition of self-control. With this in mind, the Perrone et al. (2006) scale was modified to include the original five questions dataset plus four additional questions extracted from the Add Health Wave I In-Home Survey. These four new questions tap into Hirschi's new redefinition by determining how a respondent tends to formulate plans, and if they consider the immediacy of their actions. The inclusion of the five questions of Perrone et al. (2006) allows the self-control measure used in this study to stay true to the original definition of self-control. The questions used in the Perrone et al. (2006) scale are Likert items in which the first four asked a respondent how often they had problems - never, just a few times, about once a week, almost everyday, or everyday - and the fifth asked whether the respondent felt he or she were doing things right never, sometimes, a lot of the time, or most of the time. The specific questions are:

- How often did you have trouble getting along with your teachers

- How often did you have trouble paying attention in school
- How often did you have trouble getting your homework done
- How often did you have trouble keeping your mind on what you were doing
- You feel like you are doing everything just about right

The additional four items were selected to conform to the new definition (Figure 5). These questions measured a respondent's approach to problems and problem solving and they are represented as Likert scale (1-5) items that asked a respondent to rate that they strongly agree, agree, neither agree nor disagree, disagree, or strongly disagree with the question. The specific questions are:

- When you have a problem to solve, one of the first things you do is get as many facts about the problem as possible
- When you are attempting to find a solution to a problem, you usually try to think of as many different ways to approach the problem as possible
- When making decisions, you generally use a systematic method for judging and comparing alternatives
- After carrying out a solution to a problem, you usually try to analyze what went right and what went wrong

The initial results for the self-control measure showed a Chronbach's Alpha of 0.70, a slight improvement over the Perrone et al. (2006) scale which featured an alpha of 0.66. An additional difference from the Perrone et al. (2006) scale is that higher levels of the current scale indicate higher levels of self-control, whereas the Perrone et al. (2006) scale had higher levels of the scale indicating lower levels of self-control. The measure extracted from the factor analysis has mean 0 and unit variance with a minimum score of -4.9 and a high score of 2.3. Table 12 summarizes

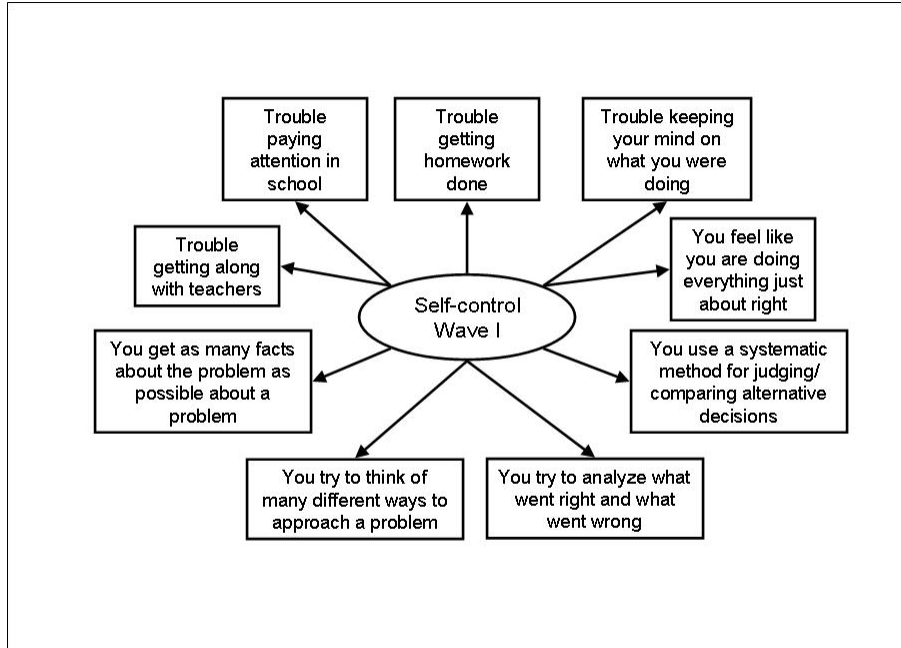


Figure 5: Self-Control Hypothesized Construct

the results from the reliability and factor analyses and shows that the set of nine questions loaded well on a single underlying factor.

Research Question 3. What are the effects of cumulative risk and cumulative protection on deviant outcomes when controlling for demographics and self-control?

Identifying the interrelationships among the outcomes, risk, protective, and self-control variables is the main goal of this research. Each outcome — Binge Drinking, Problems from Drinking, Property Crime, Assaultive Behavior, Adult Conviction, and Adult Arrest — will be used separately in independent statistical analyses. As stated previously, logistic regression models will be fit to determine the direct effects

Table 12: Self-Control Statistics

Question	Factor Pattern	Alpha
Trouble getting along with your teachers	0.42	
Trouble paying attention in school	0.57	
Trouble getting your homework done	0.52	
Trouble keeping your mind on what you were doing	0.42	
You feel like you are doing everything just about right	0.48	.70
You get as many facts about the problem as possible about a problem	0.64	
You try to think of many different ways to approach a problem	0.64	
You use a systematic method for judging/comparing alternative decisions	0.62	
You try to analyze what went right and what went wrong	0.58	
Self-Control Construct		
Mean	SD	Minimum Maximum
0	1	-4.6 1.9

and interactions of the control variables (e.g., gender, ethnicity), and will include protective and risk factors along with self-control.

Lastly, given the results reported by Turner et al. (2007) and Hartman et al. (2009) regarding the interactions between cumulative risk and cumulative protection, and to help identify a moderating effect from the accumulation of risks and assets, a difference between the number of cumulative risk and the number of cumulative protective variables is calculated to determine the influence of cumulative risk and protection in this sample. Negative values for this difference indicate a protective factor deficit with respect to risk, a difference of 0 indicates that a subject has an equal number of risk and protective factors, a difference between 1 and 5 indicates a moderate surplus of protection with respect to risk, and a difference greater than 5 indicates a marked surplus of protective factors with respect to risk. The results from

this calculation indicate that 9.6 percent had a protector factor deficit with respect to risk, 12.9 percent had a neutral difference, 31.9 percent had a moderate surplus difference, and 45.7 percent had a marked surplus difference.

Chapter 4: Results

The Relationship between the Outcome and Control Variables

The results of bivariate analyses for the control variables revealed consistent patterns. For gender, males reported higher levels of crime and deviance in all six outcomes than did females. Specifically, males in the study were nearly 2.5 times more likely to engage in binge drinking, 1.6 times more likely to report problems from drinking, 2.4 times more likely to engage in property crime, 4.2 times more likely to engage in assaultive behavior, 3.6 times more likely to have an adult arrest, and 5.7 times more likely to have an adult conviction. For race, whites were 1.9 times more likely to engage in binge drinking; 1.7 times more likely to report problems from drinking, and have slightly higher rates of arrest and conviction. Non-whites were 3.6 times more likely to engage in assaultive behavior. Lastly, age was negatively correlated with binge drinking, problems from drinking, property crime and assault, but no statistically significant association was found with either adult arrest or adult conviction. Table 13 summarizes these results.

Table 13: Outcome by Control Variable Bivariate Results

Outcome	Gender(%)		χ^2	Control Variable Race(%)		χ^2	Age r
	Male	Female		White	Non-white		
Binge Drinking	30.3	12.3	914.6***	27.4	14.1	336.9***	-0.02*
Problems From Drinking	18.3	11.4	119.4***	18.4	10.7	151.2***	-0.03***
Property Crime	18.7	7.7	338.5***	13.2	12.8	0.4	-0.09***
Adult Arrest	14.9	3.2	541.6***	9.1	8.4	2.4	0.01
Assault	10.1	2.4	323.0***	2.2	7.9	33.8***	-0.03**
Adult Conviction	8.6	1.5	333.0***	5.6	4.1	15.4***	0.01

Sample Size=12,616

* $p \leq 0.05$

** $p \leq 0.01$

*** $p \leq 0.001$

The prevalence of deviance among individuals exposed to varying degrees of criminogenic influences

The results of correlation analyses between the identified risk factors and outcome measures indicated that most of the risk factors were positively correlated with crime and deviance. The risk factors with the highest correlations with all six outcomes were the ADHD measure, number of juvenile arrests, and number of juvenile convictions; only binge drinking yielded a number of negatively correlated risk factors, including sexual abuse, non-intact parents and poverty. Table 14 summarizes these results.

Examining the prevalence of crime and deviance for cumulative risk showed that for binge drinking there was no statistically significant relationship between the two, with the rate of binge drinking varying around 20 percent across the increasing levels of cumulative risk. For the other five measures this relationship was statistically significant with problems from drinking rising from 12.1 percent in the no risk factors group to 18.6 percent in the 5 to 13 risk factors group. Similarly, property crime range in increasing order from 9.8 percent in the no risk group to 18.6 percent in the

Table 14: Outcome by Risk Factor Correlations

Factor	Problems					
	Binge Drinking	from Drinking	Property Crime	Assault	Adult Arrest	Adult Conviction
Child Abuse	0.04***	0.11***	0.14***	0.08***	0.08***	0.07***
ADHD Scale	0.11***	0.11***	0.13***	0.13***	0.13***	0.13***
Dichotomized ADHD	0.10***	0.07***	0.08***	0.10***	0.11***	0.10***
Basic Needs Not Met	0.00	0.05***	0.08***	0.11***	0.08***	0.06***
Birth Weight	0.07***	0.02*	0.02*	0.00	0.02*	0.00**
Sexual Abuse	-0.03**	0.03***	0.07***	0.08***	0.02*	0.02***
Juvenile Arrests	0.10***	0.09***	0.11***	0.13***	0.28***	0.24***
Juvenile Convictions	0.06***	0.06***	0.08***	0.10***	0.21***	0.24***
Nonintact Parents	-0.05***	0.01	0.01	0.04***	0.05***	0.04***
Father was in prison	0.00	0.01	0.03***	0.07***	0.08***	0.08***
Public Assistance	-0.05***	-0.04***	0.00	0.02**	0.01	0.01
Social Service Investigation	-0.02*	0.03***	0.05***	0.09***	0.04***	0.05***
Teenage Mother	-0.02	-0.02	-0.02*	0.02*	0.01	0.01
Foster Home	0.00	0.00	0.02	0.01	0.04***	0.04***
Social Service Removal	-0.03**	0.00	0.03***	0.08***	0.04***	0.04***
Delinquent Friends	0.08***	0.03***	-0.01	-0.02	0.01	0.01
Transiency	-0.01	0.00	0.00	0.00	0.00	0.00
Poverty	-0.07***	-0.03***	-0.01	-0.01	0.00	0.00

Sample Size=12,616

* $p \leq 0.05$

** $p \leq 0.01$

*** $p \leq 0.001$

Table 15: Deviance Prevalence by Cumulative Risk Factors

Outcome	Cumulative Risk Factors				χ^2
	None	1 to 2	3 to 4	5 to 13	
Binge Drinking	19.8	21.6	20.5	20.6	3.7
Problems From Drinking	12.1	14.1	15.1	18.6	32.1***
Property Crime	9.8	11.6	13.7	19.8	95.9***
Assault	2.6	3.8	6.5	13.3	251.8***
Adult Arrest	4.7	6.3	10.3	18.2	274.0***
Adult Conviction	2.4	2.9	6.1	11.4	233.2***

Sample Size=12,616

*** $p \leq 0.001$

5 to 13 risk factors group, assault from 2.8 percent in the no risk factors group to 13.3 percent in the high risk factors group, adult arrest from 4.7 percent in the no risk factors group to 18.2 in the high risk factors group, and adult conviction from 2.4 percent in the no risk factors group to 11.4 in the high risk factors group. Table 15 summarizes the results of these analyses in further detail.

Correlations between the outcomes and protective factors indicated that there was a negative association between the majority of protective factors and the outcome measures. For binge drinking, parental control, general health, and religiosity had the largest negative correlation. Problems from drinking also had the same measures negatively correlated with the addition of self-esteem and non-family bonds. Property crime had non-family bond, self-esteem, religiosity, and attractiveness negatively correlated. Assault had non-family bonds, future aspirations, attractiveness, and intelligence score negatively correlated. Lastly, adult convictions had non-family bond and future aspirations and adult convictions had non-family bond, future aspirations, religiosity, and attractiveness negatively correlated. Interestingly, intelligence, as measured by the PVT score, had the largest statistically significant positive correlation for binge drinking, problems from drinking, and property crime, and a small but significant positive correlation with adult arrest and adult conviction. Table 16

Table 16: Outcome by Protective Factor Correlations

Factor	Problems					
	Binge Drinking	from Drinking	Property Crime	Assault	Adult Arrest	Adult Conviction
Parental Control	-0.05***	-0.04***	0.01	0.03***	-0.02*	-0.02*
Mother Bond	-0.00	-0.03**	-0.02*	-0.00	-0.02*	-0.02*
Father Bond	0.02*	-0.02	-0.001	-0.01	-0.01	-0.02*
Non-family Bond	-0.01	-0.04***	-0.05***	-0.05***	-0.03***	-0.06***
General Health	-0.06***	-0.02*	0.00	-0.03***	-0.02*	-0.02*
Self-esteem	0.01	-0.03***	-0.03**	0.03***	0.02*	0.00
Future Aspirations	-0.01	0.00	-0.01	-0.07***	-0.02*	-0.09***
Religiosity	-0.06***	-0.04***	-0.04***	-0.01	-0.02	-0.06***
Attractiveness	-0.01	0.00	-0.03***	-0.05***	-0.01	-0.05***
PVT Score	0.11***	0.10***	0.08***	-0.06***	0.02*	0.02*

Sample Size=12,616

* $p \leq 0.05$

** $p \leq 0.01$

*** $p \leq 0.001$

summarizes these results in further detail.

Examining the prevalence of crime and deviance for cumulative protection showed that for binge drinking there was no statistically significant relationship between the cumulative protection and binge drinking measures with the rate of binge drinking varying only slightly around 20 percent across the increasing levels of cumulative protection. Similarly, for problems from drinking no statistically significant relationship was observed, with problems from drinking lowering only slightly from 15.4 percent in the 0 to 3 protective factors group to 13.9 percent in the 9 to 14 protective factors group. Results for the crime measures revealed a much stronger relationship, with property crime decreasing from 17.4 percent in the 0 to 3 protective factors group to 11.1 percent in the 9 to 14 protective factors group, assault from 6.4 percent in the 0 to 3 protective factors group to 3.2 percent in the 9 to 14 factors group, adult arrest from 12.9 percent in the 0 to 3 protective factors group to 4.8 in the 9 to 13

Table 17: Deviance by Cumulative Protective Factors

Outcome	Cumulative Protective Factors				χ^2
	0 to 3	4 to 5	6 to 8	9 to 14	
Binge Drinking	19.4	21.0	21.3	20.3	2.5
Problems From Drinking	15.4	15.1	14.6	13.9	2.0
Property Crime	17.4	14.6	12.1	11.1	34.1***
Assault	6.4	7.4	5.4	3.2	46.1***
Adult Arrest	12.9	10.2	8.5	4.8	72.1***
Adult Conviction	7.6	6.0	4.8	2.3	55.4***

Sample Size=12,616

** $p \leq 0.01$

*** $p \leq 0.001$

protective factors group, and adult conviction decreasing from 7.6 percent in the 0 to 3 protective factors group to 2.3 in the 9 to 14 protective factors group. Table 17 summarizes the results of these analyses in further detail.

Results for the prevalence of crime and deviance for risk-protection factor difference yielded rather interesting results. The prevalence of binge drinking had no statistically significant relationship with risk-protection difference, with 20.5 percent of those with a deficit of risk factors indicating binge drinking while 21.8 percent of those with a surplus of protective factors indicating this behavior. For the other measures the relationship between the outcome prevalence and risk-protection factor difference showed a statistically significant relationship with prevalence consistently declining with higher levels of protective factors relative to risk. For problems from drinking, those with a deficit had a prevalence of 17.8 percent and those with a surplus had 13.8 percent. Assault had the largest drop with the deficit group having a prevalence of 12.0 percent and the surplus group having a prevalence of only 3.5 percent. Similarly, adult arrest decreased from 17.4 percent in the deficit group to 5.5 in the surplus group and adult conviction decreased from 11.8 percent in the deficit group to only 2.7 percent in the surplus group. Table 18 summarizes these results in

Table 18: Deviance Prevalence by Protection-Risk Difference

Outcome	Difference				χ^2
	Deficit	Neutral	Moderate Surplus	Surplus	
Binge Drinking	20.5	19.7	21.3	21.8	1.9
Problems from Drinking	17.9	15.1	14.8	13.8	13.5 * *
Property Crime	19.7	15.7	13.4	10.7	84.6***
Adult Arrest	17.4	13.2	9.1	5.5	230.6***
Assault	12.0	8.7	5.9	3.5	168.5***
Adult Conviction	11.8	7.2	5.2	2.7	197.1***

Sample Size=12,616
 ** $p \leq 0.01$
 *** $p \leq 0.001$

considerably greater detail.

The Relationship between Risk and Protective Factors and Self-Control

Correlations between the self-control and risk factor measures used in this study yielded results quite consistent with the literature. Self-control was negatively correlated with the majority of risk factors, indicating that those with a particular risk factor tend to have lower levels of self-control. ADHD, juvenile arrests and juvenile convictions had the largest negative correlations with self-control among the individual risk factors studied. Cumulative risk factors and categorical cumulative risk both yielded negative correlations with self-control, with ADHD emerging as the only risk factor with a more negative correlation. Table 19 summarizes these results in greater detail.

Correlations between self-control and protective factors also yielded results largely consistent with the literature. Indeed, the correlations between self-control and pro-

Table 19: Self-control - Risk Factor Correlations

Child Abuse	-0.07***	Public Assistance	-0.04***
ADHD	-0.13***	Social Service Invest.	-0.05***
Basic Needs Not Met	-0.05***	Teenage Mother	0.00
No Diploma/GED	-0.08***	Foster Home	-0.04***
Low Birth Weight	0.02	Social Service Removal	-0.04***
Sexual Abuse	-0.03**	Delinquent Friends	0.02
Juvenile Arrests	-0.10***	Transiency	-0.03**
Juvenile Convictions	-0.09***	Poverty	0.05***
Nonintact Parents	-0.04***	Cumulative Risk	-0.12***
Father was in Prison	-0.04***	Categorical Cum. Risk	-0.11***
Sample Size=12,616			
* $p \leq 0.05$			
** $p \leq 0.01$			
*** $p \leq 0.001$			

tective factors were all positive and they were also much greater in magnitude than the self-control-risk factor correlations reported earlier. Among the protective factors, self-esteem and non-family bond had the highest correlations with self-control. Additionally, the correlation between self-control and cumulative protection and categorical cumulative protection were both statistically significant, and the correlation was considerably stronger than for the cumulative risk measures. Table 20 summarizes these results in greater detail.

The relationship between self-control and the outcome measures also yielded results consistent with the research literature. Self-control was negatively associated with all six outcomes, indicating that those with higher levels of self-control were less likely to commit crime and and engage in deviance. Specifically, self-control was most strongly and negatively correlated with problems from drinking followed by binge drinking, property crime, adult conviction and adult arrest, with assault yielding the weakest negative association. Table 21 summarizes these results in greater detail.

As reported earlier in chapter 3, the overall mean of self-control from the factor

Table 20: Self-control - Protective Factor Correlations

Mother Bond	0.18***	Religiosity	0.12***
Other Bond	0.39***	Above Avg. Intell.	0.01
Parental Control	0.01	HS Diploma/GED	0.08***
Father Bond	0.12***	Marriage	0.01
Self-esteem	0.43***	Bachelor's degree	0.08***
Healthy	0.20***	Associate's degree	0.04***
Attractive	0.10***	Cumulative Protection	0.35***
Future Aspirations	0.23***	Cat. Cum. Protection	0.33***

Sample Size=12,616

* $p \leq 0.05$

** $p \leq 0.01$

*** $p \leq 0.001$

Table 21: Self-control - Outcome Correlations

Binge Drinking	-0.09***
Problems From Drinking	-0.10***
Property Crime	-0.09***
Assault	-0.02*
Adult Arrest	-0.07***
Adult Conviction	-0.08***

Sample Size=12,616

* $p \leq 0.05$

*** $p \leq 0.001$

Table 22: Mean Self-control by Cumulative Risk, Cumulative Protection, and Protection-Risk Difference

Variable	Category	n	Mean	SD
Cumulative Risk	None	1,816	0.11	0.994
	1 to 2	5,544	0.00	0.994
	3 to 4	3,603	-0.08	1.013
	5 to 13	1,653	-0.30	1.142
Cumulative Protection	0 to 3	1,101	-0.74	1.023
	4 to 5	3,406	-0.37	1.004
	6 to 8	6,107	0.10	0.938
	9 to 14	2,002	0.45	0.891
Difference	Deficit	1,205	-0.60	1.143
	Neutral	1,624	-0.35	0.989
	Moderate Surplus	3,972	-0.14	1.030
	Surplus	5,927	0.21	0.927

Sample Size=12,616

analysis was 0, with a standard deviation of 1. Examining the relationship between self-control, cumulative risk, cumulative protection and protection-risk difference in greater detail demonstrates that for cumulative risk mean self-control drops from 0.11 in the no risk factors group to -0.30 in the 5 to 13 risk factors group. For cumulative protection, mean self-control rises more significantly, with those in the 0 to 3 protective factors group having a mean of -0.74 to a mean of 0.45 for those in the 9 to 14 protective factors group. Lastly, mean self-control also rises significantly for the protection-risk difference, with those in the deficit group having a mean of -0.60 and those in the surplus group having a mean of 0.21. These results indicate a strong relationship between self-control and cumulative protection-risk difference.

The Effects of Cumulative Risk and Cumulative Protection on Deviant Outcomes when Controlling for Demographics and Self-Control

Results from the logistic regressions yielded some surprising results. For binge drinking, not all of the control variables in the main effects model were significant. Increasing age was not statistically significant, but males were 3 times more likely to engage in binge drinking than females. Additionally, blacks were 3.4 times less likely to engage in binge drinking than whites; similarly, Hispanics and other ethnicities were 1.7 times less likely to engage in binge drinking than whites. For self-control increasing levels were protective against binge drinking, with a one-unit increase in self-control making it 1.2 times less likely to engage in binge drinking. Protection-risk factor difference showed that higher levels slightly increased the risk for binge drinking. However, results from the interaction model indicated that there was a statistically significant interaction between self-control and protection-risk factor difference for binge drinking. Indeed, adjusting for this interaction made the main effect for protection-risk factor difference no longer significant and decreased the main effect of self control. Additionally, the interaction between self-control and protection-risk factor difference reduced the effect of self-control for those with a protection-risk factor difference deficit and significantly enhanced the effect of self-control in those with a protection-risk factor difference surplus. A plot of the interaction model predicted probabilities by self-control and protection-risk factor difference for a white, 22-year-old male demonstrates this effect dramatically (Figure 6), and Tables 23 and 24 summarize these results in greater detail.

The logistic regression model for problems from drinking showed that increasing

Table 23: Binge Drinking Main Effects Model

Variable	Beta	Std. Err.	Z-score	Odds Ratio
Intercept	-1.433	0.499	-2.9**	0.24
Age	-0.011	0.022	-0.5	0.99
Male	1.113	0.065	17.0****	3.04
Black	-1.225	0.103	-11.9****	0.29
Hispanic	-0.507	0.101	-5.0****	0.60
Other	-0.553	0.127	-4.4****	0.58
White	-	-	-	-
Self-Control	-0.204	0.033	-6.3****	0.82
Protection-Risk Difference	0.018	0.01	1.7*	1.02

$\chi^2=12,132.0$, d.f.=12,257, Goodness of Fit Ratio=0.994
 * $p \leq 0.1$
 ** $p \leq 0.05$
 *** $p \leq 0.01$
 **** $p \leq 0.001$

Table 24: Binge Drinking Interaction Model

Variable	Beta	Std. Err.	Z-score	Odds Ratio
Intercept	-1.393	0.499	-2.8**	0.25
Age	-0.011	0.022	-0.5	0.99
Male	1.113	0.065	17.0****	3.04
Black	-1.238	0.103	-12.0****	0.29
Hispanic	-0.509	0.101	-5.1****	0.60
Other	-0.557	0.127	-4.4****	0.57
White	-	-	-	-
Self-Control	-0.141	0.048	-3.0***	0.87
Protection-Risk Difference	0.014	0.01	1.3	1.01
SC*Protection-Risk Difference	-0.017	0.009	-1.9*	0.98

$\chi^2=12,143.7$, d.f.=12,257, Goodness of Fit Ratio=0.995
 * $p \leq 0.1$
 ** $p \leq 0.05$
 *** $p \leq 0.01$
 **** $p \leq 0.001$

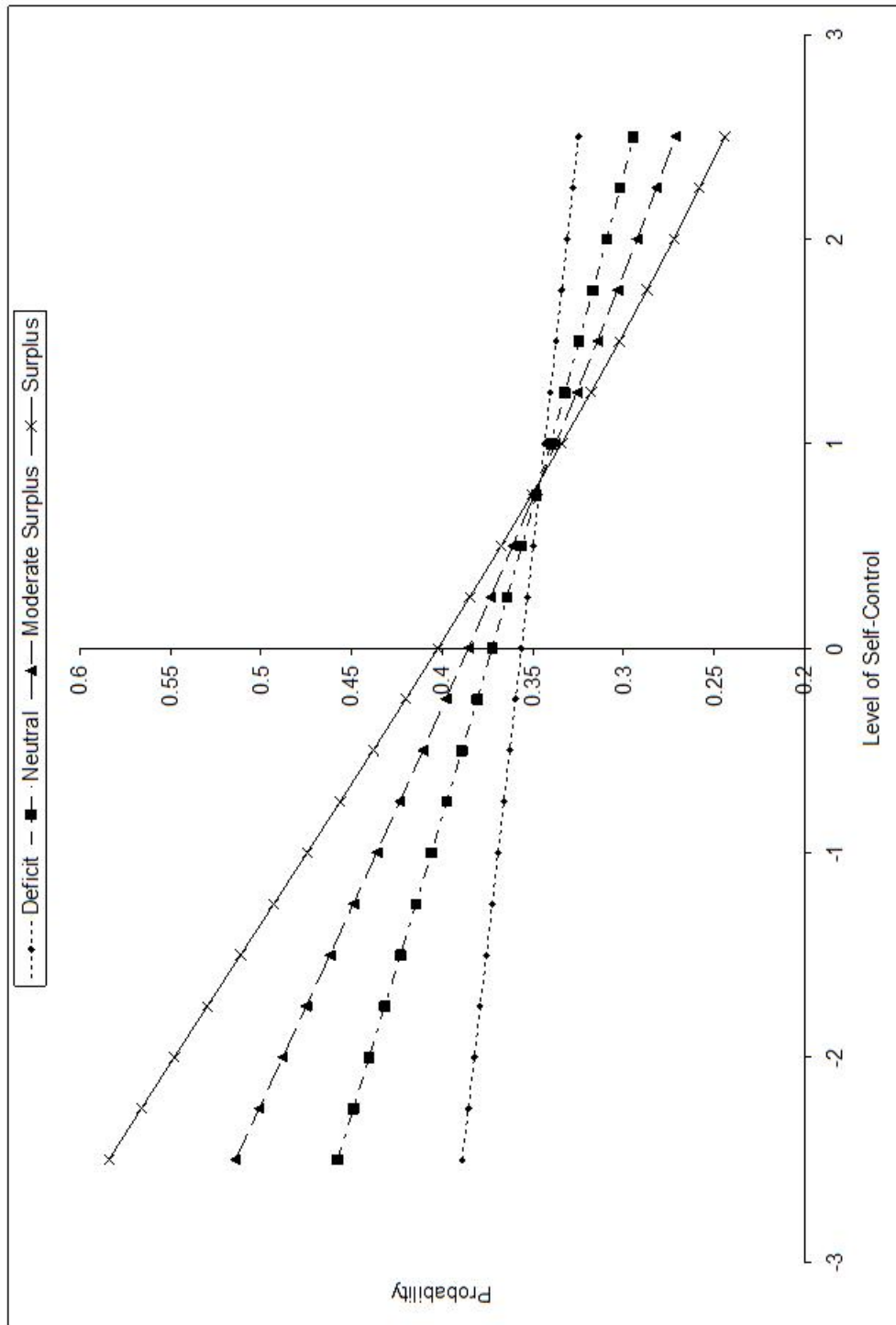


Figure 6: Predicted Probabilities from Binge Drinking Interaction Model by Self-Control and Risk-Protection Difference for a White, 22-year-old Male

Table 25: Problems from Drinking Main Effects Model

Variable	Beta	Std. Err.	Z-score	Odds Ratio
Intercept	-0.797	0.546	-1.5	0.45
Age	-0.046	0.025	-1.9*	0.96
Male	0.52	0.071	7.4****	1.68
Black	-0.774	0.112	-6.9****	0.46
Hispanic	-0.447	0.112	-4.0****	0.64
Other	-0.315	0.135	-2.3**	0.73
White	-	-	-	-
Self-Control	-0.227	0.034	-6.8****	0.8
Protection-Risk Difference	0.002	0.011	0.2	1.00

$\chi^2=12,126.9$, d.f.=12,257, Goodness of Fit Ratio=0.990

* $p \leq 0.1$

** $p \leq 0.05$

*** $p \leq 0.01$

**** $p \leq 0.001$

age was slightly protective against problems from drinking, males were 1.7 times more likely to to have problems from drinking than females, and non-whites were much less likely to have problems from drinking than were whites. Additionally, higher levels of self-control were also protective against problems from drinking. However, the protection-risk factor difference variable was not statistically significant, and results from an interaction model yielded no better fit than the main effects model nor was the interaction term between self-control and risk-protection factor difference significant. Tables 25 summarize the results of the main effects model in greater detail.

The logistic regression model for property crime showed that in the main effects model increasing age was protective and males were much more likely to engage in property crime than females; however, non-whites were no more or less likely to engage in property crime than whites. Additionally, higher levels of self-control and a protection-risk factor difference surplus greater than 0 were also protective against property crime. However, results from the interaction model indicate that there is

Table 26: Property Crime Main Effects Model

Variable	Beta	Std. Err.	Z-score	Odds Ratio
Intercept	1.275	0.621	2.1**	3.58
Age	-0.163	0.028	-5.8****	0.85
Male	1.025	0.081	12.7****	2.79
Black	-0.053	0.105	-0.5	0.95
Hispanic	-0.067	0.121	-0.6	0.94
Other	0.187	0.14	1.3	1.21
White	-	-	-	-
Self-Control	-0.201	0.038	-5.3****	0.82
Protection-Risk Difference	-0.04	0.013	-3.2***	0.96

$\chi^2=12,100.0$, d.f.=12,257, Goodness of Fit Ratio=0.988

* $p \leq 0.1$

** $p \leq 0.05$

*** $p \leq 0.01$

**** $p \leq 0.001$

significant interaction between self-control and protection-risk factor difference, with this interaction negating the majority of the main self-control effect for those with a protection-risk factor difference deficit. Additionally, the interaction model indicated a slightly better fit than the main effects model. A plot of the interaction model predicted probabilities by self-control and protection-risk difference for a white, 22-year-old male demonstrates this effect graphically (Figure 7), and Tables 26 and 27 summarize these results in greater detail.

For assault, the main effects model showed that increasing age was protective against engaging in assault, and males were much more likely to engage in assault than females. Blacks and Hispanics both were more likely to engage in assaultive behavior than whites, while those of other ethnicities were less likely to engage in assaultive than whites. Interestingly, self-control was not predictive of assaultive behavior while protection-risk dfactor iffERENCE was statistically significant. Additionally, results from an interaction model indicated no significant interaction between self-control and

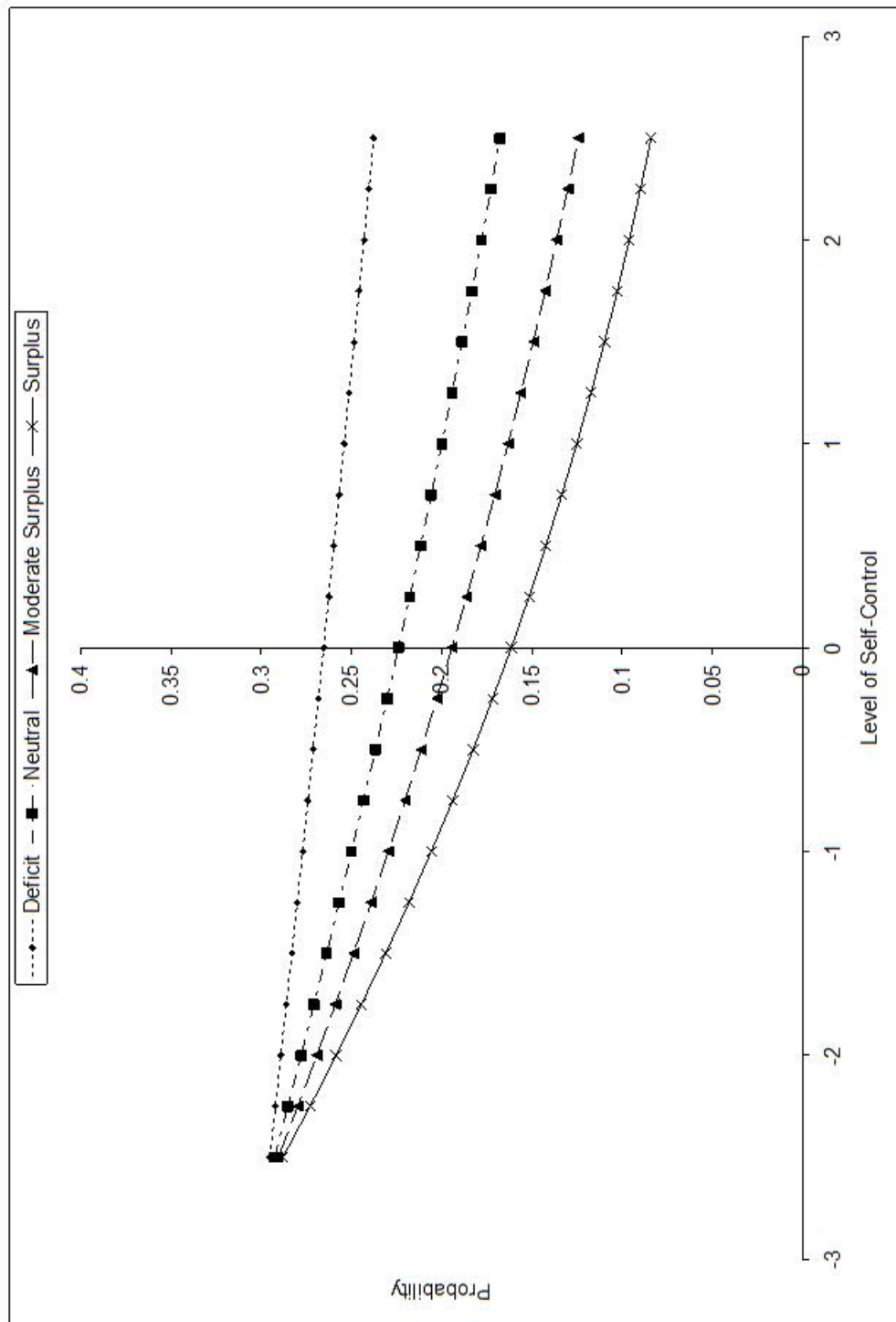


Figure 7: Predicted Probabilities from Property Crime Interaction Model by Self-Control and Risk-Protection Difference for a White, 22-year-old Male

Table 27: Property Crime Interaction Model

Variable	Beta	Std. Err.	Z-score	Odds Ratio
Intercept	1.32	0.621	2.1**	3.74
Age	-0.163	0.028	-5.8****	0.85
Male	1.023	0.081	12.7****	2.78
Black	-0.066	0.105	-0.6	0.94
Hispanic	-0.068	0.121	-0.6	0.93
Other	0.183	0.141	1.3	1.2
White	-	-	-	-
Self-Control	-0.144	0.05	-2.9***	0.87
Protection-Risk Difference	-0.045	0.013	-3.5****	0.96
SC*Protection-Risk Difference	-0.017	0.011	-1.6	0.98

$\chi^2=12,104.6$, d.f.=12,257, Goodness of Fit Ratio=0.989

* $p \leq 0.1$
** $p \leq 0.05$
*** $p \leq 0.01$
**** $p \leq 0.001$

protection-risk difference, nor did it have a better fit than the main effects model. Table 28 summarizes the results of the main effects model in greater detail.

For adult arrest, the main effects model showed that age and black race were not statistically significant, but males were 3.3 times more likely to have been arrested than females and Hispanics and other ethnicities were less likely to have been arrested than whites. Self-control was statistically significant, with those having higher levels of self-control being less likely to have been arrested. Additionally, protection-risk factor difference was also statistically significant with those having a deficit being much more likely to have an arrest and those with increasing levels of surplus being less likely to have an arrest. However, results from an interaction model, while indicating no significant interaction between self-control and protection-risk factor difference, did result in self-control no longer being predictive of arrest when the interaction term was included in the model. The interaction did not lessen the effect of protection-risk

Table 28: Assault Main Effects Model

Variable	Beta	Std. Err.	Z-score	Odds Ratio
Intercept	-0.398	0.809	-0.5	0.67
Age	-0.147	0.037	-3.9****	0.86
Male	1.815	0.134	13.6****	6.14
Black	0.658	0.131	5.0****	1.93
Hispanic	0.330	0.169	2.0*	1.39
Other	-0.417	0.230	-1.8*	0.66
White	-	-	-	-
Self-Control	0.061	0.057	1.1	1.06
Protection-Risk Difference	-0.155	0.016	-9.5****	0.86

$\chi^2=11,886.3$ d.f.=12,257, Goodness of Fit Ratio=0.971

* $p \leq 0.1$

** $p \leq 0.05$

*** $p \leq 0.01$

**** $p \leq 0.001$

factor difference. The interaction model also had a slightly better fit than the main effects model. Tables 29 and 30 summarize the results of these models.

Finally, for adult convictions, the main effects model showed that age, black and Hispanic persons were not statistically significant, but males were much more likely to have adult convictions than females and other ethnicities were less likely to have adult convictions than whites. Self-control was predictive of adult convictions, with those having low self-control being more likely to have adult convictions. Additionally, protection-risk factor difference was statistically significant with those who have a deficit being more likely to have adult convictions and those with increasing levels of surplus less likely to have convictions. Results from an interaction model indicated no significant interaction between self-control and protection-risk factor difference nor did it have a better fit than the main effects model. Table 31 summarizes the results of the main effects model in greater detail.

Table 29: Adult Arrest Main Effects Model

Variable	Beta	Std. Err.	Z-score	Odds Ratio
Intercept	-3.798	0.71	-5.4****	0.02
Age	0.044	0.032	1.4	1.04
Male	1.601	0.11	14.6****	4.96
Black	-0.029	0.118	-0.3	0.97
Hispanic	-0.302	0.139	-2.2**	0.74
Other	-0.411	0.189	-2.2**	0.66
White	-	-	-	-
Self-Control	-0.105	0.046	-2.3**	0.9
Protection-Risk Difference	-0.121	0.014	-8.4****	0.89

$\chi^2=11,851.4$, d.f.=12,257, Goodness of Fit Ratio=0.967

* $p \leq 0.1$

** $p \leq 0.05$

*** $p \leq 0.01$

**** $p \leq 0.001$

Table 30: Adult Arrest Interaction Model

Variable	Beta	Std. Err.	Z-score	Odds Ratio
Intercept	-3.785	0.711	-5.3****	0.02
Age	0.044	0.032	1.4	1.04
Male	1.600	0.110	14.5****	4.95
Black	-0.034	0.118	-0.3	0.97
Hispanic	-0.303	0.139	-2.2**	0.74
Other	-0.413	0.189	-2.2**	0.66
White	-	-	-	-
Self-Control	-0.089	0.056	-1.6	0.91
Protection-Risk Difference	-0.122	0.015	-8.4****	0.88
SC*Protection-Risk Difference	-0.006	0.013	-0.5	0.99

$\chi^2=11,887.1$, d.f.=12,257, Goodness of Fit Ratio=0.971

* $p \leq 0.1$

** $p \leq 0.05$

*** $p \leq 0.01$

**** $p \leq 0.001$

Table 31: Adult Conviction Main Effects Model

Variable	Beta	Std. Err.	Z-score	Odds Ratio
Intercept	-4.254	0.940	-4.5****	0.01
Age	0.038	0.042	0.9	1.04
Male	1.635	0.149	10.9****	5.13
Black	-0.192	0.164	-1.7	0.83
Hispanic	-0.469	0.187	-2.5**	0.63
Other	-0.334	0.233	-1.4	0.72
White	-	-	-	-
Self-Control	-0.186	0.060	-3.1***	0.83
Protection-Risk Difference	-0.138	0.018	-7.7****	0.87

$\chi^2=11,777.6$, d.f.=12,257, Goodness of Fit Ratio=0.962

* $p \leq 0.1$

** $p \leq 0.05$

*** $p \leq 0.01$

**** $p \leq 0.001$

Chapter 5: Conclusions and Policy Implications

Dicussion

The results documented for the control variables are quite consistent with the research literature. For all of the crime and deviance outcomes featured in this study, males were more likely to commit crime and engage in deviance than females. For ethnicity, whites were more likely to binge drink and have problems from drinking, a finding which is consistent with national data on alcohol and its concomitant problems (National Center for Health Statistics, 2007). For arrest and conviction, ethnicity also conformed to published national statistics showing that whites consist of a higher proportion of property crime and slightly higher rates of arrests and convictions and non-whites consist of a higher proportion of assaults (Federal Bureau of Investigation, 2008).¹¹

The findings from the bivariate analyses between the outcome measures and risk and protective factors are best described as mixed. Binge drinking and problems

¹¹ These measures do not take into account criminal justice overrepresentation, merely that whites had more cases in these categories as whole than other ethnicities. Additionally, the conviction measure did not discriminate between probation or prison sentences where overrepresentation is indeed a documented significant problem.

from drinking were not positively associated with increasing number of risk factors, nor were they negatively associated with an increasing number of protective factors. Binge drinking was not negatively associated with protection-risk difference but problems from drinking was negatively associated with risk-protection factor difference; those with a deficit were most likely to report problems, and those with a surplus of protective factors were least likely to report problems.

The finding for the other four measures — property crime, assault, adult arrest, and adult conviction — were all consistent with the literature indicating that risk factors are positively associated with crime and deviance and protective factors were negatively correlated. Additionally, results from the bivariate analyses conducted between the outcome and cumulative measures also conformed to expectations whereby increasing numbers of risk factors increased the likelihood of these outcomes, increasing numbers of protective factors decreased their likelihood, and those with a higher number risk factors than protective factors having an increased likelihood of criminal or deviant conduct.

Interestingly, in examining resilience — e.g., experiencing exposure to criminogenic influences yet remaining crime-free — revealed no consistent patterns of protection or risk beyond the finding that those who amassed more protective factors than risk factors had a reduced likelihood for the outcome measures. Indeed, while some risk factors such as a history of ADHD, prior juvenile arrests and juvenile convictions were strongly associated with the outcome measures, none were as significantly associated with the outcome measures as the cumulative risk and protection measures. Other multivariate statistical methods such as discriminant analysis and cluster analysis were explored, but none of these statistical tests yielded any result that showed an unequivocal pattern in the risk and protective factors for the outcome measures. Therefore it seems that while each risk and protective factor serves to enhance or

diminish the likelihood of crime and deviance to some degree, it is important to look at the totality of items, both good and bad, that an individual has amassed rather than seeking to pinpoint the effects each factor separately. In essence, the collection of protective factors relative to risk factors appears to be somewhat of a tipping point for the outcomes measured in this study.

While there appears to be a solid relationship between cumulative risk, cumulative protection and the outcome measures featured in this study, one major limitation is that the results were unable to determine the level of contribution each risk factor or protective factor contributed toward crime and deviance. Indeed, the relationship specified in the study was assessing the cumulative nature of risk and protection in a simple additive fashion. This simple additive way of measuring cumulative risk and protection may have potentially missed how these risk and protective factors actually interact. Might there be a multiplicative effect present? Perhaps a type of law of diminishing returns is at play? Whatever the case may be, it is apparent that considering individual risk and protective factors apart from the other risk and protective factors an individual may have also has this possible flaw. Hence, these results serve to demonstrate that studies that examine individual risks and protection that may serve to identify salient characteristics that can be affected by social policy may miss potential factors that ameliorate or enhance the effect of a particular risk or protective factor. Lastly, the social disorganization variables, transiency and poverty as captured at the census block level, might not have been sufficiently granular to capture fully the known effect of social disorganization, both on crime and resilience. Additional work is clearly needed in this area.

Examining the relationship between self-control, risk and protective factors and the outcome measures also revealed patterns of association consistent with the research literature. Level of self-control was negatively correlated with the majority of

risk factors and negatively correlated with the majority of protective factors. These results can be viewed in two distinct fashions, depending on the perspective taken. Under Gottfredson and Hirschi (1990), these results would imply that for the risks involving outcomes or secondary measures of behavior such as ADHD, attaining a high school diploma, juvenile arrests, and juvenile convictions are a function of a person's level of self-control and not risks for crime per se; they can be seen as surrogate markers for low self-control. Additionally, risk factors such as history of child abuse, basic needs not met, father in prison, and social service investigation are all surrogates for quality of parenting, and they likely indicate how a person's level of self-control was developed. Additionally, protective factors would be viewed under the same light, and items such as bonding with others, future aspirations, and religiosity are also a function of self-control. However, under Tittle et al. (2004), who separated the capability for self-control from the desire for self-control, these results suggest that the risks and protective factors serve to affect both level of self-control and how it is used.

The difficulty under these two perspectives is that items used to measure self-control in this study may not be fully reflective of the multidimensional nature of self-control, nor are they fully reflective of situational self-control or the desire to use self-control. The measure was drawn from when respondents were in high school and may not reflect his or her level of self-control that existed at the time when some of the outcome measures occurred. Nonetheless, the self-control measure was indeed associated with the outcomes and in the expected fashion under the general theory where those with low levels of the measure were more likely to commit crime and delinquency. However, evidence presented in the previous chapter indicated that mean differences in self-control were also observed with respect to cumulative risk, cumulative protection and protection-risk factor difference which imply that there is

at least an interactive effect between self-control and cumulative risk and protection. It is also clear from the findings reported here that self-control is not the only salient feature present in committing crime and engaging in deviance.

The results of the logistic regressions show that this interaction is a salient feature in predicting some, but not all, of the outcome measures investigated here. The interaction between self-control and protection-risk difference was important for binge drinking, and while the interaction term was not significant in the property crime model it did change the main effects of self-control enough to warrant its inclusion. Additionally, inclusion of this interaction term caused self-control to lose its significance for adult arrest but it remained a strong predictor of adult conviction. Lastly, self-control was not statistically significant for predicting assault in either the main effects or interaction model. Thus, the results of these various logistic regression models calls into question the salience of self-control for all types of crime and deviance in the presence of different levels of cumulative risk and protection. To be sure, these results also demonstrate that self-control is an important predictor for most crime and delinquency, but it is clear that there are apparent interactions with cumulative risk and protection that moderate the effect of self-control in certain contexts.

Within the context of resilience theory, the results also lend support to Werner's balance model (Werner & Smith, 1989, 1992) whereby resilience is seen as the likely response when the protective factors exceed the risk factors and other adverse life events. In other words, when the balance between risk and protective factors tilts in favor of the protective factors, individuals will most likely cope with stress or trauma successfully; in contrast, when risk factors outweigh protective factors maladaptation will most likely ensue. Hence, the most important results from this study were that no singular risk or protective factor was more important than cumulative risk and protection and provides evidence that while self-control is important, it likely serves

simply as an additional protective factor that lessens the likelihood of crime and deviance in conjunction with other protective factors.

Policy Implications

Given the results of this study that cumulative risk and protection are important predictors of crime and deviance, the policy implications are wide-ranging. From a preventive medicine approach, it is better to inhibit a disease from occurring than having to treat the disease and its various associated pathologies. Hence, crime policies should be centered on minimizing the factors that contribute to crime and deviance rather than dealing with the consequences after a crime has been committed. As Walker (1989) noted, most effective crime policies are those centered on improving community conditions and strengthening families and community bonds. Several programs show promise in these areas for *reducing* the likelihood of crime and delinquency. One such study, beginning with the parenting level, is the ongoing Nurse-Family Partnership in Elmira, New York, Memphis, Tennessee and Denver, Colorado where specially trained nurses visit low-income single mothers on a bi-weekly basis as early in pregnancy as possible, and continue these visits post-partum for two more years (Hicks, Larson, Nelson, Olds, & Johnston, 2008). The program, which is voluntary, has public health nurses work with mothers on improving prenatal and neonatal care and teaching these new mothers about child development and effective parenting strategies. While the program saw a decrease in a host of morbidities, for crime and delinquency the 15-year follow-up of the Elmira sample showed a nearly 80 percent reduction in child abuse and neglect, 70 percent fewer arrests for the mothers during in the 15 years after the mother's first child, and most importantly, the children in the program had more than 50 percent fewer arrests than their control-group

cohort (Olds & Korfmacher, 1998).

Other similar programs that involve education programs focused on parenting skills also improved children's behavior across a variety of domains including crime and delinquency (Brestan & Eyberg, 1998; Kazdin, 1997; Webster-Stratton, 1998; McDonald et al., 1997)

Community-based programs centered outside of the family have also shown promise in reducing crime and delinquency. A controlled experiment with 959 youth in eight cities found that the Big Brothers/Big Sisters program resulted in a nearly 50 percent reduction in drug use, a 30 percent reduction in hitting people, and a 50 percent reduction in truancy (Grossman & Garry, 1997). Studies of after-school recreational programs such as the Boys and Girls Club programs also found lower drug use and increased parent involvement (Schinke, Orlandi, & Cole, 1992; St. Pierre, Mark, Kaltreider, & Aikin, 1997), while other after-school programs using sports, art, music, dancing, and scouting showed significant reductions in juvenile arrests, drug use, and truancy compared to control groups (Jones & Offord, 1989; John, Wright, Rowe, & Duku, 2009; Stewart, Rapp-Paglicci, & Rowe, 2009).

School-based violence prevention programs also have shown promise as an effective asset development strategy. S. J. Wilson, Lipsey, and Derzon (2003), in their meta-analysis of 221 studies involving nearly 56,000 students, found evidence that school-based interventions can reduce aggressive behavior at school with an average effect size of .25 for well-implemented programs, which essentially eliminated approximately half the incidents of fighting for these schools in a typical year. Another meta-analysis (D. B. Wilson, Gottfredson, & Najaka, 2001) found that school-based prevention programs were effective in reducing a variety of problem behaviors such as substance use, conduct problems, and truancy.

Lastly, even after crime or delinquency have occurred, there is support for efforts

to treat offenders and reduce the likelihood for future offending. A meta-analysis of adult and juvenile correctional treatment conducted by Andrews et al. (1990) found that cognitive-behavioral methods constitute an effective correctional treatment that reduces recidivism and this conclusion has drawn further empirical support in the research literature conducted in subsequent years (Allen, MacKenzie, & Hickman, 2001; Gendreau & Andrews, 1990; MacKenzie & L. J. Hickman, 1998; Rosky, Pasini-Hill, Lowden, Harrison, & English, 2004). Other studies have found that prison education programs significantly lowered the risk of entering adult prison (Rosky et al., 2004; Steurer, Smith, & Tracy, 2001).

The essential message of these studies is that programs which focus on improving cognitive function and enhanced decisionmaking, whether it is for parenting, childhood education, or correctional rehabilitation, all reduce the risk for future crime and delinquency. Additionally, these programs are consistent with the resilience literature that views protective factors as resources to draw from when negative life events occur. Hence, they serve to mitigate the future harm that might occur if these protective factors were not in place. Lastly, just as public health has reduced the incidence of lung cancer by reducing the number of people who smoke, social policies should and can reduce the incidence of crime and delinquency by augmenting parenting skills, by enhancing public educational institutions and expanding prosocial opportunities.

Future Research

Three main avenues of research are suggested from the results reported here. The first is to examine the stability of self-control across the life course. Unfortunately, the Add Health data did not ask the same questions used in this study's self-control measure across all three waves of the study. However, it should be possible to iden-

tify similar questions asked in each wave that can act as a surrogate for a set of comparable self-control measures collected over time. With a measure of self-control at several different points across the life span, the models used in this study could use change-point and slope models to assess its impact on the outcome measures and its relationship with cumulative risk and protection.

The second avenue of research which deserves to be developed is how the protection-risk factor difference effect changes as an individual gains more negative and additional positive life experiences. Add Health Wave IV, for which which data will be released shortly, takes the sample into mid-adulthood; these data should help answer that and related questions.

The third avenue deserving of further exploration is that more research needs to be performed on how social disorganization affects self-control, parenting behavior, and cumulative risk and protection factors. Again, Add Health Wave IV is likely to feature more items to measure collective efficacy, social capital, and concentrated disadvantage than were available for use in this study. It is clear from the work presented here that all three avenues of further research are in need of scholarly attention in the years ahead.

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Appendices

Appendix A: Variables

#	Variable	Type	Len	Label
1	AID	Char	8	RESPONDENT IDENTIFIER
2	SCID	Char	3	SCHOOL ID-W1
3	BIO_SEX	Num	8	BIOLOGICAL SEX-W1
4	CORE2	Num	8	CORE WEIGHT WITH POST-STRATIFICATION
5	H1DA8	Num	8	S2Q8 HRS/WK WATCH TV-W1
6	H1GH1	Num	8	S3Q1 GENERAL HEALTH-W1
7	H1ED15	Num	8	S5Q15 TROUBLE-GETTING ALONG TEACHERS-W1
8	H1ED16	Num	8	S5Q16 TROUBLE-PAYING ATTENTION-W1
9	H1ED17	Num	8	S5Q17 TROUBLE-GETTING HOMEWORK DONE-W1
10	H1ED19	Num	8	S5Q19 FEEL CLOSE TO PEOPLE AT SCHOOL-W1
11	H1ED20	Num	8	S5Q20 FEEL PART OF YOUR SCHOOL-W1
12	H1SE1	Num	8	S9Q1 USE BIRTH CONTROL IF AROUSED-W1
13	H1SE2	Num	8	S9Q2 BIRTHCONTROL-ADVANCED PLANNING-W1
14	H1SE3	Num	8	S9Q3 RESIST SEX IF NO BIRTH CONTROL-W1
15	H1FS5	Num	8	S10Q5 TROUBLE KEEPING MIND FOCUSED-W1
16	H1HR6A	Num	8	S11Q6A HH MEMBER 1-PARENT-W1
17	H1HR7A	Num	8	S11Q7A HH MEMBER 1-AGE-W1
18	H1HR6B	Num	8	S11Q6B HH MEMBER 2-PARENT-W1
19	H1HR7B	Num	8	S11Q7B HH MEMBER 2-AGE-W1
20	H1HR6C	Num	8	S11Q6C HH MEMBER 3-PARENT-W1
21	H1HR7C	Num	8	S11Q7C HH MEMBER 3-AGE-W1
22	H1HR6D	Num	8	S11Q6D HH MEMBER 4-PARENT-W1
23	H1HR7D	Num	8	S11Q7D HH MEMBER 4-AGE-W1
24	H1HR6E	Num	8	S11Q6E HH MEMBER 5-PARENT-W1
25	H1HR7E	Num	8	S11Q7E HH MEMBER 5-AGE-W1
26	H1HR6F	Num	8	S11Q6F HH MEMBER 6-PARENT-W1
27	H1HR7F	Num	8	S11Q7F HH MEMBER 6-AGE-W1
28	H1HR6G	Num	8	S11Q6G HH MEMBER 7-PARENT-W1
29	H1HR7G	Num	8	S11Q7G HH MEMBER 7-AGE-W1
30	H1HR6H	Num	8	S11Q6H HH MEMBER 8-PARENT-W1
31	H1HR7H	Num	8	S11Q7H HH MEMBER 8-AGE-W1
32	H1HR6I	Num	8	S11Q6I HH MEMBER 9-PARENT-W1
33	H1HR7I	Num	8	S11Q7I HH MEMBER 9-AGE-W1
34	H1HR6J	Num	8	S11Q6J HH MEMBER 10-PARENT-W1
35	H1HR7J	Num	8	S11Q7J HH MEMBER 10-AGE-W1
36	H1HR6K	Num	8	S11Q6K HH MEMBER 11-PARENT-W1
37	H1HR7K	Num	8	S11Q7K HH MEMBER 11-AGE-W1
38	H1HR6L	Num	8	S11Q6L HH MEMBER 12-PARENT-W1
39	H1HR7L	Num	8	S11Q7L HH MEMBER 12-AGE-W1
40	H1HR6M	Num	8	S11Q6M HH MEMBER 13-PARENT-W1
41	H1HR7M	Num	8	S11Q7M HH MEMBER 13-AGE-W1
42	H1HR6N	Num	8	S11Q6N HH MEMBER 14-PARENT-W1
43	H1HR7N	Num	8	S11Q7N HH MEMBER 14-AGE-W1
44	H1HR6O	Num	8	S11Q6O HH MEMBER 15-PARENT-W1
45	H1HR7O	Num	8	S11Q7O HH MEMBER 15-AGE-W1
46	H1HR6P	Num	8	S11Q6P HH MEMBER 16-PARENT-W1
47	H1HR7P	Num	8	S11Q7P HH MEMBER 16-AGE-W1
48	H1HR6Q	Num	8	S11Q6Q HH MEMBER 17-PARENT-W1
49	H1HR7Q	Num	8	S11Q7Q HH MEMBER 17-AGE-W1
50	H1HR6R	Num	8	S11Q6R HH MEMBER 18-PARENT-W1
51	H1HR7R	Num	8	S11Q7R HH MEMBER 18-AGE-W1
52	H1HR6S	Num	8	S11Q6S HH MEMBER 19-PARENT-W1
53	H1HR7S	Num	8	S11Q7S HH MEMBER 19-AGE-W1
54	H1HR6T	Num	8	S11Q6T HH MEMBER 20-PARENT-W1
55	H1HR7T	Num	8	S11Q7T HH MEMBER 20-AGE-W1
56	H1WP1	Num	8	S16Q1 MAKE OWN DECISION-WKEND CURFEW-W1
57	H1WP2	Num	8	S16Q2 MAKE OWN DECISION-FRIEND-W1
58	H1WP3	Num	8	S16Q3 MAKE OWN DECISION-CLOTHING-W1

59	H1WP4	Num	8	S16Q4 MAKE OWN DECISION-AMOUNT OF TV-W1
60	H1WP5	Num	8	S16Q5 MAKE OWN DECISION-TV PROGRAMS-W1
61	H1WP6	Num	8	S16Q6 MAKE OWN DECISION-WEEKDAY BED-W1
62	H1WP7	Num	8	S16Q7 MAKE OWN DECISION-DIET-W1
63	H1WP8	Num	8	S16Q8 FREQ-EAT DINNER W/ PARENT-W1
64	H1WP9	Num	8	S16Q9 CLOSE TO MOM-W1
65	H1WP10	Num	8	S16Q10 MOM-HOW MUCH DOES SHE CARE-W1
66	H1WP13	Num	8	S16Q13 CLOSE TO DAD-W1
67	H1WP14	Num	8	S16Q14 DAD-HOW MUCH DOES HE CARE-W1
68	H1M01	Num	8	S17Q1 IF SEX GAIN MORE RESPECT-W1
69	H1M02	Num	8	S17Q2 IF SEX LOSE PARTNER RESPECT-W1
70	H1M03	Num	8	S17Q3 IF SEX WOULD FEEL GUILTY-W1
71	H1M04	Num	8	S17Q4 IF SEX UPSET MOTHER-W1
72	H1PF16	Num	8	S18Q16 RELY ON GUT FEELINGS-W1
73	H1PF18	Num	8	S18Q18 RESEARCH SOLUTIONS TO PROB-W1
74	H1PF19	Num	8	S18Q19 MANY APPROACHES TO PROB-W1
75	H1PF20	Num	8	S18Q20 RATIONAL DECISION MAKING APPR-W1
76	H1PF21	Num	8	S18Q21 EVALUATE OUTCOME OF DECISION-W1
77	H1PF27	Num	8	S18Q27 SELDOM GET SICK-W1
78	H1PF28	Num	8	S18Q28 WHEN SICK, RECOVER QUICKLY-W1
79	H1PF30	Num	8	S18Q30 HAVE LOTS OF GOOD QUALITIES-W1
80	H1PF31	Num	8	S18Q31 PHYSICALLY FIT-W1
81	H1PF33	Num	8	S18Q33 LIKE SELF AS ARE-W1
82	H1PF34	Num	8	S18Q34 DO EVERYTHING JUST RIGHT-W1
83	H1PF35	Num	8	S18Q35 FEEL SOCIALLY ACCEPTED-W1
84	H1PF36	Num	8	S18Q36 FEEL LOVED AND WANTED-W1
85	H1PR1	Num	8	S35Q1 ADULTS CARE ABOUT YOU-W1
86	H1PR2	Num	8	S35Q2 TEACHERS CARE ABOUT YOU-W1
87	H1PR4	Num	8	S35Q4 FRIENDS CARE ABOUT YOU-W1
88	H1PR5	Num	8	S35Q5 FAMILY UNDERSTAND YOU-W1
89	H1PR6	Num	8	S35Q6 WANT TO LEAVE HOME-W1
90	H1PR7	Num	8	S35Q7 FAMIYL HAS FUN TOGETHER-W1
91	H1PR8	Num	8	S35Q8 FAMILY PAYS ATTENTION TO YOU-W1
92	H1RE3	Num	8	S37Q3 PAST YR-ATTEND SERVICES-W1
93	H1RE4	Num	8	S37Q4 HOW IMPORTANT IS RELIGION-W1
94	H1RE6	Num	8	S37Q6 HOW OFTEN DO YOU PRAY-W1
95	H1RE7	Num	8	S37Q7 PAST YR-ATTEND YOUTH GROUPS-W1
96	H1EE1	Num	8	S38Q1 WANT TO ATTEND COLLEGE-W1
97	H1EE2	Num	8	S38Q2 LIKELY WILL ATTEND COLLEGE-W1
98	H1EE12	Num	8	S38Q12 CHANCES-LIVE TO AGE 35-W1
99	H1IR1	Num	8	S40Q1 PHYSICAL ATTRACTIVENESS OF R-W1
100	H1IR2	Num	8	S40Q2 PERSONALITY ATTRACTNESS OF R-W1
101	SQID	Char	6	QUESTIONNAIRE ID
102	S59A	Num	8	59.a SMOKED CIGARETTES-LAST 12 MTHS
103	S59B	Num	8	59.b DRANK BEER WINE LIQUOR-LAST 12 MTHS
104	S59C	Num	8	59.c GOT DRUNK-LAST 12 MTHS
105	S59D	Num	8	59.d RACED ON BIKE OR CAR-LAST 12 MTHS
106	S59E	Num	8	59.e IN DANGER DUE TO DARE-LAST 12 MTHS
107	S59G	Num	8	59.g SKIPPED SCHOOL-LAST 12 MTHS
108	PA21	Num	8	A21 RECEIVING PUBLIC ASSISTANCE-PQ
109	PC19A_P	Num	8	C19A_P BIRTHWEIGHT, POUNDS-PQ
110	PC19B_0	Num	8	C19B_0 BIRTHWEIGHT, OUNCES-PQ
111	AH_PVT	Num	8	'
112	race	Char	8	
113	idate	Num	8	
114	bdate	Num	8	
115	age_wave1	Num	8	
116	minordelinquency	Num	8	
117	H30D31	Num	8	S1Q31 EVER LIVE IN FOSTER HOME-W3
118	H30D35	Num	8	S1Q35 EVER LIVED W/EITHER BIO PARENTS-W3
119	H3WP42	Num	8	S3Q42 PREV MOM/PREV DAD LIVE TOGETHER-W3
120	H3WP57	Num	8	S3Q57 BIO DAD/BIO MOM LIVE TOGETHER-W3
121	H3RA1	Num	8	S4Q1 AGES 5-12 CARELESS MISTAKES-W3
122	H3RA2	Num	8	S4Q2 AGES 5-12 FIDGETED-W3
123	H3RA3	Num	8	S4Q3 AGES 5-12 DIFFICULTY W/ATTENTION-W3

124	H3RA4	Num	8	S4Q4 AGES 5-12 LEFT SEAT-W3
125	H3RA5	Num	8	S4Q5 AGES 5-12 DID NOT LISTEN-W3
126	H3RA6	Num	8	S4Q6 AGES 5-12 FELT RESTLESS-W3
127	H3RA7	Num	8	S4Q7 AGES 5-12 FAILED TO FINISH WORK-W3
128	H3RA8	Num	8	S4Q8 AGES 5-12 DIFFICULT TO BE QUIET-W3
129	H3RA9	Num	8	S4Q9 AGES 5-12 DIFFICULT TO ORGANIZE-W3
130	H3RA10	Num	8	S4Q10 AGES 5-12 FELT ON THE GO-W3
131	H3RA11	Num	8	S4Q11 AGES 5-12 AVOIDED MENTAL EFFORT-W3
132	H3RA12	Num	8	S4Q12 AGES 5-12 TALKED TOO MUCH-W3
133	H3RA13	Num	8	S4Q13 AGES 5-12 LOST THINGS-W3
134	H3RA14	Num	8	S4Q14 AGES 5-12 BLURTED OUT ANSWERS-W3
135	H3RA15	Num	8	S4Q15 AGES 5-12 EASILY DISTRACTED-W3
136	H3RA16	Num	8	S4Q16 AGES 5-12 DIFFICULT WAIT TURN-W3
137	H3RA17	Num	8	S4Q17 AGES 5-12 FORGETFUL-W3
138	H3RA18	Num	8	S4Q18 AGES 5-12 SPITEFUL/VINDICTIVE-W3
139	H3ED2	Num	8	S7Q2 HAS RECEIVED GED/HS EQUIV-W3
140	H3ED3	Num	8	S7Q3 HAS RECEIVED HS DIPLOMA-W3
141	H3ED4	Num	8	S7Q4 HAS RECEIVED JR COL DEGREE-W3
142	H3ED5	Num	8	S7Q5 HAS RECEIVED BACHELOR DEGREE-W3
143	H3MN1	Num	8	S13Q1 ADULT MADE POSITIVE DIFFERENCE -W3
144	H3MN2	Num	8	S13Q2 RELATIONSHIP TO MENTOR-W3
145	H3MR1	Num	8	S14Q1 NUMBER OF TIMES MARRIED-W3
146	H3MR4_A	Num	8	S14Q4 HOW MARRIAGE TO SPOUSE A END-W3
147	H3DS1	Num	8	S26Q1 12 MO,OFT DAMAGE PROP/NOT YOUR-W3
148	H3DS2	Num	8	S26Q2 12 MO,OFT STEAL SOMETHING/>\$50-W3
149	H3DS3	Num	8	S26Q3 12 MO,OFT HOUSE STEAL SOMETHIN-W3
150	H3DS6	Num	8	S26Q6 12 MO,OFT STEAL SOMETHING/<\$50-W3
151	H3DS17	Num	8	S26Q17 12 MO,#TIME HURT ONE BAD/CARE-W3
152	H3DS18H	Num	8	S26Q18H 12 MO,PULL KNIKE/GUN SOMEONE-W3
153	H3DS18I	Num	8	S26Q18I 12 MO,SHOT/STABBED SOMEONE-W3
154	H3CJ4	Num	8	S27Q4 AGE WHEN ARRESTED BY POLICE-W3
155	H3CJ5	Num	8	S27Q5 NUM TIMES ARRESTED BEF AGE 18-W3
156	H3CJ42	Num	8	S27Q42 SENTENCE PROBATION/DETENTION-W3
157	H3CJ62	Num	8	S27Q62 SENTENCE PROBATION/DETENTION-W3
158	H3CJ68	Num	8	S27Q68 NUM OF TIMES ARRESTED SINCE 18-W3
159	H3CJ107	Num	8	S27Q107 SENTENCE PROB/JAIL/PRISON-W3
160	H3CJ130	Num	8	S27Q130 SENTENCE PROB/JAIL/PRISON-W3
161	H3CJ152	Num	8	S27Q152 SENTENCE TYPE PROBATION-W3
162	H3CJ153	Num	8	S27Q153 SENTENCE TYPE JAIL-W3
163	H3CJ154	Num	8	S27Q154 SENTENCE TYPE PRISON-W3
164	H3CJ160	Num	8	S27Q160 HAS BIOL FATHER SERVED TIME-W3
165	H3TO40	Num	8	S28Q40 PST 12 MON MANY DAYS/5+ DRINKS-W3
166	H3TO43	Num	8	S28Q43 PST 12 MON # DAYS BEEN DRUNK-W3
167	H3TO45	Num	8	S28Q45 PST 12 MON PROB WORK DUE DRINK-W3
168	H3TO46	Num	8	S28Q46 PST 12 MON PROB W/FRIENDS-W3
169	H3TO47	Num	8	S28Q47 PST 12 MON PROB W/DATING FRND-W3
170	H3MA2	Num	8	S29Q2 BY 6 GRD NEEDS NOT TAKEN CARE-W3
171	H3MA3	Num	8	S29Q3 BY 6 GRD TIMES BEING HIT/KICK-W3
172	H3MA4	Num	8	S29Q4 BY 6 GRD TIMES TOUCH SEXUAL WAY-W3
173	H3MA5	Num	8	S29Q5 BY 6 GRD OFTEN SOC SVCS INVESTG-W3
174	H3MA6	Num	8	S29Q6 BY 6 GRD OFTEN TAKN BY SOC SVCS-W3
175	age_wave3	Num	8	
176	binge_drinking	Num	8	
177	drunk	Num	8	
178	problems_from_drinking	Num	8	
179	property_crime	Num	8	
180	H3DS17b	Num	8	
181	assault	Num	8	
182	juvenile_arrest	Num	8	
183	juvenile_convictions	Num	8	
184	adult_arrest	Num	8	
185	adult_convictions	Num	8	
186	adhdscale	Num	8	
187	i	Num	8	
188	mom_age	Num	8	

189	biologicalmom	Char	2	
190	stepmom	Char	2	
191	adoptivemom	Char	2	
192	fostermom	Char	2	
193	biologicaldad	Char	2	
194	stepdad	Char	2	
195	adoptivedad	Char	2	
196	fosterdad	Char	2	
197	momdiff	Num	8	
198	teenage_mother	Num	8	
199	parents	Char	23	
200	parental_type	Char	20	
201	single_parent	Num	8	
202	nonintact_parents	Num	8	
203	birthweight	Num	8	
204	lowbirthweight	Num	8	
205	foster_home	Num	8	
206	basic_needs_not_met	Num	8	
207	child_abuse	Num	8	
208	sexual_abuse	Num	8	
209	social_service_investigation	Num	8	
210	social_service_removal	Num	8	
211	father_in_prison	Num	8	
212	public_assistance	Num	8	
213	adult_mentor	Num	8	
214	frienddelinquency	Num	8	
215	BST90598	Num	8	Prop Persons W/ Inc in 1989 < Pov Lev
216	BST90813	Num	8	Prop Occ H Units Moved Into 1985-1990
217	poverty	Num	8	
218	transiency	Num	8	
219	adhd_present	Num	8	
220	fd	Num	8	
221	ged	Num	8	
222	hsd	Num	8	
223	aa	Num	8	
224	ba	Num	8	
225	edcheck	Num	8	
226	nodiploma_ged	Num	8	
227	teenage_mother2	Num	8	
228	single_parent2	Num	8	
229	nonintact_parents2	Num	8	
230	foster_home2	Num	8	
231	basic_needs_not_met2	Num	8	
232	child_abuse2	Num	8	
233	sexual_abuse2	Num	8	
234	social_service_investigation2	Num	8	
235	social_service_removal2	Num	8	
236	father_in_prison2	Num	8	
237	public_assistance2	Num	8	
238	poverty2	Num	8	
239	transiency2	Num	8	
240	adhd_present2	Num	8	
241	nodiploma_ged2	Num	8	
242	fd2	Num	8	
243	risk_factors	Num	8	
244	rf2	Num	8	
245	parentalcontrol	Num	8	
246	parentalcontrol2	Num	8	
247	motherbond	Num	8	
248	fatherbond	Num	8	
249	otherbond	Num	8	
250	healthy	Num	8	
251	selfesteem	Num	8	
252	futureaspirations	Num	8	
253	religiosity	Num	8	

254	attractiveness	Num	8	
255	intelligence	Num	8	
256	marriage	Num	8	
257	diploma_ged	Num	8	
258	protective_factors	Num	8	
259	pf2	Num	8	
260	pf_rf_diff	Num	8	
261	pf_rf_diff2	Num	8	
262	H1ED15b	Num	8	
263	H1ED16b	Num	8	
264	H1ED17b	Num	8	
265	H1FS5b	Num	8	
266	H1PF34b	Num	8	
267	sc	Num	8	
268	pc	Num	8	
269	mb	Num	8	
270	fb	Num	8	
271	co	Num	8	
272	gh	Num	8	
273	se	Num	8	
274	rel	Num	8	
275	fa	Num	8	
276	at	Num	8	
277	nonwhite	Num	8	
278	GSWGT3_2	Num	8	POSTSTRAT GS TRIMMED CROSS-SECT WGT-W3
279	GSWGT3	Num	8	POSTSTRAT GS TRIMMED LONGIT WGT-W3

Appendix B: SAS Code

```
/*Program to load SAS transport files into SAS datafiles*/

/*Tell SAS to close DOS Window without waiting
but to make SAS wait for Windows to finish command*/
options noxwait xsync;

/Execute DOS command within SAS to get list of files to write conversion code*/
x 'dir e:*.xpt /s /b > e:\filelist.txt';

/*SAS code to create more SAS code to create datafiles*/
libname addhlth 'E:\ADD Health';
data _null_;
  infile 'E:\filelist.txt' lrecl=300 trunccover;
  input @1 file $250.;
  file2=compress(file);
  reversefile=compress(reverse(file2));
  slashindex=index(reversefile, '\');
  length=length(file);
  name=substr(file,length-slashindex+2);
  dotindex=index(name, '.');
  length2=length(name);
  name2=substr(name,1,dotindex-1);
  file 'E:\ADD Health\DataloadSub.sas';
  put @1 "libname loader xport " @23 file " ";
  put 'data addhlth.' name2 ' ';
  put 'set loader.' name2 ' ';
  put 'run;';
run;
%include 'E:\ADD Health\DataloadSub.sas';

options nonumber nodate nocenter ps=80 ls=100;
libname addhlth 'e:\ADD Health';
data wave1;
  set addhlth.allwave1;
  /*Race/Ethnicity*/
  if h1gi4=1 then race='Hispanic';
  else if h1gi6b=1 then race='Black';
  else if h1gi6d=1 or h1gi6c=1 or h1gi6e=1 then race='Other';
  else if h1gi6a=1 then race='White';

  /*age at wave 1 calculation*/
  idate=mdy(imonth,iday,iyear);
  bdate=mdy(h1gi1m,15,h1gi1y);
  age_wave1=int((idate-bdate)/365.25);

  *remove records with measures outside of the variable domain;
  array bm1{*} H1SE1 H1SE2 H1SE3 H1WP8 H1PR5 H1PR6
              H1PR7 H1PR8 H1PR1 H1PR2 H1PR4 H1TO18;
  /*deletes 96 refused,97 legitimate skip,99 not applicable*/
  do i=1 to dim(bm1);
    if bm1{i} in (96, 97,98, 99) then bm1{i}=.;
  end;
  /*deletes 996 refused,997 legitimate skip,999 not applicable*/
  array bm3{*} H1DA8;
  do i=1 to dim(bm3);
    if bm3{i} in (906, 997,998, 999) then bm3{i}=.;
  end;
  array bm2{*} H1M01 H1M02 H1M03 H1M04 H1ED15 H1FS5 H1ED17
              H1ED16 H1PF16 H1PF18 H1PF19 H1PF20 H1PF21
              H1WP1 H1WP2 H1WP3 H1WP4 H1WP5 H1WP6 H1WP7
```

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                H1WP9 H1WP10 H1WP13 H1WP14 H1PF27 H1PF28
                H1PF31 H1GH1 H1PF30 H1PF33 H1PF34 H1PF35
                H1PF36 H1EE12 H1EE1 H1EE2 H1IR1 H1IR2
                H1ED19 H1ED20 H1T01 H1T012;
/**deletes 6 refused, 7 legitimate skip, 9 not applicable*/
do i=1 to dim(bm2);
  if bm2{i} in (6, 7,8, 9) then bm2{i}=.;
end;
  array rel{*} H1RE3 H1RE4 H1RE6 H1RE7;
do i=1 to dim(rel);
  if rel{i}=6 then rel{i}=.;
end;
  array rev{*} H1ED19 H1ED20;
do i=1 to dim(rev);
  if rev{i}=1 then rev{i}=5;
  else if rev{i}=2 then rev{i}=4;
  else if rev{i}=4 then rev{i}=2;
  else if rev{i}=5 then rev{i}=1;
end;

* calculates minor delinquency per Haynie(2001);
array del{*} S59A S59B S59C S59D S59E S59G;
do i=1 to dim(del);
  if del{i}=. then del{i}=0;
else if del{i}>0 then del{i}=1;
end;
minordelinquency=(S59A+S59B+S59C+S59D+S59E+S59G);

*retains variables used in analysis;
  keep AID scid sqid /*respondent, school & survey identifiers*/
  bio_sex race idate bdate age_wave1 /*demographics*/
  H1M01 H1M02 H1M03 H1M04 H1DA8 H1ED15 H1FS5
  H1ED17 H1ED16 H1SE1 H1SE2 H1SE3 H1PF18 H1PF19 H1PF16
  H1PF20 H1PF21 H1PF34/*self control wave I*/
  H1WP1 H1WP2 H1WP3 H1WP4 H1WP5 H1WP6 H1WP7 /*parental control*/
  H1WP8 H1WP9 H1WP10 H1WP13 H1WP14 /*parental connectedness*/
  H1PR5 H1PR6 H1PR7 H1PR8 /*family connectedness*/
  H1PR1 H1PR2 H1PR4 H1ED19 H1ED20/*connectedness with others*/
H1PF27 H1PF28 H1PF31 H1GH1 /*general health*/
H1PF30 H1PF33 H1PF35 H1PF36/*self esteem*/
H1EE12 H1EE1 H1EE2 /* future aspirations */
AH_PVT /* intelligence */
H1RE3 H1RE4 H1RE6 H1RE7/* religiosity */
H1IR1 H1IR2 /*attractiveness*/
  pa21 /*public assistance*/
PC19A_P PC19B_0 /*birthweight*/
  S59A S59B S59C S59D S59E S59G /*minor delinquency*/
  H1HR6A H1HR6B H1HR6C H1HR6D H1HR6E H1HR6F H1HR6G H1HR6H
  H1HR6I H1HR6J H1HR6K H1HR6L H1HR6M H1HR6N H1HR6O
  H1HR6P H1HR6Q H1HR6R H1HR6S H1HR6T/* mom/dad/stepparent indicators*/
  H1HR7A H1HR7B H1HR7C H1HR7D H1HR7E H1HR7F H1HR7G H1HR7H
  H1HR7I H1HR7J H1HR7K H1HR7L H1HR7M H1HR7N H1HR7O
  H1HR7P H1HR7Q H1HR7R H1HR7S H1HR7T /*age of mother variables*/
minordelinquency;
*output respondents between 14 and 18 years old;
if (14<=age_wave1<19) then output;
run;
data wave3;
  set addhlth.wave3;
  /*age at wave 3*/
  idate=mdy(imonth3,iday3,iyear3);
  bdate=mdy(h3od1m,15,h3od1y);
  age_wave3=int((idate-bdate) / 365.25);
*remove records with measures outside of the variable domain;
array bm1{*} H3CJ5 H3CJ4 H3MA2 H3MA3 H3MA4

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H3MA5 H3MA6 H3MN2 H3T038 H3T043 ;
/*deletes 96 refused,97 legitimate skip,99 not applicable*/
do i=1 to dim(bm1);
  if bm1{i} in (96, 97,98, 99) then bm1{i}=.;
end;
array bm3{*} H3CJ68 H3DS17 ;
/*deletes 996 refused,997 legitimate skip,999 not applicable*/
do i=1 to dim(bm3);
  if bm3{i} in (906, 997,998, 999) then bm3{i}=.;
end;
array bm2{*} H3CJ5 H3MR1 H3CJ42 H3CJ62 H3CJ107 H3CJ130
             H3CJ152 H3CJ153 H3CJ154 H3CJ160 H3OD31
             H3MN1 H3T045 H3T046 H3T047 H3DS18H
             H3DS18I H3DS1 H3DS6 H3DS2 H3DS3
             H3ED2 H3ED3 H3ED4 H3ED5;
/**deletes 6 refused, 7 legitimate skip,8 don't know 9 not applicable*/
do i=1 to dim(bm2);
  if bm2{i} in (6, 7,8, 9) then bm2{i}=.;
end;

*alcohol outcome measures;
if H3T040 in (3,4,5,6) then binge_drinking=1;
  else if H3T040 in (0,1,2,97,99) then binge_drinking=0;
if H3T043 in (4,5,6) then drunk=1;
  else if H3T043 in (1,2,3) then drunk=0;
  if H3T045 in (1,2,3,4) or H3T046 in (1,2,3,4)
    or H3T047 in (1,2,3,4)
    then problems_from_drinking=1;
  else problems_from_drinking=0;

*property crime measure;
if H3DS1 in (1,2,3) or H3DS6 in (1,2,3) or
  H3DS2 in (1,2,3) or H3DS3 in (1,2,3)
  then property_crime=1;
  else property_crime=0;
*assault measure;
if (0<H3DS17<996) then H3DS17b=1; else H3DS17b=0;
  if H3DS17b=1 or H3DS18H in (1,2,3)
    or H3DS18I in (1,2,3) then assault=1;
  else assault=0;

*juvenile criminal measures;
if H3CJ5>0 then juvenile_arrest=1;
  else juvenile_arrest=0;
if H3CJ42 in (1,2,3,4) or H3CJ62 in (1,2,3,4)
  then juvenile_convictions=1;
  else juvenile_convictions=0;

*adult criminal measures;
if (0<H3CJ68<100) then adult_arrest=1;
  else adult_arrest=0;
if H3CJ107 in (1,2,3,4) or H3CJ130 in (1,2,3,4)
  or H3CJ152=1 or H3CJ153=1 or H3CJ154=1
  then adult_convictions=1;
  else adult_convictions=0;

*retains variables used in analysis;
keep AID /*respondent identifier*/
  idate bdate age_wave3 /*demographics*/
  H3RA1 H3RA2 H3RA3 H3RA4 H3RA5 H3RA6 H3RA7 H3RA8 H3RA9
  H3RA10 H3RA11 H3RA12 H3RA13 H3RA14 H3RA15 H3RA16 H3RA17
  H3RA18 /*adhd retrospective questions*/
  H3MR1 /*How many times have you been married?*/
  H3CJ4 /*age at first arrest*/
  H3CJ5 /*How many times were you arrested before you were 18?*/

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H3CJ42 /*Were you sentenced to probation, or to a juvenile
      or youth detention center (first conviction)?*/
H3CJ62 /*Were you sentenced to probation, or to a juvenile
      or youth detention center (other convictions)?*/
H3CJ68 /*How many times have you been arrested since you were 18?*/
      H3CJ107 /*Were you sentenced to probation, jail, or prison? (First Convictions)*/
      H3CJ130 /*Were you sentenced to probation, jail, or prison? (Recent Convictions)*/
      H3CJ152 /*Have you been sentenced to probation? (Other Convictions)*/
      H3CJ153 /*Have you been sentenced to jail? (Other Convictions)*/
      H3CJ154 /*Have you been sentenced to prison? (Other Convictions)*/
H3CJ160 /*Has your biological father ever served time in jail or prison?*/
H30D35 /*Did you ever live with either of your biological parents?*/
H3WP57 /*Do your biological parents live together in the same household? */
H3WP42 /*Do your mother and father still live together in the same household?*/
H3MR4_A
H30D31 /*did you ever live in a foster home?*/
H3MA2 /*How often had your parents or other adult care-givers not
      taken care of your basic needs, such as keeping you clean
      or providing food or clothing?*/
H3MA3 /*How often had your parents or other adult
      care-givers slapped, hit, or kicked you?*/
      H3MA4 /*How often had one of your parents or other adult care-givers
      touched you in a sexual way, forced you to touch him or her in
      a sexual way, or forced you to have sexual relations?*/
H3MA5 /*How often had Social Services investigated how you were taken
      care of or tried to take you out of your living situation?*/
H3MA6 /*How often had you actually been taken out of your living
      situation by Social Services?*/
H3MN1 /*Other than your parents or step-parents, has an adult made an
      important positive difference in your life at any time
      since you were 14 years old?*/
H3MN2 /*How is this person related to you? If there has been more
      than one person, describe the most influential*/
H3T040 H3T043 H3T045 H3T046 H3T047 /*alcohol*/
H3DS17 H3DS17b /*In the past 12 months, how often did you hurt someone
badly enough to need bandages or care from a doctor or nurse?*/
H3DS18H /*In the past 12 months, how often did you pull a knife or gun on someone? */
H3DS18I /*In the past 12 months, how often did you shoot or stab someone?*/
H3DS1 /*In the past 12 months, how often did you damage property that did not belong to you?*/
H3DS6 /*In the past 12 months, how often did you steal something worth less than $50?*/
H3DS2 /*In the past 12 months, how often did you steal something worth more than $50?*/
H3DS3 /*In the past 12 months, go into a house or building to steal something?*/
H3ED2 H3ED3 H3ED4 H3ED5
      binge_drinking drunk_problems_from_drinking property_crime assault
      juvenile_arrest juvenile_convictions adult_arrest adult_convictions;
run;
proc sort data=wave1; by aid;
proc sort data=wave3; by aid;
data wave1and3merge;
  merge wave1(in=a) wave3(in=b);
  by aid;

  *creates ADHD scale;
  array adhd{*} H3RA1 H3RA2 H3RA3 H3RA4 H3RA5 H3RA6 H3RA7 H3RA8 H3RA9 H3RA10
                H3RA11 H3RA12 H3RA13 H3RA14 H3RA15 H3RA16 H3RA17 H3RA18;
  adhdscale=0;
  do i=1 to dim(adhd);
    if adhd{i} in (6,8,9) then adhd{i}=.;
  adhdscale=adhdscale+adhd{i};
  end;

  *parental types;
  array parent{*} H1HR6A H1HR6B H1HR6C H1HR6D H1HR6E
                  H1HR6F H1HR6G H1HR6H H1HR6I H1HR6J
                  H1HR6K H1HR6L H1HR6M H1HR6N H1HR6O

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```

                H1HR6P H1HR6Q H1HR6R H1HR6S H1HR6T
                /*mom/dad/stepparent indicator*/ ;
array momage{*} H1HR7A H1HR7B H1HR7C H1HR7D H1HR7E
                H1HR7F H1HR7G H1HR7H H1HR7I H1HR7J
                H1HR7K H1HR7L H1HR7M H1HR7N H1HR7O
                H1HR7P H1HR7Q H1HR7R H1HR7S H1HR7T
                /*age of mother*/;
do i=1 to dim(parent);
    if parent{i}=7 then do;
        mom_age=momage{i};
biologicalmom='BM';
end;
    if parent{i}=8 then steppom='SM';
    if parent{i} in (9,10) then adoptivemom='AM';
    if parent{i}=11 then fostermom='FM';
if parent{i}=1 then biologicaldad='BD';
    if parent{i}=2 then stepdad='SD';
    if parent{i} in (3,4) then adoptivedad='AD';
    if parent{i}=5 then fosterdad='FD';
    end;
if mom_age=0 or mom_age>100 then mom_age=.;
momdiff=mom_age-age_wave1;
if momdiff^=. and momdiff<18 then teenage_mother=1;
else teenage_mother=0;
    parents=compress(biologicalmom||',',||steppom||',',||
                    adoptivemom||',',||fostermom||',',||
                    biologicaldad||',',||stepdad||',',||
                    adoptivedad||',',||fosterdad);
    if parents in ('',,,,,,FD',',,,FM,,,,,
                  ',,,FM,,,FD',',,,FM,,SD,,',',SM,,,,,AD,')
        then parental_type='No Parents Indicated';
    else if parents in ('',,,,,,AD',',',AM,,,,,',',AM,,,AD,')
                  ',,AM,,SD,,',',BM,,AM,,,AD,')
        then parental_type='Adoptive Parent(s)';
    else if parents in ('EM,,,BD,,,','EM,SM,,,BD,SD,,,')
                  'EM,,,BD,SD,,',',SM,,,,,SD,,')
        then parental_type='Parents Together';
    else if parents in ('',,,,,SD,,',',,,,,BD,,')
        then parental_type='Single Dad';
    else if parents in ('',SM,,,,,','EM,,,,,')
        then parental_type='Single Mom';
    else if parents in ('EM,,,,,AD,','EM,,,,,SD,,')
        then parental_type='Mom with Stepdad';
    else if parents in ('',AM,BD,,,','SM,,,BD,,')
        then parental_type='Dad with Stepmom';

    if parents in ('',,,,,,FD',',,,FM,,,,,',,,,,SD,,',
                  ',,,,,BD,,,','SM,,,,,','EM,,,,,')
        then single_parent=1;
    else single_parent=0;

    if parental_type^='Parents Together' then nonintact_parents=1;
    else nonintact_parents=0;

*birthweight calculation;
    if PC19A_P not in (.,98) then do;
        if PC19B_0 in (.,98,99) then PC19B_0=0;
        birthweight=PC19A_P+PC19B_0/16;
    end;
    if H3CJ5=. then H3CJ5=0;
    if 0<birthweight<5.5 then lowbirthweight=1;
    else if birthweight>=5.5 then lowbirthweight=0;

*other risk factors;
    if H30D31=1 then foster_home=1;

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else foster_home=0;
  if H3MA2 in (1,2,3,4,5) then basic_needs_not_met=1;
  else basic_needs_not_met=0;
  if H3MA3 in (1,2,3,4,5) then child_abuse=1;
  else child_abuse=0;
  if H3MA4 in (1,2,3,4,5) then sexual_abuse=1;
  else sexual_abuse=0;
  if (0<H3MA5<61) then social_service_investigation=1;
  else social_service_investigation=0;
  if (0<H3MA6<67) then social_service_removal=1;
  else social_service_removal=0;
  if H3CJ160=1 then father_in_prison=1;
  else father_in_prison=0;
  if pa21=1 then public_assistance=1;
  else public_assistance=0;
*other protective factors;
  if H3MN1=1 then adult_mentor=1; else adult_mentor=0;
*outputs merged data set where wave1.aid=wave3id;
  if a and b then output;
run;

*calculation of friend network per Haynie(2001);
*reshapes friends variables into columns;
proc sql;
  create table friends as select a.aid, b.* from addhlth.inschool
  a inner join addhlth.sfriend b on a.sqid=b.sqid where aid^='';
quit;
proc sort data=friends; by aid;
proc transpose data=friends out=friends2;
by aid;
run;
*removes friends without valid AID;
data friends3;
  set friends2;
  if col1 in (77777777,88888888,99959995,99999999) then delete;
  aid_friend=put(col1,$.);
run;

*switches AID columns to get full friend network as some respondents
  may have been nominated but nominated no one themselves;
data friends3b;
  set friends3;
  rename aid_friend=aid aid=aid_friend;
run;

*combines datasets to get full network;
data friends4;
  set friends3(in=a) friends3b(in=b);
  junk=aid||aid_friend;
  if input(aid,8)=. or input(aid_friend,8)=. or aid=aid_friend then delete;
  if a then data=1; if b then data=2;
run;

*removes duplicate network entries;
proc sort data=friends4; by junk;
data friends5;
  set friends4;
  by junk;
  if first.junk then output;
  drop col1 junk;
run;

*calculate average delinquency per node per Haynie (2001);
proc sql;
  create table frienddelinquency

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```

        as select a.aid, a.aid_friend, b.minordelinquency
        from wave1 b inner join friends5 a
        on a.aid_friend=b.aid where input(a.aid,8.)^=.;
quit;
proc means data=friendedelinquency noprint;
  class aid;
  var minordelinquency;
  output out=friendedelinquency2 sum=friendedelinquency;
run;
data friendedelinquency2b;
  set friendedelinquency2;
  if aid='' then output;
run;

*merge friendedelinquency into full data;
proc sql;
  create table friendedelinquency3 as select b.aid, a.friendedelinquency
  from wave1 b left join friendedelinquency2b a on a.aid=b.aid;
quit;
data friendedelinquency3;
  set friendedelinquency3;
  if friendedelinquency=. then friendedelinquency=0;
  if aid='' then output;
run;
proc sort data=friendedelinquency3; by aid;
proc sql;
  create table neighborhood as select a.aid, bst90598, bst90813
  from wave1and3merge as a left join addhlth.Context1 as b
  on a.aid=b.aid ;
quit;
data wave1and3merge2;
  merge wave1and3merge(in=a) friendedelinquency3 neighborhood;
  by aid;
  *reverse code self-control factors;
  array sc{*} H1SE1 H1SE2 H1SE3;
  do i=1 to dim(sc);
    if sc{i}=1 then sc{i}=6;
  else if sc{i}=2 then sc{i}=5;
  else if sc{i}=3 then sc{i}=4;
  else if sc{i}=4 then sc{i}=3;
  else if sc{i}=5 then sc{i}=2;
  else if sc{i}=6 then sc{i}=1;
  end;
  array sc2{*} H1PF18 H1PF19 H1PF20 H1PF21 ;
  do i=1 to dim(sc2);
    if sc2{i}=1 then sc2{i}=5;
  else if sc2{i}=2 then sc2{i}=4;
  else if sc2{i}=3 then sc2{i}=3;
  else if sc2{i}=4 then sc2{i}=2;
  else if sc2{i}=5 then sc2{i}=1;
  if sc2{i}=6 then sc2{i}=.;
  end;
  *reverse code parental control factors;
  array pc1{*} H1WP1 H1WP2 H1WP3 H1WP4 H1WP5 H1WP6 H1WP7 ;
  do i=1 to dim(pc1);
    if pc1{i}=1 then pc1{i}=0;
  else if pc1{i}=0 then pc1{i}=1;
  end;
  *reverse code general health & se factors;

  array gh{*} H1PF27 H1PF28 H1PF31 H1GH1 H1PF30
  H1PF33 H1PF34 H1PF35 H1PF36;
  do i=1 to dim(gh);
    if gh{i}=1 then gh{i}=5;
  else if gh{i}=2 then gh{i}=4;

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```

else if gh{i}=4 then gh{i}=2;
else if gh{i}=5 then gh{i}=1;
end;
if bio_sex=2 then bio_sex=0;
if bst90598>.3 then poverty=1;
else poverty=0;
if bst90813>.6 then transiency=1;
else transiency=0;
if adhd_scale>13.16+8.91 then adhd_present=1;
else adhd_present=0;
if frienddelinquency>5 then fd=1;
else fd=0;
array ed{*} H3ED2 H3ED3 H3ED4 H3ED5;
array ed2{*} ged hsd aa ba;
edcheck=0;
do i=1 to dim(ed);
  if ed{i}=1 then ed2{i}=1; else ed2{i}=0;
edcheck=edcheck+ed2{i};
end;
if edcheck=0 then nodiploma_ged=1; else nodiploma_ged=0;
array rfcalc {*} teenage_mother single_parent nonintact_parents
  foster_home basic_needs_not_met child_abuse sexual_abuse
  social_service_investigation social_service_removal
  father_in_prison public_assistance poverty
  transiency adhd_present nodiploma_ged fd;
array rfcalc2 {*} teenage_mother2 single_parent2 nonintact_parents2
  foster_home2 basic_needs_not_met2 child_abuse2 sexual_abuse2
  social_service_investigation2 social_service_removal2
  father_in_prison2 public_assistance2 poverty2
  transiency2 adhd_present2 nodiploma_ged2 fd2;
do i=1 to dim(rfcalc);
  if rfcalc{i}=. then rfcalc2{i}=0;
else rfcalc2{i}=rfcalc{i};
end;
risk_factors=teenage_mother2+single_parent2+nonintact_parents2+
  foster_home2+basic_needs_not_met2+child_abuse2+
  sexual_abuse2+social_service_investigation2+
  social_service_removal2+father_in_prison2+
  public_assistance2+poverty2+transiency2+
  adhd_present2+nodiploma_ged2+fd+
  juvenile_arrest+juvenile_convictions;
if risk_factors=0 then rf2=1;
else if risk_factors in (1,2) then rf2=2;
else if risk_factors in (3,4) then rf2=3;
else if risk_factors>4 then rf2=4;
parentalcontrol=H1WP1+H1WP2+H1WP3+H1WP4+H1WP5+H1WP6+H1WP7;
if parentalcontrol>2 then parentalcontrol2=0;
else if parentalcontrol<3 then parentalcontrol2=1;
if H1WP9 in (4,5) and H1WP10 in (4,5) then motherbond=1;
else motherbond=0;
if H1WP13 in (4,5) and H1WP14 in (4,5) then fatherbond=1;
else fatherbond=0;
if H1PR1 in (5) or H1PR2 in (5) or H1PR4 in (5) or
  H1ED19 in (5) or H1ED20 in (5) then otherbond=1;
else otherbond=0;
if H1PF27>3 and H1PF28>3 and H1PF31>3 then healthy=1;
else healthy=0;
if H1PF30>3 and H1PF33>3 and H1PF34>3 and H1PF35>3 and
  H1PF36>3 then selfesteem=1;
else selfesteem=0;
if H1EE12>4 and H1EE1>4 and H1EE2>4 then futureaspirations=1;
else futureaspirations=0;
if H1RE3 in (1,2) and H1RE4 in (1,2) and
  H1RE6<4 and H1RE7<3 then religiosity=1;
else religiosity=0;

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if H1IR1 in (4,5) and H1IR2 in (4,5) then attractiveness=1;
else attractiveness=0;
if AH_PVT>100.53+14.53 then intelligence=1;
else intelligence=0;
if H3MR1 in (1,2,3) then marriage=1;
else marriage=0;
diploma_ged=1-nodiploma_ged;
protective_factors=parentalcontrol2+motherbond+fatherbond+
    otherbond+healthy+selfesteem+
    futureaspirations+religiosity+
    attractiveness+intelligence+ diploma_ged+
    aa+ba+marriage;
if protective_factors<4 then pf2=1;
else if 3<protective_factors<6 then pf2=2;
else if 5<protective_factors<9 then pf2=3;
else if protective_factors>8 then pf2=4;
pf_rf_diff=protective_factors-risk_factors;
if pf_rf_diff=. and pf_rf_diff<0 then pf_rf_diff2=1;
else if pf_rf_diff=0 or pf_rf_diff=1 then pf_rf_diff2=2;
else if 1<pf_rf_diff<5 then pf_rf_diff2=3;
else if pf_rf_diff>4 then pf_rf_diff2=4;
*Reverse code Perrone's self-control questions;
array sc2a{*} H1ED15 H1ED16 H1ED17 H1FS5;
array sc2b{*} H1ED15b H1ED16b H1ED17b H1FS5b;
do i=1 to dim(sc2a);
    sc2b{i}=-1*sc2a{i};
end;
H1PF34b=-1*H1PF34;
if a then output;
run;

title 'Control Variables';
proc means data=wave1and3merge2 maxdec=2 n mean std median min max;
var age_wave1 age_wave3;
run;
proc freq data=wave1and3merge2 formchar (1,2,7)='  ';
table race bio_sex;
run;
proc freq data=wave1and3merge2 formchar (1,2,7)='  ';
title 'Binge drinking';
table H3T040 binge_drinking;
run;
proc freq data=wave1and3merge2 formchar (1,2,7)='  ';
title 'Problems from drinking';
table H3T045 H3T046 H3T047 problems_from_drinking;
run;
proc freq data=wave1and3merge2 formchar (1,2,7)='  ';
title 'Property Crime';
table H3DS1 H3DS6 H3DS2 H3DS3 property_crime ;
run;
proc freq data=wave1and3merge2 formchar (1,2,7)='  ';
title 'Assault';
table H3DS17 H3DS18H H3DS18I assault;
run;
proc freq data=wave1and3merge2 formchar (1,2,7)='  ';
title 'Adult Arrest';
table H3CJ68 adult_arrest ;
run;
proc freq data=wave1and3merge2 formchar (1,2,7)='  ';
title 'Adult Convictions';
table H3CJ107 H3CJ130 H3CJ152 H3CJ153 H3CJ154 adult_convictions;
run;

title 'Risk Factors';
proc means data=wave1and3merge2 maxdec=2 mean std median min max;

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var birthweight adhd scale risk_factors
    frienddelinquency bst90598 bst90813;
run;

proc freq data=wave1and3merge2 formchar (1,2,7)= '  ';
    table lowbirthweight teenage_mother parental_type single_parent nonintact_parents
        foster_home basic_needs_not_met child_abuse sexual_abuse social_service_investigation
        social_service_removal father_in_prison public_assistance poverty transiency
        adhd_present nodiploma_ged fd juvenile_arrest juvenile_convictions rf2;
run;

title 'Self-Control Construct ';
proc corr data=wave1and3merge2 alpha nosimple nocorr ;
    var H1ED15b H1ED16b H1ED17b H1FS5b H1PF34 ;
run;
proc corr data=wave1and3merge2 alpha nosimple nocorr ;
    var H1ED15b H1ED16b H1ED17b H1FS5b H1PF34 H1PF18 H1PF19 H1PF20 H1PF21 ;
run;
proc factor data=wave1and3merge2 out=sc nfactors=1;
    var H1ED15b H1ED16b H1ED17b H1FS5b H1PF34 H1PF18 H1PF19 H1PF20 H1PF21;
run;
proc freq data=wave1and3merge2 ;
    table H1ED15 H1ED16 H1ED17 H1FS5 H1PF34 H1PF18 H1PF19 H1PF20 H1PF21;
run;

title 'Parental Control';
proc corr data=wave1and3merge2 alpha nosimple nocorr;
    var H1WP1 H1WP2 H1WP3 H1WP4 H1WP5 H1WP6 H1WP7 /*parental control*/;
run;
proc factor data=wave1and3merge2 out=pc nfactors=1;
    var H1WP1 H1WP2 H1WP3 H1WP4 H1WP5 H1WP6 H1WP7 /*parental control*/;
run;
proc freq data=wave1and3merge2 ;
    table H1WP1 H1WP2 H1WP3 H1WP4 H1WP5 H1WP6 H1WP7 parentalcontrol2/*parental control*/;
run;
title 'Mother Bond';
proc corr data=wave1and3merge2 alpha nosimple nocorr;
    var H1WP9 H1WP10 /*parental connectedness*/;
run;
proc factor data=wave1and3merge2 out=mb nfactors=1;
    var H1WP9 H1WP10 /*parental connectedness*/;
run;
proc freq data=wave1and3merge2 ;
    table H1WP9 H1WP10 motherbond/*parental connectedness*/;
run;
title 'Father Bond';
proc corr data=wave1and3merge2 alpha nosimple nocorr;
    var H1WP13 H1WP14 /*parental connectedness*/;
run;
proc factor data=wave1and3merge2 out=fb nfactors=1;
    var H1WP13 H1WP14 /*parental connectedness*/;
run;
proc freq data=wave1and3merge2 ;
    table H1WP13 H1WP14 fatherbond /*parental connectedness*/;
run;
title 'Connectedness with Others';
proc corr data=wave1and3merge2 alpha nosimple nocorr;
    var H1PR1 H1PR2 H1PR4 H1ED19 H1ED20/*connectedness with others*/;
run;
proc factor data=wave1and3merge2 out=co nfactors=1;
    var H1PR1 H1PR2 H1PR4 H1ED19 H1ED20/*connectedness with others*/;
run;
proc freq data=wave1and3merge2 ;
    table H1PR1 H1PR2 H1PR4 H1ED19 H1ED20 otherbond/*connectedness with others*/;
run;

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title 'General Health';
proc corr data=waveland3merge2 alpha nosimple nocorr;
  var H1PF27 H1PF28 H1PF31 H1GH1/*general health*/;
run;
proc factor data=waveland3merge2 out=gh nfactors=1;
  var H1PF27 H1PF28 H1PF31 H1GH1/*general health*/;
run;
proc freq data=waveland3merge2 ;
  table H1PF27 H1PF28 H1PF31 H1GH1 healthy/*general health*/;
run;
title 'Self Esteem';
proc corr data=waveland3merge2 alpha nosimple nocorr;
  var H1PF30 H1PF33 H1PF34 H1PF35 H1PF36/*self esteem*/;
run;
proc factor data=waveland3merge2 out=se nfactors=1;
  var H1PF30 H1PF33 H1PF34 H1PF35 H1PF36/*self esteem*/;
run;
proc freq data=waveland3merge2 ;
  table H1PF30 H1PF33 H1PF34 H1PF35 H1PF36 selfesteem/*self esteem*/;
run;
title 'Religiosity';
proc corr data=waveland3merge2 alpha nosimple nocorr;
  var H1RE3 H1RE4 H1RE6 H1RE7/* religiosity */;
run;
proc factor data=waveland3merge2 out=rel nfactors=1;
  var H1RE3 H1RE4 H1RE6 H1RE7/* religiosity */;
run;
proc freq data=waveland3merge2 ;
  table H1RE3 H1RE4 H1RE6 H1RE7 religiosity/* religiosity */;
run;
title 'Future Aspirations';
proc corr data=waveland3merge2 alpha nosimple nocorr;
  var H1EE12 H1EE1 H1EE2 /* future aspirations */;
run;
proc factor data=waveland3merge2 out=fa nfactors=1;
  var H1EE12 H1EE1 H1EE2 /* future aspirations */;
run;
proc freq data=waveland3merge2 ;
  table H1EE12 H1EE1 H1EE2 futureaspirations /* future aspirations */;
run;
title 'Attractiveness';
proc corr data=waveland3merge2 alpha nosimple nocorr;
  var H1IR1 H1IR2 /*attractiveness*/;
run;
proc factor data=waveland3merge2 out=at nfactors=1;
  var H1IR1 H1IR2 /*attractiveness*/;
run;
proc freq data=waveland3merge2 ;
  table H1IR1 H1IR2 attractiveness/*attractiveness*/;
run;

data factors;
  merge waveland3merge2
    sc(keep=aid factor1 rename=(factor1=sc)) pc(keep=aid factor1 rename=(factor1=pc))
    mb(keep=aid factor1 rename=(factor1=mb)) fb(keep=aid factor1 rename=(factor1=fb))
    co(keep=aid factor1 rename=(factor1=co)) gh(keep=aid factor1 rename=(factor1=gh))
    se(keep=aid factor1 rename=(factor1=se)) rel(keep=aid factor1 rename=(factor1=rel))
    fa(keep=aid factor1 rename=(factor1=fa)) at(keep=aid factor1 rename=(factor1=at));
  by aid;
  label ah_pvt='';
  sc_sum=H1PF18+H1PF19+H1PF20+H1PF21;
  sc_sum_z=(sc_sum-15.2842)/2.4729;
  if sc=. then sc_miss=1; else sc_miss=0;
  if race='White' then nonwhite=1; else nonwhite=0;
run;

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```

title 'Intelligence';
proc freq data=factors ;
  table intelligence;
run;
title 'Self-Control and Protective Factors Scales';
proc means data=factors maxdec=4 mean std min max;
var sc pc mb co gh se fa rel at ah_pvt;
run;
title 'Protection-Risk Measure';
proc freq data=factors ;
  table pf_rf_diff2;
run;

title 'Relationship between Deviance and Controls';
proc freq data=factors formchar(1,2,7)='  ';
table (bio_sex race nonwhite)*(problems_from_drinking property_crime
  assault adult_arrest adult_convictions)/chisq nofreq nocol nopct;
run;
proc corr data=factors nosimple;
  var problems_from_drinking property_crime
  assault adult_arrest adult_convictions;
with age_wave3 ;
run;
title 'Relationship between Deviance and Risk Factors';
proc corr data=factors nosimple;
var  birthweight adhdscale frienddelinquency minordelinquency
juvenile_arrest juvenile_convictions
teenage_mother single_parent nonintact_parents
foster_home basic_needs_not_met child_abuse sexual_abuse social_service_investigation
social_service_removal father_in_prison public_assistance
adult_mentor;
with problems_from_drinking property_crime assault
  adult_arrest adult_convictions;
run;

title 'Relationship between Deviance and Protective Factors';
proc corr data=factors nosimple;
  var parentalcontrol2 /*parental control*/
  motherbond fb fatherbond/*parental connectedness*/
  otherbond/*connectedness with others*/
  healthy/*general health*/
  selfesteem /*self esteem*/
  futureaspirations/* future aspirations */
  religiosity/* religiosity */
  attractiveness/*attractiveness*/
  intelligence diploma_ged aa ba
  marriage protective_factors pf2;
with problems_from_drinking property_crime assault
  adult_arrest adult_convictions;
run;

title 'Relationship between Deviance and Protective Factors';
proc corr data=factors nosimple;
  var pc /*parental control*/
  mb fb /*parental connectedness*/
  co /*connectedness with others*/
  gh /*general health*/
  se /*self esteem*/
  fa /* future aspirations */
  rel/* religiosity */
  at /*attractiveness*/
  AH_PVT;
with problems_from_drinking property_crime assault
  adult_arrest adult_convictions;
run;

```

```

title 'Risk Factors as a Percentage of Overall Risk Factors';
proc transpose data=wave1and3merge2 out=pfd_transpose;
  var lowbirthweight nonintact_parents foster_home
      basic_needs_not_met child_abuse sexual_abuse
      social_service_investigation
      social_service_removal
      father_in_prison public_assistance
      poverty transiency adhd_present
      nodiploma_ged fd juvenile_arrest
      juvenile_convictions
teenage_mother;
  by aid pf_rf_diff2 problems_from_drinking;
run;
proc freq data=pfd_transpose formchar (1,2,7)='  ';
  table pf_rf_diff2*_name_*problems_from_drinking/chisq cmh nopct norow nofreq;
  where col1=1;
run;
proc transpose data=wave1and3merge2 out= property_crime_transpose;
  var lowbirthweight nonintact_parents foster_home
      basic_needs_not_met child_abuse sexual_abuse
      social_service_investigation
      social_service_removal
      father_in_prison public_assistance
      poverty transiency adhd_present
      nodiploma_ged fd juvenile_arrest
      juvenile_convictions
teenage_mother;
  by aid pf_rf_diff2 property_crime;
run;
proc freq data= property_crime_transpose formchar (1,2,7)='  ';
  table pf_rf_diff2*_name_* property_crime/chisq cmh nopct norow nofreq;
  where col1=1;
run;
proc transpose data=wave1and3merge2 out=assault_transpose;
  var lowbirthweight nonintact_parents foster_home
      basic_needs_not_met child_abuse sexual_abuse
      social_service_investigation
      social_service_removal
      father_in_prison public_assistance
      poverty transiency adhd_present
      nodiploma_ged fd juvenile_arrest
      juvenile_convictions
teenage_mother;
  by aid pf_rf_diff2 assault;
run;
proc freq data=assault_transpose formchar (1,2,7)='  ';
  table pf_rf_diff2*_name_*assault/chisq cmh nopct norow nofreq;
  where col1=1;
run;
proc transpose data=wave1and3merge2 out=adult_arrest_transpose;
  var lowbirthweight nonintact_parents foster_home
      basic_needs_not_met child_abuse sexual_abuse
      social_service_investigation
      social_service_removal
      father_in_prison public_assistance
      poverty transiency adhd_present
      nodiploma_ged fd juvenile_arrest
      juvenile_convictions
teenage_mother;
  by aid pf_rf_diff2 adult_arrest;
run;
proc freq data=adult_arrest_transpose formchar (1,2,7)='  ';
  table pf_rf_diff2*_name_*adult_arrest/chisq cmh nopct norow nofreq;
  where col1=1;

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```

run;
proc transpose data=wave1and3merge2 out=adult_convictions_transpose;
  var lowbirthweight nonintact_parents foster_home
    basic_needs_not_met child_abuse sexual_abuse
    social_service_investigation
    social_service_removal
    father_in_prison public_assistance
    poverty transiency adhd_present
    nodiploma_ged fd juvenile_arrest
    juvenile_convictions
teenage_mother;
  by aid pf_rf_diff2 adult_convictions;
run;
proc freq data=adult_convictions_transpose formchar (1,2,7)='  ';
  table pf_rf_diff2*_name_*adult_convictions/chisq cmh nopct norow nofreq;
  where col1=1;
run;

title 'Protective Factors as a Percentage of Protective Risk Factors';
proc transpose data=wave1and3merge2 out=pf_d_transpose;
  var parentalcontrol2 /*parental control*/
    motherbond fatherbond/*parental connectedness*/
    otherbond/*connectedness with others*/
healthy/*general health*/
selfesteem /*self esteem*/
  futureaspirations/* future aspirations */
religiosity/* religiosity */
attractiveness/*attractiveness*/
  intelligence diploma_ged aa ba marriage;
  by aid pf_rf_diff2 problems_from_drinking;
run;
proc freq data=pf_d_transpose formchar (1,2,7)='  ';
  table pf_rf_diff2*_name_*problems_from_drinking/chisq cmh nopct norow nofreq;
  where col1=1;
run;
proc transpose data=wave1and3merge2 out= property_crime_transpose;
  var parentalcontrol2 /*parental control*/
    motherbond fatherbond/*parental connectedness*/
    otherbond/*connectedness with others*/
healthy/*general health*/
selfesteem /*self esteem*/
  futureaspirations/* future aspirations */
religiosity/* religiosity */
attractiveness/*attractiveness*/
  intelligence diploma_ged aa ba marriage;
  by aid pf_rf_diff2 property_crime;
run;
proc freq data= property_crime_transpose formchar (1,2,7)='  ';
  table pf_rf_diff2*_name_* property_crime/chisq cmh nopct norow nofreq;
  where col1=1;
run;
proc transpose data=wave1and3merge2 out=assault_transpose;
  var parentalcontrol2 /*parental control*/
    motherbond fatherbond/*parental connectedness*/
    otherbond/*connectedness with others*/
healthy/*general health*/
selfesteem /*self esteem*/
  futureaspirations/* future aspirations */
religiosity/* religiosity */
attractiveness/*attractiveness*/
  intelligence diploma_ged aa ba marriage;
  by aid pf_rf_diff2 assault;
run;
proc freq data=assault_transpose formchar (1,2,7)='  ';
  table pf_rf_diff2*_name_*assault/chisq cmh nopct norow nofreq;

```



```

    where coll=1;
run;
proc transpose data=wave1and3merge2 out=adult_arrest_transpose;
    var parentalcontrol2 /*parental control*/
        motherbond fatherbond/*parental connectedness*/
        otherbond/*connectedness with others*/
    healthy/*general health*/
    selfesteem /*self esteem*/
    futureaspirations/* future aspirations */
    religiosity/* religiosity */
    attractiveness/*attractiveness*/
        intelligence diploma_ged aa ba marriage;
    by aid pf_rf_diff2 adult_arrest;
run;
proc freq data=adult_arrest_transpose formchar (1,2,7)='  ';
    table pf_rf_diff2*_name_*adult_arrest/chisq cmh nopct norow nofreq;
    where coll=1;
run;
proc transpose data=wave1and3merge2 out=adult_convictions_transpose;
    var parentalcontrol2 /*parental control*/
        motherbond fatherbond/*parental connectedness*/
        otherbond/*connectedness with others*/
    healthy/*general health*/
    selfesteem /*self esteem*/
    futureaspirations/* future aspirations */
    religiosity/* religiosity */
    attractiveness/*attractiveness*/
        intelligence diploma_ged aa ba marriage;
    by aid pf_rf_diff2 adult_convictions;
run;
proc freq data=adult_convictions_transpose formchar (1,2,7)='  ';
    table pf_rf_diff2*_name_*adult_convictions/chisq cmh nopct norow nofreq;
    where coll=1;
run;
title 'relationship between risk factors and self-control';
proc corr data=factors nosimple ;
    var bio_sex age_wave3 nonwhite teenage_mother lowbirthweight
        nonintact_parents foster_home basic_needs_not_met
        child_abuse sexual_abuse social_service_investigation
        social_service_removal father_in_prison public_assistance
        poverty transiency adhd_present nodiploma_ged fd
        juvenile_arrest juvenile_convictions risk_factors rf2;
with sc;
run;

*relationship between protective factors and self-control;
proc corr data=factors2 nosimple vardef=weight ;
    var pc parentalcontrol2 /*parental control*/
        mb motherbond fb fatherbond/*parental connectedness*/
        co otherbond/*connectedness with others*/
    gh healthy/*general health*/
    se selfesteem /*self esteem*/
    fa futureaspirations/* future aspirations */
    rel religiosity/* religiosity */
    at attractiveness/*attractiveness*/
        intelligence diploma_ged aa ba
        marriage protective_factors pf2
        binge_drinking problems_from_drinking property_crime assault
        adult_arrest adult_convictions;
with sc;
weight GSWGT3_2;
run;
title 'Self-control means by risk, protection and difference levels';

proc means data=factors2 mean std vardef=weight ;

```

```

class rf2;
var sc pc mb co gh se fa rel at;
weight GSWGT3_2;
run;
proc means data=factors2 mean std vardef=weight ;
class pf2;
var sc pc mb co gh se fa rel at ;
weight GSWGT3_2;
run;
proc means data=factors2 mean std vardef=weight ;
class pf_rf_diff2 ;
var sc pc mb co gh se fa rel at ;
weight GSWGT3_2;
run;
proc sql;
create table factors2 as select * from factors as a inner join addhlth.weights3 as b on a.aid=b.aid;
quit;
data factors3;
set factors2;
risk_factors_wo_life_events=teenage_mother2+single_parent2+nonintact_parents2+
foster_home2+basic_needs_not_met2+child_abuse2+sexual_abuse2+
social_service_investigation2+social_service_removal2+
father_in_prison2+public_assistance2+poverty2+
transiency2+adhd_present2+fd;
protective_factors_wo_life=parentalcontrol2+motherbond+fatherbond+
otherbond+healthy+selfesteem+
futureaspirations+religiosity+
attractiveness+intelligence;
pf_rf_diff_wo_life=protective_factors_wo_life-risk_factors_wo_life;
run;

title 'Binge Drinking Main Effects Model' ;
proc genmod data=factors2 desc;
class aid scid pf_rf_diff2 race;
model binge_drinking=age_wave3 bio_sex race sc pf_rf_diff/dist=bin ;
repeated subject=aid(scid)/logor=fullclust;
weight GSWGT3_2;
run;
title 'Binge Drinking Interactions Model ' ;
proc genmod data=factors2 desc;
class aid scid pf_rf_diff2 race;
model binge_drinking=age_wave3 bio_sex race sc|pf_rf_diff/dist=bin ;
repeated subject=aid(scid)/logor=fullclust;
* output out=predicted pred=pred;
weight GSWGT3_2;
run;

title 'Drinking Main Effects Model' ;
proc genmod data=factors2 desc;
class aid scid pf_rf_diff2 race;
model problems_from_drinking=age_wave3 bio_sex race sc pf_rf_diff/dist=bin ;
repeated subject=aid(scid)/logor=fullclust;
* weight GSWGT3_2;
run;
title 'Drinking Interactions Model ' ;
proc genmod data=factors2 desc;
class aid scid pf_rf_diff2 race;
model problems_from_drinking=age_wave3 bio_sex race sc|pf_rf_diff/dist=bin ;
repeated subject=aid(scid)/logor=fullclust;
* output out=predicted pred=pred;
weight GSWGT3_2;
run;

title 'Property Crime Effects Model' ;
proc genmod data=factors2 desc;

```

```

class aid scid pf_rf_diff2 race;
model property_crime=age_wave3 bio_sex race sc pf_rf_diff/dist=bin ;
repeated subject=aid(scid)/logor=fullclust;
weight GSWGT3_2;
run;
title 'Property Crime Interactions Model ' ;
proc genmod data=factors2 desc;
class aid scid pf_rf_diff2 race;
model property_crime=age_wave3 bio_sex race sc|pf_rf_diff/dist=bin ;
repeated subject=aid(scid)/logor=fullclust;
* output out=predicted pred=pred;
weight GSWGT3_2;
run;

title 'Assault Effects Model' ;
proc genmod data=factors2 desc;
class aid scid pf_rf_diff2 race;
model Assault=age_wave3 bio_sex race sc pf_rf_diff/dist=bin ;
repeated subject=aid(scid)/logor=fullclust;
weight GSWGT3_2;
run;
title 'Assault Interactions Model ' ;
proc genmod data=factors2 desc;
class aid scid pf_rf_diff2 race;
model Assault=age_wave3 bio_sex race sc|pf_rf_diff/dist=bin ;
repeated subject=aid(scid)/logor=fullclust;
* output out=predicted pred=pred;
weight GSWGT3_2;
run;

title 'Arrest Effects Model' ;
proc genmod data=factors2 desc;
class aid scid pf_rf_diff2 race;
model adult_arrest=age_wave3 bio_sex race sc pf_rf_diff/dist=bin ;
repeated subject=aid(scid)/logor=fullclust;
weight GSWGT3_2;
run;
title 'Arrest Interactions Model ' ;
proc genmod data=factors2 desc;
class aid scid pf_rf_diff2 race;
model adult_arrest=age_wave3 bio_sex race sc|pf_rf_diff/dist=bin ;
repeated subject=aid(scid)/logor=fullclust;
* output out=predicted pred=pred;
weight GSWGT3_2;
run;

title 'Conviction Effects Model' ;
proc genmod data=factors2 desc;
class aid scid pf_rf_diff2 race;
model adult_convictions=age_wave3 bio_sex race sc pf_rf_diff2/dist=bin ;
repeated subject=aid(scid)/logor=fullclust;
weight GSWGT3_2;
run;
title 'Conviction Interactions Model ' ;
proc genmod data=factors2 desc;
class aid scid pf_rf_diff2 race;
model adult_convictions=age_wave3 bio_sex race sc|pf_rf_diff2/dist=bin ;
repeated subject=aid(scid)/logor=fullclust;
* output out=predicted pred=pred;
weight GSWGT3_2;
run;

```