

ABSTRACT

Title of thesis: SCHOOL PEERS AND DELINQUENCY: AN
INTERACTIONAL THEORY APPROACH TO EXAMINING
RACIAL DIFFERENCES

Daniel Wonho Jang, Master of Arts, 2015

Thesis directed by: Professor Terence P. Thornberry
Department of Criminology and Criminal Justice

Using an approach based on Thornberry's interactional theory, this paper focuses on testing whether or not the theory is valid in explaining racial differences. This paper focuses on two variables of the theory, which previous studies indicate are more likely to explain race differences in delinquency than the others: commitment to school and peer delinquency. In accordance with interactional theory, this paper intends to examine the relationship between each set of variables and how they influence one another over time, whether or not these relationships are similar across racial groups, expanding on findings that use general theories such as social control and social learning to explain racial differences in offending, and, ultimately, implications regarding the application of theories to explain racial differences in offending. This paper will utilize structural equation modeling to conduct a multi-wave analysis using data from the Rochester Youth Development Study.

SCHOOL, PEERS, AND DELINQUENCY: AN INTERACTIONAL THEORY
APPROACH TO EXAMINING RACIAL DIFFERENCES

by

Daniel Wonho Jang

Thesis submitted to the Faculty of the Graduate School of the
University of Maryland; College Park in partial fulfillment
of the requirements for the degree of
Master of Arts
2015

Advisory Committee:

Professor Terence P. Thornberry, Chair

Professor Brian D. Johnson

Professor Thomas A. Loughran

Table of Contents

Introduction	1
Thornberry’s Interactional Theory	2
Hirschi’s Control Theory	4
<i>School and delinquency</i>	7
Akers’ Social Learning Theory	10
<i>Peers and delinquency</i>	11
Reconciling Control and Learning Theories: Selection vs. Socialization	12
School and Peers	14
Observing and Explaining Racial Differences	16
Assessing Racial Differences: Different Levels vs Different Effects	17
<i>Different levels of causal variables</i>	17
<i>Different effects of causal variables</i>	18
Testing Racial Differences with General Theories	19
<i>Interactional theory on different levels and effects</i>	19
Racial Differences in Levels and Effects of Causal Variables	21
<i>Racial differences in level of commitment to school</i>	21
<i>Racial differences in level of delinquent peers</i>	22
<i>Racial differences in effect of commitment to school</i>	22
<i>Racial differences in effect of peer delinquency</i>	24
Methods	26
Sample	26
<i>Rochester Youth Development Study</i>	26
<i>Sample Attrition and FIML</i>	27
<i>Power</i>	28
Measurement	29
<i>Endogenous Variables</i>	29
<i>Control Measures</i>	31
Results	33
Analysis	33
<i>Testing Interactional Theory</i>	33
<i>Testing Generality: Comparison of Race Groups</i>	35
Descriptive Statistics	36

Bivariate Analyses	40
Fit Statistics	44
Testing Interactional Theory	47
<i>Total Sample</i>	47
<i>White and African American Samples</i>	56
Testing Racial Differences	57
Discussion	62
Appendix	66
References	68

Introduction

Many of the theoretical explanations of crime describe a single process that explains deviance for all people. According to these general theories of crime, models of delinquency should be invariant even in the context of differing subgroups. Several general theories, including more recent theories such as Gottfredson and Hirschi's general theory of crime (Gottfredson & Hirschi, 1990) and Agnew's general strain theory (1992; 2006) have received empirical assessment concerning the generality of their causal propositions across a variety of subgroups including gender (Piquero, et al., 2005) and geographic location (Vazsonyi and Belliston, 2007). This study is interested in assessing the generality of one such theory: Thornberry's interactional theory (1987).

One area of research where there has been some testing of these general theories is in the assessment of racial differences in crime (Matsueda & Heimer, 1987; Cernkovich & Giordano, 1992; Akins et al., 2010). Specifically, research has examined whether the specific processes of a given theory of crime or delinquency differ by racial/ethnic subgroup. These tests are specifically interested in the ability of theorized causal variables to explain crime and delinquency. Here, "causal variables" refer to the specified variables in a theory that are expected to have a causal effect on an outcome. In other words, the presence of a particular causal variable in a criminological theory should be strongly predictive of crime or delinquency. This is tested by both observing an empirical association between the theorized causal variables and delinquency as well as providing a discursive explanation for why and how certain factors directly influence an individual's involvement in delinquency. When considering race and control theory, for example, the causal influence of the social bond on delinquency should be negative for

both whites and African Americans. According to general theories, the direction and magnitude of these causal effects should also remain consistent across racial groups. To continue the extensive study of racial differences in crime, it is important to examine whether or not the causal effects of certain factors apply equally across groups and whether there are implications regarding how we should attempt to address those differences, assuming they exist.

Thornberry's Interactional Theory

Thornberry's interactional theory (Thornberry, 1987; Thornberry & Krohn, 2005) incorporates elements of control and learning theory while emphasizing additional components to the theoretical processes originally defined by these theories. Like control and learning theory, interactional theory proposes that its processes are general. Such processes include weaker bonds to conventional society and association with delinquent peers and delinquent beliefs leading to higher levels of delinquency. Specifically, individuals who experience a weakening of bonding to conventional society will experience more behavioral freedom, which can be channeled into delinquent behavior if reinforced through interactions with delinquent peers (Thornberry, 1987). Interactional theory also specifies differing effects across the life course, where, for example, parents can be considered the primary means of socialization during childhood but can later be replaced by school and peers during adolescence. In addition, relationships between bonding and peer variables and delinquent outcomes are not only applicable in the unidirectional way that is defined by traditional theories, but rather have more extensive, reciprocal relationships that develop over time. In other words, these variables form "mutually reinforcing causal loops as delinquent careers unfold" (Thornberry and Krohn,

2005). In this way, many of the outcome variables in the theoretical model can be considered causal variables at different points.

Interactional theory involves a large network of variables and theoretically relevant factors. This study will focus on a particular subset of those variables. This is in large part due to practical empirical concerns regarding the ability to properly estimate a large number of effects (including reciprocal effects) among many variables over time, which requires a substantial amount of analytical power (both regarding the sample and analysis tool). More importantly, there are theoretical reasons for why the study may be more interested in focusing on the effects of a specific part of the whole interactional theory.

For the purposes of this particular study, I focus on the stage of adolescence when individual behavior is more likely to be influenced by two sources, school and peers. Focusing the analysis on these two concepts stems from previous research looking at factors associated with a particularly crucial stage of individual development (Peterson et al., 1992). Using data from the National Youth Survey (NYS), Jang (1999) found that there were age-varying effects of school and delinquent peers across an individual's adolescence. Specifically, commitment to school and association with delinquent peers exhibited stronger effects on delinquency during mid-adolescence (mid-13 to mid-15 years old) compared to earlier adolescence. Research has emphasized the importance of this stage of mid-adolescence, where individuals are more likely to seek autonomy from parental authority and are more susceptible to the negative influence of delinquent peers. This also emphasizes the importance of studying this crucial period in an individual's life course.

In addition to the variables that directly model delinquent involvement, interactional theory also notes the effect of structural factors. In the context of this theory, structural factors refer to neighborhood and environmental characteristics as well as structural position, such as class and race. Unlike social control and social learning theory, Thornberry (1987) argues that structural factors including class and race directly influence the individual's social bonds and peer networks and therefore indirectly influence delinquency (Thornberry et al., 1991; 1993). Structural and status factors such as race or class have a direct impact on the level of causal variables. For example, lower class, African Americans are expected to have weaker bonds to school and stronger relationships with delinquent peers. However, the theory maintains that despite the differences in the level of these variables, their effects should remain consistent across different subgroups. While the theory discusses this influence to the direct effects of the original causal variables, it is necessary to test the generality hypothesis that is still a part of the theory despite the acknowledgement of the additional influence of social-structural factors.

Hirschi's Control Theory

Interactional theory draws several of its propositions from earlier, traditional theories of delinquency. Interactional theory draws a large portion of its propositions from Hirschi's (1969) control theory. In his theory, Hirschi is less concerned with explaining why people become criminal and instead focuses on the forces that keep an individual from acting on their natural deviant tendencies. Hirschi states that the extent to which an individual is bonded to conventional society will determine how likely they are to be involved in delinquency.

Hirschi (1969) specifically mentions four elements that together form the social bond, which help prevent an individual from acting on their natural, delinquent tendencies: attachment, commitment, involvement, and belief. Attachment refers to the emotional, affective ties that one has, particularly for others, such as family and friends, but can also include people outside of those circles, such as teachers. High levels of attachment should have a negative effect on delinquency, as stronger attachments with others will raise the likelihood that individuals will consider the risk of disappointing those with whom they are close. Commitment refers to a key concept in control theory referred to as one's "stake in conformity" and is considered the rational component of the bond. Specifically, an individual dedicates a considerable amount of time and effort towards a conventional "line of action". Depending on the degree to which one is invested in achieving conventional goals, participation or association with delinquency and deviance can pose a risk of losing these conventional goals as well as their investments towards that goal. In this way, this element prevents the individual from committing delinquent acts for fear of losing their investment in conformity, similar to how attachment addresses the importance of an individual potentially breaking a personal relationship by committing a delinquent act. Involvement refers to the amount of time spent doing prosocial rather than deviant activities. Here, Hirschi argues that more time spent doing prosocial activities will limit the amount of time individuals have to participate in delinquent activities. Finally, belief refers to the set of rules that discourage deviance, specifically those that the individual legitimizes. Individuals who acknowledge the legitimacy of societal norms and rules are more likely to adhere to them. In

summary, the more elements of the social bond an individual develops and the stronger the bond is, the less likely an individual will be to engage in delinquency.

The empirical status of Hirschi's control theory has generally been supportive of the idea that bonds to social institutions can have a negative effect on delinquency. Hindelang (1973) examined bivariate relationships between social control variables and delinquency, finding, with the exception of attachment to peers, a strong association between the two sets of variables. However, later studies questioned the consistency in the significance of the individual components of the bond. A review of the literature testing this theory has resulted in somewhat mixed consistency in the strength of each type of bond on delinquency (Kempf, 1993). The review of the literature questioned the construct validity of the variables used in the studies testing the effects of social control as well as the significance of each individual bond. Specifically, involvement and belief did not seem to have an independent direct effect on delinquency beyond their association with commitment and attachment, respectively. Krohn and Massey (1980) found that commitment exhibited greater explanatory power in their comparison of social bonding variables. This was likely due to their commitment variable being a combined measure of Hirschi's concepts of involvement and commitment, as well as what Hirschi referred to as attachment to school. While this finding still raised questions about the relative strength of the different bonds in Hirschi's theory, it certainly implies the importance of the adolescent's relationship with school elements and how those elements play a role in shaping their delinquency.

Further criticism of Hirschi's control theory stems from support issues when using longitudinal data, something that Kempf (1993) pointed out in her assessment of

the empirical validity of the theory. Agnew (1991) noted that longitudinal studies have found that attachment, commitment, and involvement have weak to no significant effects on future delinquency while there is mixed support for belief having a moderate effect on future delinquency (Agnew, 1985; Paternoster and Iovanni, 1986). However, Agnew notes that these findings may largely be a result of methodological problems involving the measurement of theoretical concepts, including low reliability of the social control measures. Agnew's reassessment of social control theory found that there were relatively weak effects of the different forms of social bonds. One explanation he offers is that social control theory may differ by group. While he primarily addresses the possible differences based on age (later examined by Jang, 1999), this also supports the need to examine generality of theories across other groups.

School and delinquency

Hirschi acknowledges the importance of school factors in shielding adolescents from delinquent impulses and influences. Stronger attachment and commitment to school as well as high levels of involvement in school activities results in lower levels of delinquency (Hirschi, 1969; Krohn & Massey, 1980). Thornberry also notes that from a developmental perspective, school factors are expected to especially important during the middle adolescent years. Several studies have examined the contemporaneous effects of school on negative outcomes as well as unidirectional studies of the effects of delinquency on individual school performance and activity (Bachmann et al., 2008). The findings of these studies has been generally supportive of the significant negative effect of school variables on delinquency. Stewart (2003) conducted a study using multilevel modeling to assess the effects of individual and school-level bonding effects, such as

attachment and commitment to school, as well as belief in school rules and involvement in school activities. The study finds support for the effect of these school social bonds in reducing different types of school misbehavior, net of control variables. However, using a longitudinal approach, Felson and Staff (2006) found that the relationship between academic achievement and delinquency was spurious, explained by the effects of school bonds, specifically, attachment to teacher.

Some discrepancies appear when disaggregating different types of school bonds and sometimes when introducing other social factors into the model. A study by Jenkins (1997) examines this issue by testing the independent effects of four elements of school bonding. Concerning this issue, the study finds that commitment to school was consistently the most significant factor in predicting negative school outcomes with involvement in school being the weakest. Stewart (2003), however, found that belief in school rules was the strongest predictor of delinquency, followed by school attachment and commitment, respectively. One study by Matsueda & Heimer (1987) found that the independent effects of family and school bonding were nullified by the introduction of delinquent peer effects. This seems to indicate that while control variables like commitment to school can have significant effects when considered in isolation, researchers must account for other factors associated with an individual's experience during their time in school, specifically peer influence.

Several studies have also investigated the reverse causal effect of delinquency on school variables. Using data from the Rochester Youth Development Study, McCluskey et al. (2002) conducted a longitudinal analysis where they find that early substance use is a strong, significant predictor of school completion and academic achievement. A

significant effect was observed for whites and African Americans, but not for Latinos (specifically, Latino males). Using data from the National Longitudinal Study of Adolescent Health, McLeod et al. (2012) investigated the simultaneous effects of mental health and behavior problems on academic performance. They find that both general delinquency and substance use help account for poor academic performance.

In general, studies that look into the causal relationship between school factors and delinquency suggest further investigation into the reciprocal effects of these variables, rather than solely using a unidirectional model (Demantet & Van Houtte, 2012) and some have even investigated reciprocal effects between these variables (Liska & Reed, 1985; Hirschfield & Gasper, 2011). One example that specifically uses an interactional theory approach is a study conducted by Hoffman et al. (2013), which finds some support for a reciprocal relationship between academic achievement and delinquent involvement as well as a reciprocal relationship between academic achievement and school bonding variables. This reciprocal relationship makes sense since better academic achievement and higher levels of bonding make delinquent behavior a risky endeavor since it would diminish their social standing in school. Likewise, involvement in delinquent behavior may indicate that an individual is not interested in school or is acting in rebellion against an established authority. Further elaborating on the findings of studies such as Hoffman et al. (2013) would provide better insight into the overall relationship between school and delinquency in a way that addresses some of the insufficiencies of unidirectional models of delinquency.

Akers' Social Learning Theory

Another theory from which interactional theory draws its propositions is Sutherland's differential association theory (1947) and Akers' social learning theory (Akers & Burgess, 1966). In his theory, Sutherland states that deviance is learned like any other behavior and that individuals learn crime and delinquency through a process of learning definitions that are either favorable or unfavorable to crime. Differential association also implies that the types of definitions learned are related to the types of social interactions one has with others, specifically those in the individual's primary social group. Therefore, individuals who interact primarily with deviant others will most likely receive an excess of definitions favorable to crime.

Akers' theory reformulates the differential association theory originally introduced by Sutherland. In addition to the sociological explanation provided by differential association theory, Akers also includes psychological research related to operant conditioning and behavior modeling (Bandura et al., 1961) as well as a discussion further specifying the details of the learning process. While learning occurs from a variety of sources and interactions, during adolescence, these interactions would primarily involve an individual's peers and would be dependent on their respective peer groups. Therefore, higher levels of delinquency are associated with a closer relationship to delinquent peers or higher numbers of delinquent peers. The effect of peers on delinquency has long been studied and is consistently noted as one of the strongest relationships during the formative years of adolescence (Akers & Burgess, 1966; Berndt, 1979; Krohn & Thornberry, 2001).

Peers and delinquency

In addition to school and family, relationships with peers is a primary area of research. Learning theory is specifically interested in delinquent peers since the learning process is dependent on interacting with people who are in the individual's primary social group. During adolescence, peers generally become the primary source of socialization, and therefore learning theorists would expect the delinquent nature of the individual's peers to directly influence the individual's delinquency.

There is little debate as to the strong association between peers and delinquency. Early studies consistently showed support for a model that posited delinquent behavior was a result of the influence of delinquent peers (Akers et al., 1979; Matsueda & Heimer, 1987). Warr and Stafford (1991) examine the specific mechanisms behind the influence of peers on delinquent behavior. Specifically, they distinguish between the effects of peers' attitudes and actual peer behavior. While their findings support a model implying direct peer influence, they also specify that delinquent peer behavior has a stronger and more consistent effect on individual delinquency compared to peer delinquent attitudes. Using network analysis, Haynie (2002) investigated the effect of peers by testing the proportion of peers who were delinquent in a friend network and its association with delinquency. The study found support for peer influence on delinquent behavior.

Research concerned with testing Sutherland and Aker's theories tended to lean toward a causal model that emphasized delinquent peers as a cause of delinquent behavior. More recent studies, however, reveal that individuals often do not have completely homogenous peer groups in terms of delinquency. Using an approach based on balance theory, McGloin (2009) conducted a study that examined the specific

influence processes of peers, specifically best friends, on delinquent behavior. The study found that best friends were influential in adjusting an individual's delinquent behavior towards the mean level of delinquent behavior between the two. This worked both ways, where friends with lower levels of delinquency compared to a particular individual would predict lower rates of delinquency for that individual over time and higher levels of delinquency for the best friend would predict higher levels of individual delinquency. Because individuals seemed to be reacting towards the perceived norms of their peer groups, this can be considered strong support for a direct influence of peer delinquency on individual delinquency.

Reconciling Control and Learning Theories: Selection vs. Socialization

Because this study is interested in the bidirectional relationship between peers and delinquency, and social learning theory is a theory that proposes a unidirectional causal relationship from peers to delinquency, it is necessary to introduce selection effects, which proposes a causal direction opposite of learning theory. Critics of social learning theory, mostly control theorists such as Hirschi, (1969) noted that the causal process proposed by learning theorists may be spurious. Specifically, an individual may select their friends based on their prior interests, characteristics, and behaviors, meaning an individual's delinquency may actually be the cause for associating with delinquent peers. Theorists who note this issue of causality expanded research to include models of selection in addition to testing models of socialization. Several of these studies have concluded that selection effects tend to be stronger than socialization (Matsueda & Anderson, 1998). Some have even suggested that further examination supports the selection model while not supporting the claims of learning theory (Knecht, 2010).

In order to move research beyond the debate of the unidirectional causal effect of peers, studies have looked into the issue of reciprocal effects. Because there has been support for both causal mechanisms for the peer-delinquency relationship, it is reasonable to incorporate a model that suggests that the processes of socialization and selection both operate over time. Studies have incorporated the models proposed by interactional theory to test a process that includes reciprocal causal effects rather than analyzing them separately. A study by Thornberry et al. (1994) combines models proposed by both selection and socialization models of peers and delinquency to form a model that proposes bidirectional effects on the variables over time. Using three different models that tested contemporaneous and lagged effects of peers on delinquent behavior and vice versa, the study found support for an interactive model over a unidirectional one such as selection or socialization. Krohn et al. (1996) examines this relationship further by expanding on the number of waves of data included in the analysis. They look specifically at drug use, peer drug use, and peer reactions to drug use, noticing reciprocal effects among these variables. In addition, their findings suggest that these effects differ across time, where the effects of drug use on peer drug use are stronger in earlier adolescence while the effects of peer reactions to drug use on drug use gets stronger as the adolescent ages. This implies that there is a causal loop where adolescents initially choose friends based on similar behaviors but are more influenced by the beliefs of their peers once they are more embedded into a specific peer network. Matsueda & Anderson (1998) found that reciprocal processes were not equal, as delinquent behavior had a stronger effect on peer delinquency than the reverse. Reed and Rountree (1997) also test reciprocal effects and find support for both causal effects when predicting substance use.

Monahan et al. (2009) finds support for reciprocal causal effects as well, with the relative effect of selection and socialization seeming to change throughout the life course. Specifically, both selection and socialization processes are observed in middle adolescence, but the effect of socialization seems to disappear once adolescents age into young adulthood. The consensus regarding peer effects on delinquency, similar to other previously studied factors like commitment to school, seems to be moving towards the consideration of reciprocal effects to address the insufficiency of analyses with solely unidirectional processes. For this reason, interactional theory provides a good framework to examine the complex association between peers and delinquency.

School and Peers

Because this study incorporates commitment to school and peer influence into an interactional model, we are also concerned with the causal relationship between these two variables. Interactional theory hypothesizes that there should be strong negative relationship between delinquent peers and commitment to school (Thornberry, 1987). Delinquent peers are expected to have a negative influence on an individual's commitment to school, as delinquent peers tend to encourage behavior that is oriented around short-term goals and instant gratification. High levels of commitment to school would serve as a shielding factor against delinquent peers (who are seen as a detriment to the goals associated with school commitment), similar to the role that positive family influence played during childhood and, to a lesser extent, continues to play during adolescence.

Dishion et al. (1991) studied the factors that affect early adolescent involvement with antisocial peers. They note that poor school performance may have a significant

role in leading to associations with deviant peers. This may be because schools often group students of the same academic level together, which may indirectly group adolescents of similar behavioral and social profiles as well (Dishion et al., 1991; Kellam, 1990). Given the link between negative school outcomes and delinquency (Simons et al., 1991; Maguin & Loeber, 1996), it is understandable that this would indirectly encourage association between peers who are more likely to be delinquent. This kind of explanation is possible through utilizing the concepts of both control and learning theory, where less attachment and commitment to school can lead to a higher probability of associating with delinquent peers.

There is much less direct examination regarding the effect of peers on commitment to school. Studies in the education field have given some insight into this relationship, mostly through studies of peer effects on motivation toward school performance. However, these studies examine peer group formation and their effects in terms of acceptance and rejection by peers, rather than actual peer deviance. Prosocial peers serve to encourage individual motivation to do well in school (Clasen & Brown, 1985), with positive reinforcement from peers promoting positive school achievement outcomes. Since peers are more likely to be approving of peers who are like them, we can reason that delinquent peers should serve as a negative influence on motivation for conventional goals while approving of and encouraging delinquent behavior. Studies have also looked at the relationship between peers and other school-related outcomes. Battin-Pearson et al. (2000) conducted a test of five different theories to predict early high school dropout and found that association with antisocial peers was one of the few variables that was significant in predicting dropout and was not fully mediated by the

effect of school performance. While the relationship is somewhat intuitive, the general lack of research directly examining the effect of peers on commitment to school emphasizes the need to examine a model like interactional theory that attempts to explicitly relate these concepts in addition to their relevance in the study of delinquency.

Observing and Explaining Racial Differences

Trends in official statistics have been largely responsible for driving the research regarding racial differences in offending. According to Uniform Crime Report (UCR) statistics (2008), while whites do constitute the majority of arrests, African Americans are arrested at disproportionately high levels compared to their representation in the total population. This overrepresentation in official statistics seemed to imply that African Americans were more likely to be involved in serious crimes based on disproportionate arrest rates. However, some questioned whether this observed disparity was a result of differential involvement or differential selection. In other words, the observed racial differences in offending may simply be a product of police bias (Antonovics & Knight, 2009; Beckett et al., 2006; Lundman & Kaufman, 2002) and systematic bias at various stages of the criminal justice system including sentencing (Spohn et al, 1987; Steffensmeier et al., 1998; Stolzenberg et al., 2015) and corrections (Huebner & Bynum, 2008). Hindelang (1978) compared official report data from the UCR to victimization data using the National Crime Panel (NCP) to assess whether these differences were explained by accounting for whether or not a crime was reported to the police. He found that there was generally little difference between the two reports, implying that there was support for differential involvement rather than a bias in measurement.

The attention to racial disparities was further questioned when data using self-report surveys seemed to contradict the vast racial disparities indicated by official statistics. Specifically, self-report data tend to exhibit smaller disparities in offending behavior when comparing whites and African Americans. Hirschi (1969) found that while there was a large disparity in the likelihood of having police records (42% for African Americans, 18% for whites), there was little difference when comparing self-reported measures of being involved in delinquency (49% for African Americans, 44% for whites). One explanation for this similarity in self-report measures is that the validity of these measures differs by race and that African Americans are more likely to underreport crime and delinquent behavior, especially those that are more serious (Hindelang et al., 1981; Elliott et al., 1983).

Assessing Racial Differences: Different Levels vs Different Effects

Different levels of causal variables

When assessing racial differences, specifically for offending, there are two general explanations. One focuses on the differences in the *level* of explanatory factors. For example, whites may exhibit higher levels of commitment to school compared to African Americans, or African Americans may exhibit higher levels of delinquent peer association compared to whites. A general model of crime or delinquency implies that while there are differences in attitudes and behaviors that are used to explain crime (which may be the results of a variety of influences such as environmental or structural characteristics), the expected effects should remain consistent across race groups, where higher levels of commitment to school will consistently yield lower levels of delinquency and delinquent peers. Likewise, there should be a significant positive effect of peer

delinquency on individual delinquency. For this reason, observing differences in the levels of causal variables alone does not influence the generality hypothesis of theories with respect to race.

Different effects of causal variables

Another aspect of racial differences in offending would be concerned with different *effects* of causal variables. Here, theorists would question whether or not the same causal variables provide similar explanatory power for an outcome equally across race groups. For example, we may hypothesize that while whites are more likely to be experience lower levels of offending and delinquency as their commitment to school went up, this association would be different for African Americans. When empirically assessing the effect of a causal variable on an outcome, there are several characteristics of an effect coefficient that help identify inconsistent effects across groups. First, we can observe a change in statistical significance. For example, while commitment to school may be a significant predictor of delinquency for whites, the coefficient may become non-significant when the same model is run for an African-American sample, meaning a factor may change the outcome for certain groups and not others. Another important change would be in the direction of the effect. For example, while commitment to school would decrease the level of delinquency for whites, it may increase the level of delinquency for African Americans. Finally, one can consider differences in the magnitude of the coefficient. Here, commitment to school or peer delinquency may cause a much higher increase or decrease in general delinquency for race group compared to another. If a coefficient for one race group is statistically significantly different from another, there may be support for racial differences in the effect of a particular factor. An

empirical test for a particular general theory that identified important differences in any of these ways would then question the generality of the theory.

Testing Racial Differences with General Theories

Studies explaining racial differences in offending usually examine whether or not theories can explain away the significant effect of race on delinquency (Matsueda & Heimer, 1987; Felson et al., 2007; Kaufman et al., 2008). For control theory, some studies have addressed bonds separately and measured whether their effects were invariant across racial groups (Cernkovich & Giordano, 1992; McCluskey et al., 2002; Peguero et al., 2011), while others assessed generality for control variables along with causal variables from other theories (Gardner & Shoemaker, 1989; Junger & Marshall, 1997). The results of these studies have ranged from generally supportive to mixed, with most studies cautioning against immediately accepting generality and suggesting that race may still be a significant factor in differentiating involvement in crime independent of bonding variables. For social learning theory, several studies examine the generality of the theory in explaining delinquency. Results are mixed, with some of these studies showing support for generality (Matsueda & Heimer, 1987; Junger & Marshall, 1997; Orcutt & Schwabe, 2012) while others imply that application of the theoretical concepts in explaining deviant behavior is conditional based on racial/ethnic group (Newcomb & Bentler, 1986; Akins et al., 2010).

Interactional theory on different levels and effects

Interactional theory, like other general theories, acknowledges the differences between race groups in the levels of the causal variables. Specifically, it attributes these differences largely to differences in structural variables across individuals. The theory

specifically addresses the differential influences of social class on family processes during early childhood. Disruption of these processes can further exacerbate the negative influence of delinquent peers, especially during mid-adolescence, as the strength of parental influence weakens and the individual shifts their primary associations to peers. Interactional theory therefore gives a more detailed explanation through the example of social class as a primary structural variable for why there may be differences in the level of causal variables. Since African Americans are more likely to be characterized by lower-class families compared to whites, interactional theory predicts that this will result in African Americans being “*initially* less bonded to conventional society while being more exposed to delinquent values, friends, and behaviors... the initial values of the interactional variables are systematically related to the social class of origin” (Thornberry, 1987). The differences in levels of commitment to school and peer delinquency by social class or race provide different contexts from which reciprocal effects are take place between school and peers and delinquency. Socially disadvantaged groups such as racial minorities are likely to begin the process of interactional theory with weaker commitment to school and higher exposure to delinquent peers and delinquency, making it more likely for them to continue delinquent behavior compared to more privileged groups in society such as whites who are more likely to being with stronger bonds to conventional society.

Regardless of the differences in starting points between whites and African Americans, interactional theory maintains that the process remains the same for both race groups and that reciprocal effects continue to play out over time, where bonding and learning variables interact with delinquency in the same way. Specifically, higher levels

of commitment to school should significantly reduce levels of delinquency and peer delinquency for both whites and African Americans. Likewise, higher levels of peer delinquency should result in lower levels of commitment to school while increasing delinquency. Delinquency should lead to a decrease in commitment to school and higher levels of delinquent peers. In other words, this process should explain the relationship between different variables in the same way regardless of social context or starting point.

Racial Differences in Levels and Effects of Causal Variables

Racial differences in level of commitment to school

Regarding differences in the level of commitment to school by race, theoretical traditions other than interactional theory posit that differences in the level of commitment to school may be a result of differential exposure to certain stimuli. For example, strain theories (Agnew, 2001; Simons et al., 2003) suggest that racial and ethnic minorities may experience unique strains in the form of racism and systematic discrimination, much of which is rooted in concentration of minorities in poor areas over time. Part of this discrimination may manifest itself through the educational system, where minorities who tend to live in poorer neighborhoods may be in school environments that are less likely to foster a strong sense of attachment to the school or a commitment to educational pursuits. In this sense, the reason for lower levels of commitment to school among minority racial groups may be due to differential access and exposure to sources of positive reinforcement for education. This argument helps support the idea that social structure can influence differences in starting points as interactional theory points out.

Racial differences in level of delinquent peers

We also need to consider how the level of delinquent peer association may differ between whites and African Americans. Similar to the reasoning for the differential levels of commitment to school, we can suggest that there is difference in exposure to delinquent peers. The level of exposure to delinquent peers is also tied into environmental factors, where peers groups are often concentrated in the same school or neighborhood. In these disadvantaged neighborhoods, lack of consistent structure in the community (single parent households, lack of jobs, fewer resources, etc.) often results in adolescents who may congregate with little supervision, contributing to the likelihood of being delinquent (Siennick & Osgood, 2012). In this sense, there are likely to be higher numbers of delinquent peers in these types of neighborhoods and therefore there is a higher likelihood of being exposed to these types of peers. Similar to how segregation and concentration of poverty can have negative effects on an adolescent's commitment to school, the historical background of African Americans, which have placed many of them in areas of concentrated poverty, may play an important role in certain types of peer group formations, especially delinquent peers (Thornberry, 1998; Harding, 2009; Schaefer et al., 2014). In this sense, we can expect higher levels of delinquent behavior for African Americans because they are more likely to be exposed to delinquent peers.

Racial differences in effect of commitment to school

As a general theory, interactional theory does not propose a separate explanation for why commitment to school may operate differently for African Americans compared to whites. Much of the discussion regarding the differential effects of school for African Americans stems from a conflict perspective. A meta-analysis conducted by Maguin &

Loeber (1996) found that several studies seemed to suggest that there was a stronger, negative effect of academic performance on delinquency for whites than for African-Americans, especially for studies that utilized a longitudinal as opposed to a cross-sectional approach. Specifically, the magnitude of the effect size for whites tended to about 1.5 time larger for whites than African Americans. Mickelson (1990) argues that African-American attitudes on the importance of school and education have little impact on actual school performance compared to whites. Ogbu (1991) would argue that this is due to the “wishful” nature of their responses, meaning attitudes regarding school for African Americans is more delusional and will therefore have little direct effect on affecting behavior. Some minorities may not view the educational system as a fair means of achieving success in society, favoring those who are part of the dominant culture: whites. This leads some to embrace an oppositional culture approach to explaining racial differences in educational outcomes (Ogbu, 1991). For minorities who may harbor a more cynical view of the educational system, it is possible that commitment to school may not have as large an influence on delinquency compared to whites. Some argue that there may also be a conflict element stemming purely from an “anti-white” mentality that has developed due to historical patterns of discrimination. For example, African Americans may consider conventional academic success and commitment to be a means of “acting white”. This may result in African-Americans being less likely to embrace what society defines as conventional, such as academic achievement and school-related success, and instead receive definitions of convention from other influences, such as family and peers. (Fordham & Ogbu, 1986; Cernkovich et al., 2000). In this case,

commitment to school would be less salient to African Americans and exact a weaker influence on their delinquent behavior.

Racial differences in effect of peer delinquency

From a cultural perspective, African Americans may place less importance on institutions such as school, which may then result in a greater effect of peers on delinquency, since those adolescents with weak bonds would receive much of their influence from peers. Also, disadvantaged communities may place more of an emphasis on the relationships between individuals and members of their community, including family and peers. Social status may be more directly tied to approval of peers for African Americans that live in these disadvantaged communities, especially during mid-adolescence when family and parents have less of a direct influence compared to childhood and early adolescence. Because of this, we may expect a stronger effect of delinquent peers for these adolescents. In addition, African-American delinquent peers may be more likely to explicitly discourage commitment to school and academic achievement. This explanation would be consistent with the previously mentioned oppositional culture approach (Ogbu, 1991). According to an oppositional culture approach, African-American peers should be more likely to discourage involvement in school and be more likely to punish positive attitudes regarding school.

Ultimately, this study seeks to clarify the potential effect that racial differences may have on delinquency. The first possibility is that generality is observed across both whites and African Americans and that the effect sizes for the causal variables are statistically equivalent between these two groups. Given the discussion of interactional theory, it is likely that these two racial groups have different “starting points” with

regards to how much initial exposure they have to different types of peers and different types of school environments, which then translate to differences in delinquent behavior. These resultant differences in starting points can be mostly explained through historical effects of race relations between whites and African Americans. The second possibility is that there is a significant statistical difference in the effect sizes (for magnitude or direction) of certain factors, such as commitment to school and association with delinquent peers, between whites and African Americans. This would mean that there may be racially-based differences in how we understand the influence of social institutions and that theories of generality may actually be racially biased. Specifically, the assumption that certain institutions, such as school, that are deemed to have consistent prosocial effects on the whole population may be incorrect. This would imply that efforts should be differentially distributed based on the racially differentiated effects of particular institutions when addressing the issue of crime and delinquency.

Methods

Sample

Rochester Youth Development Study

This study uses data from the Rochester Youth Development Study (RYDS) to test its hypotheses. The study began data collection in 1988 and was conducted with the purpose of identifying and studying the causes and consequences of delinquency. RYDS is a longitudinal sample based on a community sample design, using a probability sample of 1,000 7th and 8th grade public school students in Rochester, NY. The study also oversampled at-risk youth in order to identify individuals with the highest risk of delinquent behavior. This was done through oversampling males as well as stratifying on high-crime areas (Krohn & Thornberry, 1999). This dataset has been used extensively to test various aspects of interactional theory (Thornberry et al., 2003). However, as previously stated, this analysis has not been applied to the assessment of racial differences.

One issue with this particular dataset is the potential lack of heterogeneity in the socioeconomic status of the sample. Due to the sampling strategy, all of the children in the sample are urban and over-represent lower and working class families. This means that it may not be the best way to explain the role that socioeconomic status plays in shaping the impact of social factors such as school or peers. However, the present study simply focuses on whether or not certain processes apply equally across race groups, where the dataset somewhat accounts for a potentially confounding factor in socioeconomic heterogeneity while limiting the generalizability of the findings.

Sample Attrition and FIML

While the original RYDS sample contains 1,000 respondents, the full sample for this study begins with 830 subjects since we only focus on whites (n=150) and African Americans (n=680). From the 830, only 634 (n=100 for white; n=534 for African American), or 76% of the total sample, are considered complete cases (i.e., none of the variables used in the analysis are missing for that case) in the general delinquency analysis. However, most of the cases that are incomplete are only missing one or two values.

While the dataset is generally complete, dropping cases that are technically incomplete would greatly lower the statistical power of the models. Full information maximum likelihood (FIML) estimation is used to handle missing cases. Since the sample attrition is not excessive, this method makes the results of the analysis more powerful and avoids wasting cases for which there is still relevant information. FIML uses the partially available data from other variables to simultaneously estimate missing data during parameter estimation in the analysis. Since other information for a particular case is used to estimate missing values, standard error estimates are smaller for FIML estimates than for maximum likelihood (ML) estimates. FIML has also been shown to produce unbiased estimates for missing cases when data are missing at random (MAR) or missing completely at random (MCAR) (Enders, 2001; Graham, 2009). Furthermore, this method of handling missing data is useful when using a model with a maximum likelihood framework such as structural equation modeling and if exogenous variables are not missing. For these reasons, this method of handling missing data should not

produce biased estimates when estimating values for cases and only serve to increase power during analysis.

Ideally, estimation for missing values should be minimal, estimating values for cases randomly missing one or two responses. The original sample used for this study includes 22 cases (3 for white and 19 for African American) that did not provide responses for any of the endogenous variables for any waves of data collection. To avoid estimating values for cases is very little information to inform the estimation process, these cases are removed from the study. This is a relatively small proportion of the final sample (about 2.7%) and should not bias the final results.

Power

In testing effects and differences in the present study, it is important to address the issue of power. Statistical power represents the probability of rejecting the null hypothesis when the alternative is true. For a test to have good statistical power, the model must be properly specified and the sample size must be adequate, since a higher number of cases will result in more accurate estimates. If sample size is too low, then the model will be unable to detect significant effects. One issue in testing significant differences between the two samples is the difference in statistical power between the white and African-American samples, specifically due to the differences in their sample sizes. This is especially problematic when considering the sample size for whites, which is somewhat marginal for SEM standards ($n=200$ is a common cutoff). This places a limit on the confidence of the estimates in the analysis by increasing the standard errors of the estimates. The inability to precisely estimate effects in the white model may then lead to

difficulties in observing differences using these estimates, meaning lower statistical power also makes it more difficult to detect statistical differences between two separate samples. In this study, this biases the results in favor of the hypothesis and findings must therefore be interpreted with some caution.

Measurement

Endogenous Variables

The model for this study focuses on three endogenous variables to test its hypotheses: commitment to school, peer delinquency, and general delinquency. Each of these measures is self-reported by the children in the original RYDS sample, with recall periods of six months for all of the variables. Each variable was taken at three different waves of the study (in six month intervals) to form the three different time points for the final model. Time 1 of the analysis uses data from wave 2 of the study (average age =14.3), time 2 refers to data from wave 3, and time 3 uses wave 4 data.

Commitment to school is an average of 10 self-reported items measuring the extent to which the respondent is involved in and concerned about doing well in school. The scale was developed by RYDS (1991) and has been tested for reliability ($\alpha=.81$ at wave 2) and has been endorsed by the CDC as a scale to be used for evaluating violence prevention programs (Dahlberg et al., 2005). Respondents were asked to indicate to what extent they agreed with the statements in each item, with responses ranging from 1 (strongly disagree) to 4 (strongly agree), with items assessing the respondents' attitudes at the time of the interview.

Peer delinquency is a scale averaging 8 items that measure how many of the respondent's peers are involved in delinquent activities ($\alpha=.88$ at wave 2). Respondents were asked to indicate how many of their friends engaged in a variety of delinquent behaviors in the past six months, with responses ranged from 1 (none of them) to 4 (Most of them). The delinquent acts ranged from minor offenses like skipping school to more severe, violent crimes like using a weapon to take money from someone.

Finally, two measures of *general delinquency* are used in the analysis. These measures are two recoded versions of an original general delinquency index. The original general delinquency scale measured a respondent's engagement in any of 30 delinquent behaviors, ranging in severity from minor status offenses to serious violent crimes.¹ At each interview, the respondent indicated if they had committed the act and, if so, the number of incidents that he or she had been involved in within the past six months.

As is the case with most measures of delinquency, the distribution of the frequency variable is skewed and would therefore, if used, violate the normality assumption necessary to properly interpret findings in the analysis. We therefore created two measures to adjust the original measure to minimize bias in the interpretation of the findings in the analysis. The first delinquency measure is initially an incidence measure which sums all of the reported incidents for each offense in the delinquency scale, resulting in a scale with no upper bound. To reduce the effect of the heavy right skew due to the initial construction of this measure, the incidence measure of general delinquency

¹ Details of individual items in Appendix.

top-codes the number of incidents at 10 for each wave bounding the new scale from 0-10 incidents for each respondent.

The second measure of general delinquency uses a variety count measure, where the value is the sum of the prevalence of different delinquent behaviors included in the original general delinquency scale. This means no matter how many incidents are reported for a particular delinquency item in the general delinquency scale, the response for that item is reported as either 1 if an individual reported an act during the recall period or 0 if they never did. This also means that this scale is bounded from 0-30. This measure is also calculated separately for each wave. While these adjustments to the general delinquency variable admittedly do not fully account for potential biases, they serve as more viable alternatives for use in a model like SEM compared to simply logging the dependent variable, as is commonly done (Osgood, 2000). Implications for interpreting findings will be addressed in more detail when discussing the results.

Control Measures

Finally, age, gender, neighborhood arrest rate, and a measure for socioeconomic status were used as control variables in this analysis. A parent education variable was used to control for socioeconomic status. This is a binary self-report variable was measured at wave 1 (one wave prior to the first wave in the model) and assesses whether the parent's highest level of educational achievement can be characterized as "low." Specifically, respondents are coded "1" if the parent had an education below high school

level and “0” if they at least completed high school or had earned a GED.²

Neighborhood arrest rate was calculated as the proportion of the census tract’s adult population arrested by Rochester police in 1986. In addition to neighborhood arrest rate, gender is also included as a control in order to account for the stratifying variables in the original sample design.

² Other variables that represented SES were considered, including measures for unemployment, receiving public assistance, and earning income below the federal poverty line. However, because of the large number of missing cases for these variables, parent education was used instead.

Results

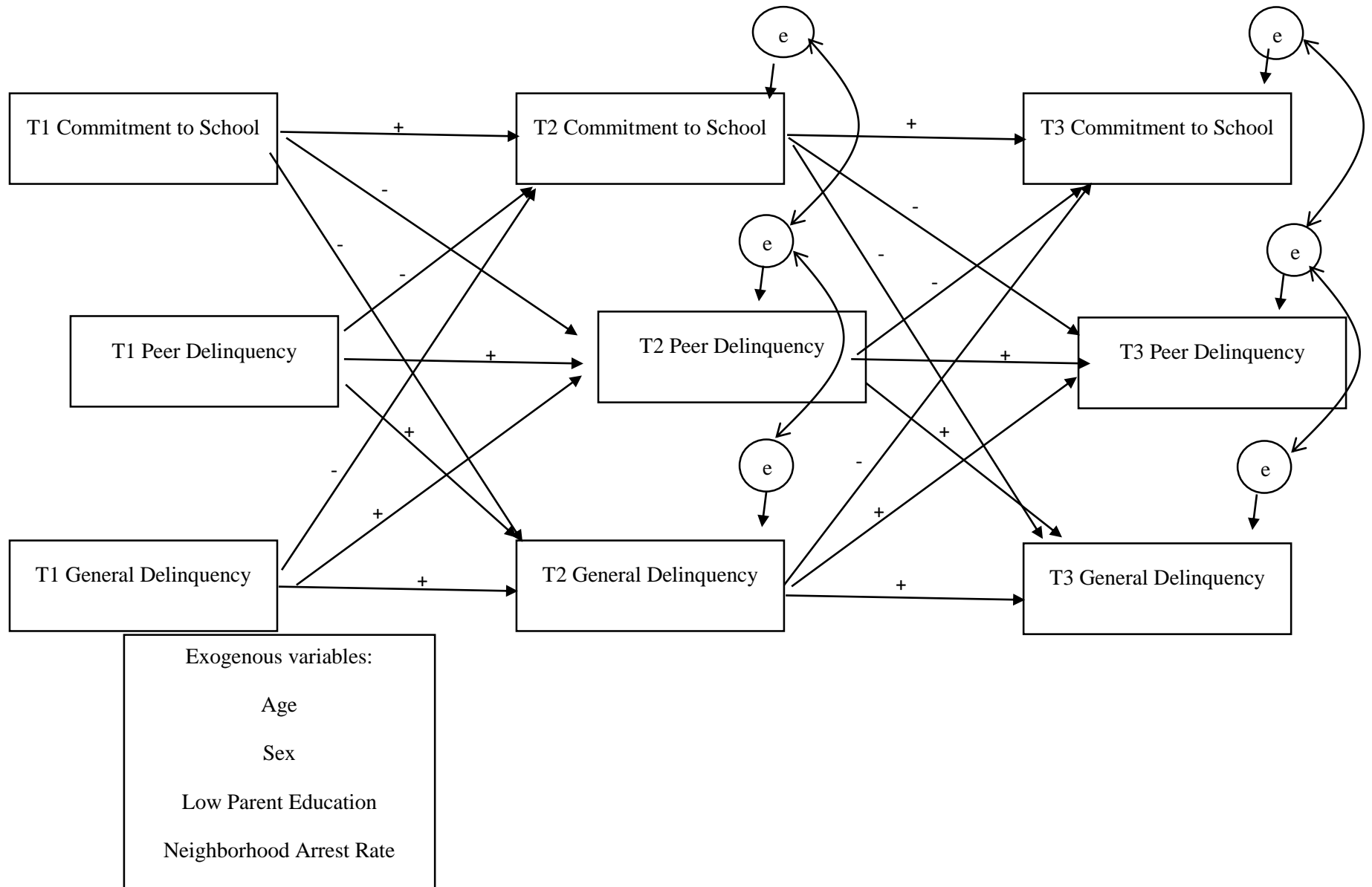
Analysis

Testing Interactional Theory

First, an analysis of descriptive statistics is conducted. This includes t-tests of means between whites and African Americans to test for differences for all of the variables in the model. In particular, we are interested racial differences in the endogenous variables, especially commitment to school and peer delinquency. Bivariate correlations are also conducted which show the relationships between endogenous variables across different waves. Second, a structural equation model (SEM) analysis is conducted on the whole sample to test the relationships proposed by interactional theory. Specifically, we are interested in the lagged effects of the endogenous variables on one another over the three waves of observation. Figure 1 displays the full, theoretical model to be tested.³

³ All subsequent figures represent the significant findings for the effects in each model. Figure labels correspond to the numerical labels of their respective tables.

Figure 1. Estimated Structural Equation Model of Commitment to School, Peer Delinquency, and General Delinquency



To estimate the effects of multiple relationships at once, including the reciprocal relationships detailed in interactional theory, a SEM approach that simultaneously estimates the parameters in the model is appropriate. SEM allows us to consider a traditional dependent variable like general delinquency along with commitment to school and peer delinquency as endogenous variables. This allows us to measure the effect of general delinquency on other endogenous variables rather than acting solely as a dependent variable.

To measure the lagged effect of each variable, each parameter in the model is estimated for a variable from time t to each variable from time $t+1$. By doing this across three waves, we can observe reciprocal effects that occur over time, where, for example, the effect from commitment to school is observed from time t to delinquency at time $t+1$ and the effect of delinquency at time $t+1$ on commitment to school at time $t+2$ can also be estimated. Parameters are estimated for each dyad of endogenous variables in the model and are interpreted as linear effects, similar to the interpretation of OLS estimates.

Testing Generality: Comparison of Race Groups

To test the generality of the model fit for both race groups, the same SEM model that was run for the general sample is run separately for both white and African-American samples. In this step, we can observe any differences in the significance of certain parameter estimates between groups (although, as stated before, these differences in significance should be interpreted with caution).

To test whether or not there are statistically significant racial differences in the estimation of particular parameters, a multi-group comparison test is conducted for each

parameter. Here, the model is run for both white and African-American samples while implementing an equality constraint. This equality constraint holds a *specified* parameter equal for both samples and estimates the rest of the parameters. Then, a difference of chi-square test is run, using the chi-square fit statistic from the white and African-American models. A significant difference in chi-square between the two models would indicate a statistically significant difference in the parameter that was held constant by the equality constraint. This analysis is *rerun* for each parameter in the model, noting each parameter for which the multi-group analysis indicates a significant difference. If the generality of interactional theory holds, we would expect there to be no differences between the white and African-American models of delinquency when conducting the multi-group test for any of the specified parameters.

Results

Descriptive Statistics

Table 1.1 presents the descriptive statistics for the total sample, while Table 1.2 presents descriptive statistics by race as well as t-tests comparing mean differences between whites and African-Americans. The African American sample contains a higher proportion of males (.89 compared to .68). More substantively, the parents of African American respondents had less education on average, compared to white respondents. Specifically, only 24.8% of African Americans had parents with at least a high school degree (or equivalent) compared to 41.1% of whites. We see a similar pattern of disparity between race groups when examining neighborhood arrest rate. The significant difference between neighborhood arrest rate and parent education indicate support for the hypothesized structural differences between whites and African Americans, specifically

that African Americans are more likely to come from structurally disadvantaged environments.

At Time 1, African Americans self-report a significantly higher score on both the incidence of general delinquency and variety measure of delinquency. At Time 2 and Time 3, however, the differences are not significant and the two groups report similar levels of offending. For the school and peer variables, at all three time points, there appear to be no significant differences between white and African American respondents with respect to commitment to school and peer delinquency.

Table 1.1 Descriptive Statistics for All Variables in Study (Total Sample)

Variable	n	Mean	SD	min	max
General delinquency (top-coded) T1	792	2.923	3.822	0	10
General delinquency (top-coded) T2	777	2.571	3.781	0	10
General delinquency (top-coded) T3	775	2.677	3.914	0	10
General delinquency (variety) T1	792	1.653	2.452	0	18
General delinquency (variety) T2	777	1.386	2.344	0	17
General delinquency (variety) T3	775	1.240	2.094	0	16
Commitment to school T1	785	3.087	0.353	1.6	4
Commitment to school T2	770	3.101	0.373	1.6	4
Commitment to school T3	747	3.132	0.363	2	4
Peer delinquency T1	767	1.422	0.500	1	4
Peer delinquency T2	745	1.450	0.560	1	4
Peer delinquency T3	748	1.402	0.523	1	4
Male	808	0.718	0.450	0	1
Low Parent Education	785	0.383	0.487	0	1
Neighborhood Arrest Rate	808	4.184	2.118	0.12	7.87

Table 1.2 Descriptive Statistics for All Variables in Study (by race)

Variable	White					African American				
	n	Mean	SD	min	max	n	Mean	SD	min	max
General delinquency (top-coded) T1*	143	2.301	3.474	0	10	649	3.060	3.883	0	10
General delinquency (top-coded) T2	140	2.179	3.559	0	10	637	2.658	3.825	0	10
General delinquency (top-coded) T3	144	2.861	4.017	0	10	631	2.635	3.892	0	10
General delinquency (variety) T1*	143	1.294	2.432	0	18	649	1.732	2.451	0	15
General delinquency (variety) T2	140	1.314	2.688	0	17	637	1.402	2.264	0	15
General delinquency (variety) T3	144	1.375	2.317	0	15	631	1.209	2.040	0	16
Commitment to school T1	142	3.011	0.390	1.6	4	643	3.104	0.342	1.8	4
Commitment to school T2	136	2.999	0.399	1.6	4	634	3.123	0.364	2	4
Commitment to school T3	138	3.009	0.373	2	3.9	609	3.160	0.355	2.1	4
Peer delinquency T1	133	1.334	0.445	1	3.625	634	1.440	0.510	1	4
Peer delinquency T2	132	1.363	0.514	1	3.75	613	1.468	0.568	1	4
Peer delinquency T3	138	1.347	0.450	1	3	610	1.415	0.537	1	4
Male*	147	0.891	0.313	0	1	661	0.679	0.467	0	1
Low Parent Education*	133	0.248	0.434	0	1	652	0.411	0.492	0	1
Neighborhood Arrest Rate*	147	2.501	1.587	0.12	7.32	661	4.558	2.039	0.27	7.87

*significant difference between white and African American means at $\alpha=.05$

The goal of the study is to examine the causal relationships proposed by interactional theory across three waves of data. This is done first for the total sample and then separately for whites and African Americans. In addition to observing differences in significance for the effects of variables between the two models, I test the statistical implication of having a particular parameter held constant across the white and African-American models. This will indicate whether the assumption that the proposed causal processes are equal for both race groups will significantly alter the model.

Bivariate Analyses

In table 2.1, we display correlations between school and peer variables and both of the delinquency measures. For both measures of delinquency, there are significant cross-sectional and cross-lagged relationships in theoretically expected directions. Specifically, commitment to school has a consistently negative association with both measures of delinquency while peer delinquency has a significant positive association with delinquency at all time points.

Table 2.1 Bivariate Relationships between Delinquency Measures and all other variables for Total Sample

	General delinquency (top-coded) T1	General delinquency (top-coded) T2	General delinquency (top-coded) T3	General delinquency (variety) T1	General delinquency (variety) T2	General delinquency (variety) T3
Commitment to school T1	-0.201***	-0.237***	-0.212***	-0.244***	-0.214***	-0.160***
Commitment to school T2	-0.236***	-0.292***	-0.236***	-0.268***	-0.309***	-0.221***
Commitment to school T3	-0.205***	-0.226***	-0.306***	-0.200***	-0.243***	-0.259***
Peer delinquency T1	0.575***	0.506***	0.341***	0.687***	0.527***	0.333***
Peer delinquency T2	0.451***	0.525***	0.386***	0.533***	0.632***	0.372***
Peer delinquency T3	0.430***	0.511***	0.594***	0.482***	0.549***	0.642***

*p<.05, **p<.01, ***p<.001

Table 2.2 Bivariate Relationships between Delinquency Measures and all other variables for White Sample

	General delinquency (top-coded) T1	General delinquency (top-coded) T2	General delinquency (top-coded) T3	General delinquency (variety) T1	General delinquency (variety) T2	General delinquency (variety) T3
Commitment to school T1	-0.240*	-0.106	-0.195	-0.283**	-0.268**	-0.223*
Commitment to school T2	-0.202*	-0.298**	-0.339***	-0.375***	-0.443***	-0.429***
Commitment to school T3	-0.356***	-0.284**	-0.396***	-0.397***	-0.364***	-0.421***
Peer delinquency T1	0.613***	0.519***	0.362***	0.849***	0.731***	0.561***
Peer delinquency T2	0.462***	0.509***	0.365***	0.665***	0.672***	0.514***
Peer delinquency T3	0.526***	0.445***	0.587***	0.536***	0.528***	0.682***

*p<.05, **p<.01, ***p<.001

Table 2.3 Bivariate Relationships between Delinquency Measures and all other variables for African-American Sample

African American						
	General delinquency (top-coded) T1	General delinquency (top-coded) T2	General delinquency (top-coded) T3	General delinquency (variety) T1	General delinquency (variety) T2	General delinquency (variety) T3
Commitment to school T1	-0.201***	-0.267***	-0.213***	-0.243***	-0.209***	-0.145***
Commitment to school T2	-0.258***	-0.308***	-0.207***	-0.260***	-0.297***	-0.176***
Commitment to school T3	-0.200***	-0.238***	-0.281***	-0.179***	-0.239***	-0.225***
Peer delinquency T1	0.568***	0.501***	0.352***	0.668***	0.500***	0.311***
Peer delinquency T2	0.447***	0.523***	0.404***	0.516***	0.628***	0.364***
Peer delinquency T3	0.415***	0.516***	0.606***	0.474***	0.552***	0.644***

*p<.05, **p<.01, ***p<.001

Table 2.4 Bivariate Relationships between Commitment to School and Peer Delinquency for Total Sample

	Commitment to school T1	Commitment to school T2	Commitment to school T3	Peer delinquency T1	Peer delinquency T2	Peer delinquency T3
Commitment to school T1	1					
Commitment to school T2	0.60295***	1				
Commitment to school T3	0.50827***	0.64343***	1			
Peer delinquency T1	-0.25245***	-0.22836***	-0.18364***	1		
Peer delinquency T2	-0.17541***	-0.22151***	-0.18943***	0.60986***	1	
Peer delinquency T3	-0.19574***	-0.21135***	-0.19527***	0.48571***	0.55499***	1

*p<.05, **p<.01, ***p<.001

Table 2.5 Bivariate Relationships between Commitment to School and Peer Delinquency for White Sample

	Commitment to school T1	Commitment to school T2	Commitment to school T3	Peer delinquency T1	Peer delinquency T2	Peer delinquency T3
Commitment to school T1	1					
Commitment to school T2	0.66321***	1				
Commitment to school T3	0.48308***	0.67057***	1			
Peer delinquency T1	-0.28751***	-0.32539**	-0.40186***	1		
Peer delinquency T2	-0.30433**	-0.36904***	-0.38473***	0.79295***	1	
Peer delinquency T3	-0.25418*	-0.27222**	-0.34353***	0.53569***	0.61373***	1

*p<.05, **p<.01, ***p<.001

Table 2.6 Bivariate Relationships between Commitment to School and Peer Delinquency for African-American Sample

	Commitment to school T1	Commitment to school T2	Commitment to school T3	Peer delinquency T1	Peer delinquency T2	Peer delinquency T3
Commitment to school T1	1					
Commitment to school T2	0.58765***	1				
Commitment to school T3	0.51133***	0.62871***	1			
Peer delinquency T1	-0.26082***	-0.23829***	-0.18306***	1		
Peer delinquency T2	-0.16901***	-0.22382***	-0.19205***	0.58746***	1	
Peer delinquency T3	-0.19388***	-0.21607***	-0.19163***	0.47718***	0.54659***	1

*p<.05, **p<.01, ***p<.001.

Table 2.2 presents these correlations for the white sample. We see that commitment to school is negatively related to delinquency, for both the incidence and variety measures, at all cross-sectional points. In addition, with two exceptions involving commitment to school at time 1, the cross-lagged correlations are also significant and negative. The cross-sectional relationships between peer delinquency and delinquent behavior, both incidence and variety measures, are significantly positive. In addition, all of the cross-lagged correlations are significant and positive.

Table 2.3 presents the same correlations for the African-American sample. Correlations between commitment to school and delinquency are all significant and negative. Similarly, all correlations between peer delinquency and the delinquency measures are all significant and positive.

All of the correlations in these tables are in the theoretically expected direction. Moreover, the results are quite similar for both African American and white respondents. For both groups, commitment to school and delinquency are negatively related, while peer delinquency and delinquent behavior are positively related. The magnitude of the parallel correlations in these tables are also quite comparable.

Fit Statistics

Table 3 presents the fit statistics for the SEM analysis. This is presented for the analyses for both delinquency variables. Before running analysis, it is important to assess the quality of the model being used. For SEM, indices of fit indicates the model's ability to reproduce a covariance matrix that matches the sample covariance matrix. Because the

fit of a SEM requires an array of considerations, researchers consider several classes of indices when fully determining how well a model fits.

The most commonly used fit statistic is the chi-square value. Here, a non-significant finding indicates that the predicted model covariance matrix is not significantly different observed sample covariance matrix. However, researchers recommend inclusion of multiple fit indices to account for some issues regarding the interpretation of the chi-square value alone. For example, large sample sizes will usually result in rejecting the model. Also, the statistic is sensitive to models that deviate from normality. This problem can be observed in the reported chi-square values for the African American models, which all indicate bad fit due to high sample size and non-normal distributions. While the models for the white sample have lower chi-square values compared to the models for the African-American sample, they are all statistically significant, again, likely due to the non-normality of the model.

Another index that is commonly reported is the root mean square error of approximation (RMSEA), which measures the error of approximation per model degree of freedom. The statistic has a lower bound of 0 with no upper bound, with lower values closer to 0 indicating good fit. Recommended cutoffs have varied over time (MacCallum et al., 1996; Hu & Bentler, 1999; Steiger, 2007), however an upper limit of RMSEA $< .07$ is currently suggested. The statistic also provides a confidence interval, which helps to assess the precision of the statistic. Here, a good fit statistic should have an upper limit below $.08$. This statistic also favors parsimony in models. The reported statistics from table 3 indicate that the models have marginally good fit. While none of

the models report confidence intervals with upper limits below .08, the actual RMSEA statistic is relatively close to .07 for all models.

Table 3. Fit statistics of SEM analysis for White, African-American, and full samples.

	Full model (incidence)	Full model (variety)	White (inc)	African American (inc)	White (var)	African American (var)
	n=808; df=9	n=808; df=9	n=147; df=9	n=661; df=9	n=147; df=9	n=661; df=9
χ^2	38.94	46.88	18.32	40.10	11.63	50.19
SRMR	0.02	0.02	0.02	0.02	0.01	0.02
RMSEA	0.06	0.07	0.09	0.07	0.04	0.08
RMSEA 90% Lower	0.04	0.05	0.02	0.05	<0.001	0.06
RMSEA 90% Upper	0.09	0.09	0.14	0.10	0.11	0.11
CFI	0.99	0.99	0.99	0.99	>0.99	0.99

Another index of absolute fit is the root mean square residual (RMR) or standardized root mean square residual (SRMR). These calculate the square root of the difference between the residuals of the sample and model covariance matrices. Here lower values closer to 0 indicate good fit since this indicates that the residuals and therefore the differences between the two matrices are very small. A suggested upper cutoff for this statistic is .08. The report for the SRMR for all models indicates good fit, with all models reporting either SRMR = .02 or .01.

One additional index is the comparative fit index (CFI), which compares the model covariance matrix to a null model which assumes all of the variables are uncorrelated. Here, the fit statistic is calculated using a null model as a comparison

rather than the observed sample matrix. Values approaching 1 are considered to indicate acceptable fit, with the cutoff generally recognized as being $CFI > 0.95$ (Hu & Bentler, 1999). The reported CFI's in table 3 also indicate good fit in this regard, with all values of $CFI > .99$.

Testing Interactional Theory

Total Sample

Table 4.1 presents the unstandardized coefficients for the effects of the full model run for the total sample using the top-coded incidence measure of delinquency. For all of the endogenous variables, we observe consistent stability effects across all waves. Commitment to school at time 1 has a significant positive effect on commitment to school at time 2. The same is true for the effect of commitment to school at time 2 on commitment to school at time 3. This indicates that prior commitment consistently predicts future commitment. Similar effects are observed for general delinquency and peer delinquency.

There are less consistent results for the hypothesized substantive effects in the model. In addition to stability effects, for commitment to school at time 1, we observe a significant negative effect on general delinquency at time 2. However, the effect on peer delinquency at time 2 is not significant, although it is in the expected direction. This is also observed for the effect of commitment to school at time 2 on peer delinquency and general delinquency, where there is a significant negative effect on general delinquency, but no significant effect on peer delinquency. The effect of peer delinquency at time 1 on general delinquency is also significantly negative and in the expected direction. The same significant effect is observed for peer delinquency at time 2 on general delinquency

at time 3. However, there is no significant effect of peer delinquency on commitment to school at either time period. With the exception of general delinquency at time 2 on commitment to school at Time 3, general delinquency exerts a significant effect on commitment to school and peer delinquency. Specifically, general delinquency predicts lower levels of commitment to school at time 2 while predicting higher levels of peer delinquency for both time periods.

Table 4.2 contains estimates for the same model as table 4.1 while replacing the top-coded general delinquency measure with the general delinquency variety measure. The findings are generally similar to the model containing the incidence measure of delinquency. Stability effects are still significant and in the expected directions, with magnitudes similar to the effects observed in table 4.1. With the exception of the significant effect of commitment to school at time 2 on peer delinquency at time 3, commitment to school and peer delinquency do not seem to significantly predict one another. However, general delinquency is found to be a significant predictor for both commitment to school and peer delinquency at all time periods.

Table 4.1 Estimated Structural Equation Model of Commitment to School, Peer Delinquency, and Top-coded General Delinquency Measure for Total Sample ($n = 808$): Parameter Estimates and Standard Errors (in parentheses)

	Commitment to school T2	Peer delinq. T2	General delinq. T2	Commitment to school T3	Peer delinq T3	General delinq T3
Commitment to school T1	.631** (.031)	-.027 (.049)	-1.015** (.311)			
Peer delinquency T1	-.023 (.026)	.591** (.040)	1.456** (.261)			
General delinquency T1	-.009** (.003)	.019** (.005)	.475** (.034)			
Commitment to school T2				.591** (.029)	-.038 (.043)	-.628* (.324)
Peer delinquency T2				-.009 (.022)	.385** (.032)	.681** (.246)
General delinquency T2				-.003 (.003)	.038** (.005)	.510** (.037)
Male	-.043 (.023)	.072** (.036)	.231 (.231)	-.053** (.023)	.020 (.034)	.406 (.255)
Age	-.024** (.014)	.012 (.022)	.168 (.142)	-.043** (.014)	.025 (.021)	.480** (.154)
Low Parent Education	-.052** (.022)	-.017 (.034)	.313 (.223)	.030 (.022)	-.007 (.032)	.079 (.243)
Neighborhood Arrest Rate	<.001 (.005)	-.003 (.008)	-.025 (.050)	.012** (.005)	.004 (.007)	-.051 (.055)

* $p < .1$, ** $p < .05$

Figure 4.1 Estimated Structural Equation Model of Commitment to School, Peer Delinquency, and Top-coded General Delinquency Measure for Total Sample

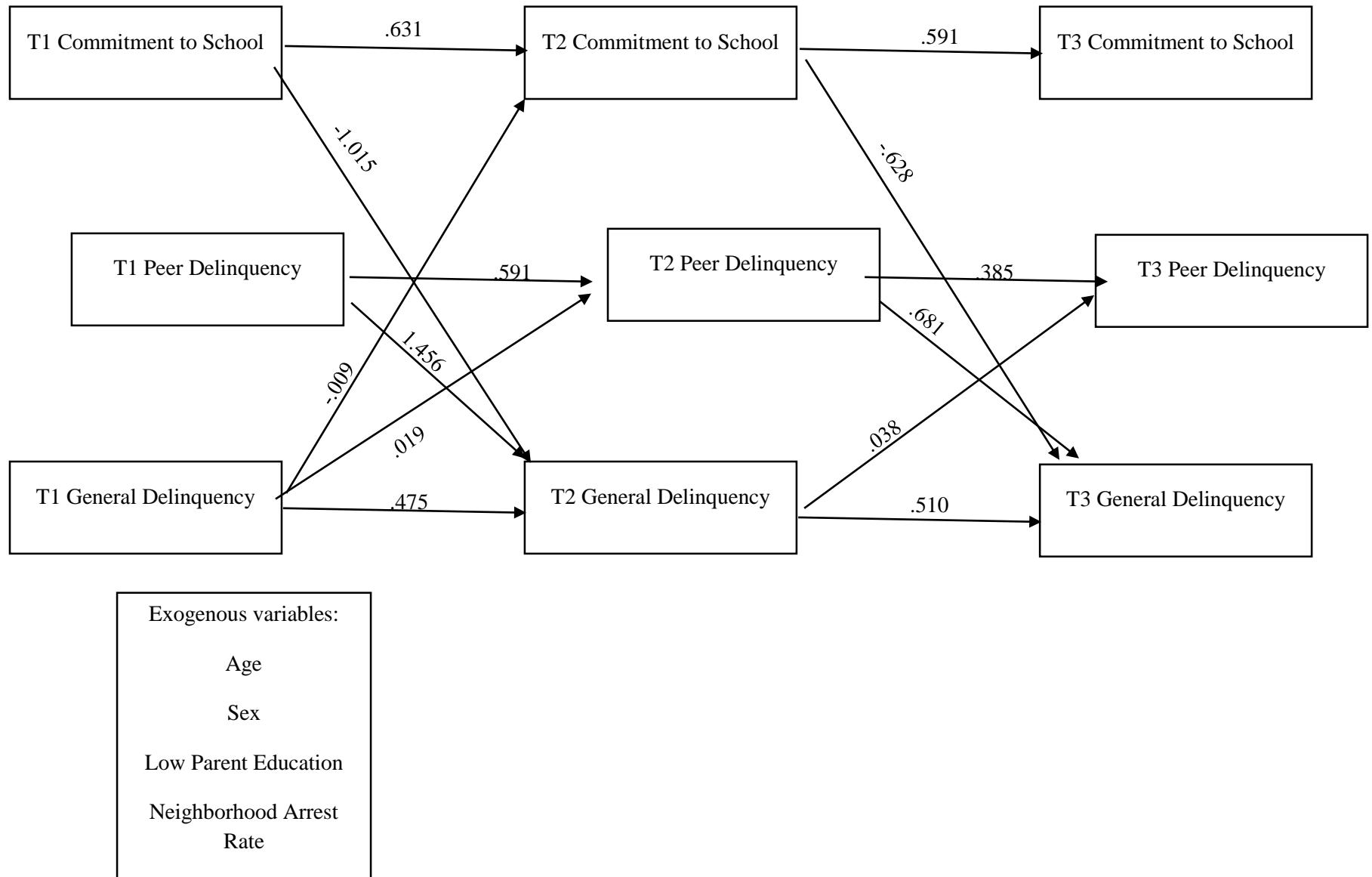


Table 4.2 Estimated Structural Equation Model of Commitment to School, Peer Delinquency, and Variety General Delinquency Measure for Total Sample ($n = 808$): Parameter Estimates and Standard Errors (in parentheses)

	Commitment to school T2	Peer delinq. T2	General delinq T2	Commitment to school T3	Peer delinq T3	General delinq T3
Commitment to school T1	.631** (.031)	-.018 (.048)	-.467** (.195)			
Peer delinquency T1	-.025 (.029)	.547** (.044)	.633** (.177)			
General Delinquency T1	-.012** (.006)	.039** (.009)	.497** (.035)			
Commitment to school T2				.585** (.029)	-.035* (.043)	-.264 (.174)
Peer delinquency T2				.006 (.024)	.341** (.035)	-.015 (.141)
General Delinquency T2				-.011* (.006)	.070** (.008)	.516** (.034)
Male	-.042* (.023)	.067* (.036)	.364** (.142)	-.051** (.023)	.002 (.034)	.108 (.136)
Age	-.025* (.014)	.013 (.022)	.095 (.089)	-.044** (.014)	.028 (.021)	.169** (.083)
Low Parent Education	-.052** (.022)	-.017 (.034)	.117 (.137)	.031 (.022)	-.004 (.032)	-.048 (.129)
Neighborhood Arrest Rate	<.001 (.005)	-.001 (.008)	-.025 (.031)	.011** (.005)	.005 (.007)	-.007 (.029)

* $p < .1$, ** $p < .05$

Figure 4.2 Estimated Structural Equation Model of Commitment to School, Peer Delinquency, and General Delinquency Variety

Measure

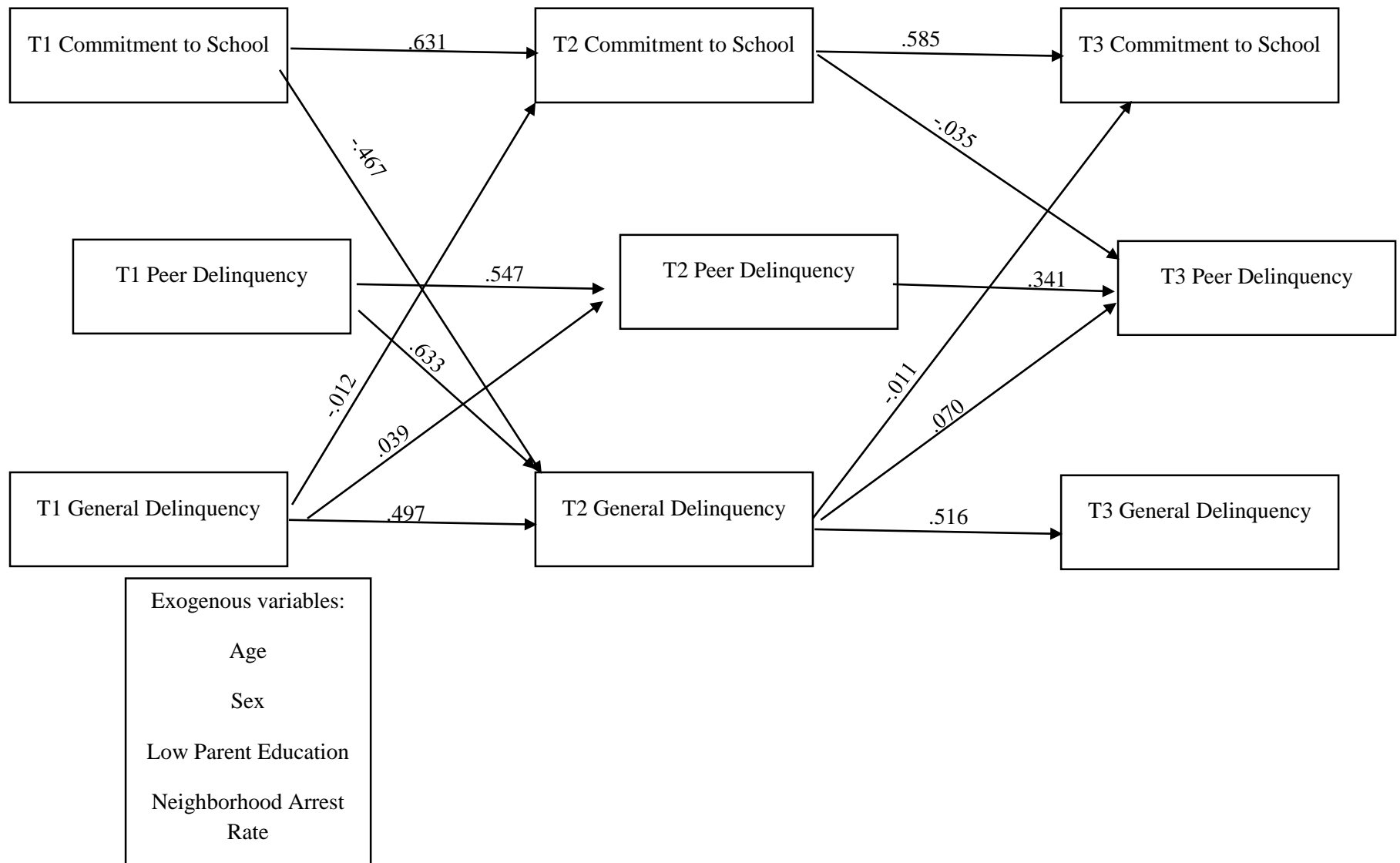


Table 5.2 Estimated Structural Equation Model of Commitment to School, Peer Delinquency, and Variety General Delinquency Measure for Race Groups: Parameter Estimates and Standard Errors (in parentheses)

	1	2	3	4	5	6
a. Whites (n = 147)						
1. Commitment to school T1	.671** (.068)	.009 (.079)	-.464 (.357)			
2. Peer delinquency T1	.007 (.086)	.785**† (.095)	.580 (.448)			
3. General delinquency T1	-.028* (.015)	.009 (.017)	.688**† (.074)			
4. Commitment to school T2				.554** (.068)	.009 (.082)	-.662* (.381)
5. Peer delinquency T2				-.096 (.064)	.401** (.083)	-.291 (.358)
6. General delinquency T2				-.010 (.013)	.044**† (.016)	.624**† (.071)
Male	.114 (.082)	.014 (.088)	-.167 (.432)	-.206** (.075)	.070 (.094)	.336 (.423)
Age	-.010 (.036)	.024 (.042)	-.078 (.203)	.008 (.035)	.042 (.046)	.141 (.221)
Parent Education	-.123** (.058)	-.023 (.072)	.706** (.307)	.045 (.060)	-.063 (.071)	-.048 (.322)
Neighborhood Arrest Rate .125	.014 (.015)	.018 (.018)	.057 (.078)	.004 (.015)	.024 (.019)	
b. African Americans (n = 661)						
Commitment to school T1	.607** (.035)	-.037 (.057)	-.469** (.219)			
Peer delinquency T1	-.031 (.030)	.513**† (.049)	.613** (.185)			
General delinquency T1	-.008 (.006)	.041** (.010)	.449**† (.038)			
Commitment to school T2				.577** (.033)	-.058 (.050)	-.111 (.199)
Peer delinquency T2				.013 (.026)	.078** (.010)	.072 (.156)
General delinquency T2				-.010 (.007)	.322**† (.039)	.476**† (.040)
Male	-.041 (.025)	.085** (.039)	.403** (.152)	-.032 (.024)	-.003 (.037)	.079 (.156)
Age	-.029 (.015)	.008 (.025)	.091 (.094)	-.052** (.015)	.027 (.023)	.186** (.089)
Parent Education	-.046* (.024)	-.018 (.038)	.049 (.149)	.027 (.024)	.003 (.036)	.069 (.141)
Neighborhood Arrest Rate -.009	-.009 (.006)	-.009 (.009)	-.041 (.035)	.009 (.006)	.002 (.009)	

* $p < .1$, ** $p < .05$

† $p < .05$ nested chi-square test indicates significant difference in models where this parameter is held constant between

whites and African Americans.

Figure 5.2a Estimated Structural Equation Model of Commitment to School, Peer Delinquency, and General Delinquency Variety

Measure for White Sample

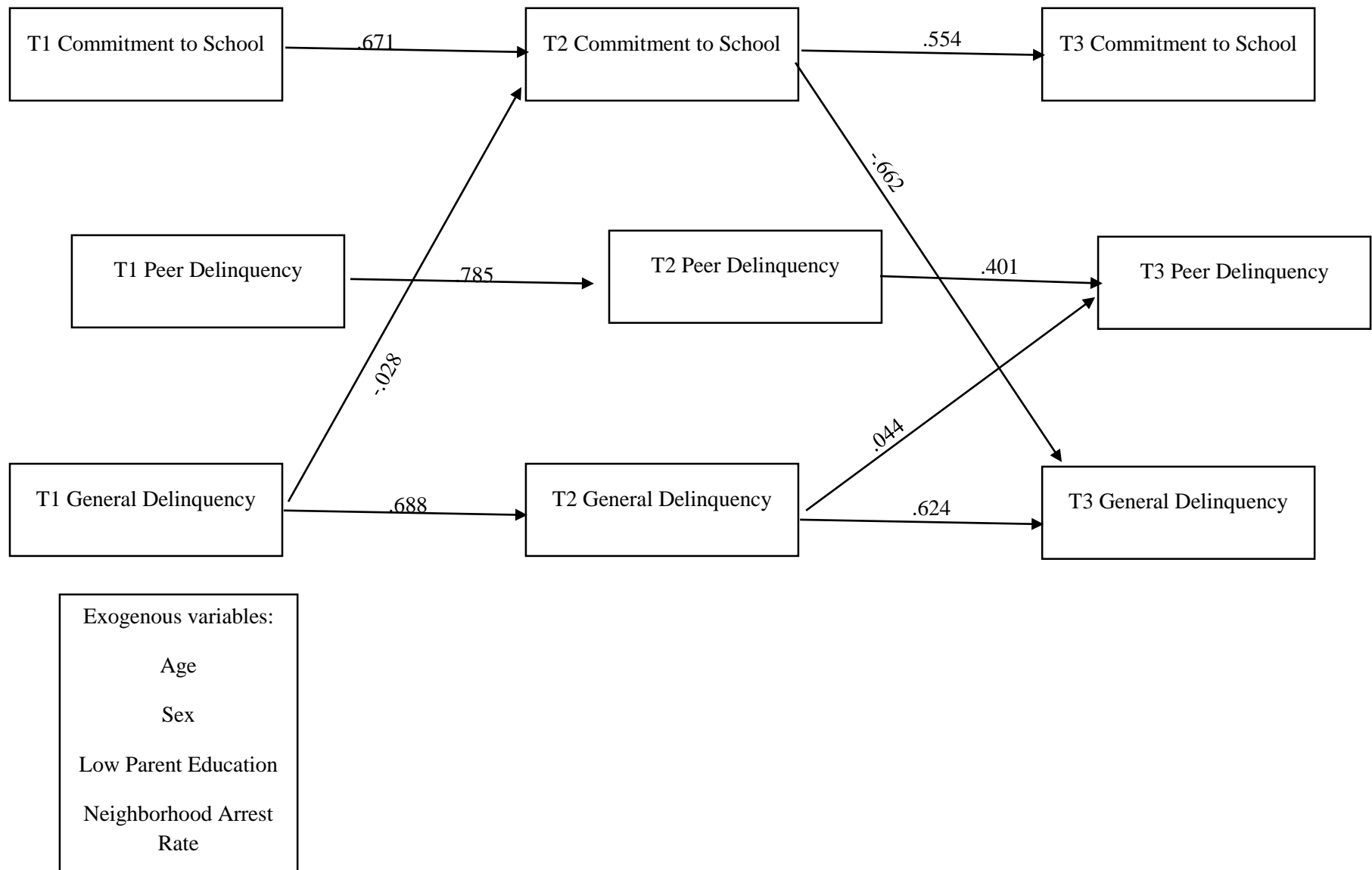
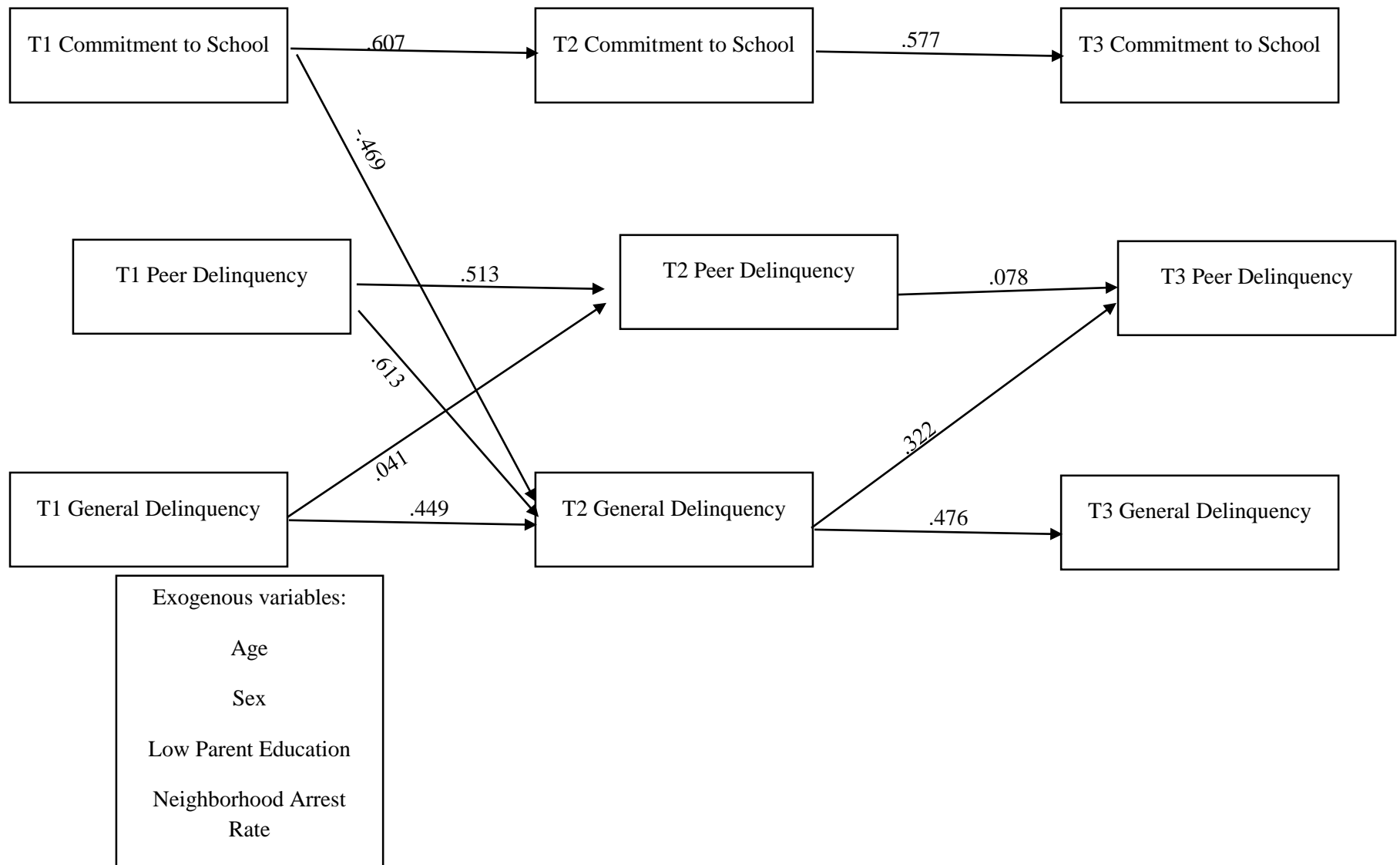


Figure 5.2b Estimated Structural Equation Model of Commitment to School, Peer Delinquency, and General Delinquency Variety Measure for African-American Sample



White and African American Samples

The same model was conducted to calculate effects separately for whites and African American samples. The results are shown in Table 5.1 for the top-coded general delinquency incidence measure. The effects of commitment to school at time 1 on general delinquency at time 2 as well as the effect of peer delinquency at time 2 are non-significant for the white sample. The effect of peer delinquency at time 1 for all other endogenous variables measured at time 2 is significant and in the expected direction. The effect of commitment to school at time 2 on general delinquency at time 3 is significant and in the expected, negative direction. For African Americans, the stability effects also remain comparable to the total model and the white sample, in direction, significance, and magnitude. The only exception is the effect of commitment to school at time 2 on general delinquency at time 3, which is insignificant for the African American sample.

Table 5.2 runs the model for both whites and African Americans for the variety measure of general delinquency. Similar to the previous models, stability effects remain consistent across time periods and in the expected directions. For the white sample, the only significant effect on general delinquency is a significant negative effect of commitment to school at time 2 on general delinquency at time 3. In addition, general delinquency at time 1 predicts a decrease in commitment to school at time 2, while an increase in delinquency at time 2 leads to a significant increase in peer delinquency at time 3. This generally matches the results found for the analysis of the incidence measure of general delinquency, with the exception of the effect of peer delinquency at time 1 on commitment to school at time 2, which is non-significant in the model using the variety measure of general delinquency.

For the African-American sample, the effects generally match those found in the previous model using the top-coded incidence measure of general delinquency. The only notable exception is with regard to the effect of general delinquency at time 1 on commitment to school at time 2, which is non-significant in this model. While the effects are in the expected directions, the magnitudes of several of the coefficients (for example, the effects of all three endogenous variables at time 1 on general delinquency at time 2) seem to be significantly lower compared to the model for the top-coded general delinquency measure.

Testing Racial Differences

Finally, tables 5.1 and 5.2 also indicate the results of the multi-group analysis where each model was run while setting an equality constrain for a particular parameter and comparing the fit statistic as a result of this assumption. Models were run multiple times, where each iteration held a single parameter constant. The chi-square test statistic of the constrained model was then compared to the original full model with all free parameters. This results in a nested model difference of chi-square test, where a significant difference between chi-squared values indicates that assuming equality for a parameter between the free and constrained models would significantly alter the effects of the other parameters in the model.

Table 5.1 displays the significant differences found in coefficients between whites and African Americans in the model with top-coded general delinquency shows four parameters with significant differences. Two of these differences are found in the stability effects, specifically, the effect of peer delinquency at time 1 on peer delinquency at time 2 and general delinquency at time 1 on general delinquency at time 2. This

indicates that peer delinquency has a significantly larger, positive effect on general delinquency for whites compared to African Americans while the other two differences were for peer delinquency at time 1 on general delinquency at time 2 and the effect of commitment to school at time 2 on general delinquency at time 3. This implies that the effect of peer delinquency at time 1 has a stronger effect on general delinquency at time 2 for whites than African Americans. The difference found in the effect of commitment to school on general delinquency is evident both in the change in magnitude and significance, where the negative effect of commitment to school appears to be much stronger for whites compared to African Americans. This is especially significant since it implies that there may be some validity to the inconsistency of the effect of commitment to school suggested by oppositional culture theories, where it plays a large role in shaping conformity for whites but not African-Americans.

We also observe differences between race groups for coefficients for which there were no significant differences found. At both time periods, there seems to be a change in direction for the effect of commitment to school on peer delinquency, where the effect is in the expected, negative direction for African Americans but not whites. However, since the statistic is not significant for either race group, this may be interpreted as a null effect for both groups. Significance changes between whites and African Americans also exist for some coefficients, including commitment to school at time 1 on general delinquency at time 2 and peer delinquency at time 2 on general delinquency at time 3. For both, the effect is significant for African Americans and not whites, however this may be a result of the differences in sample sizes for both groups.

Despite these differences, out of the 18 tests that were run to detect significant differences between whites and African Americans, only four were found to be significant. In addition, the coefficient size for whites that likely led to findings of significant differences (peer delinquency T1 → general delinquency T2 and commitment to school T2 → general delinquency T3) were abnormally large and only occurred in one time period (for example similar results are not found for the effect of peer delinquency T1 → general delinquency T2 on T2 → T3). For this reason, it may be questionable to make any strong conclusions regarding these observed effect differences. Instead, we see that 14 out of the 18 tests show consistency across race groups, which supports the generality hypothesis of interactional theory.

Table 5.2 displays the results for the multi-group analysis using the variety measure of offending. Again, there are four parameters suggesting statistically significant model differences. However, three of these are likely indicators of differences in the magnitudes of the stability coefficients. The effect of peer delinquency at time 1 on peer delinquency at time 2 and general delinquency at time 1 and time 2 on general delinquency at time 2 and time 3, respectively, seem to indicate significant differences in magnitude. Specifically, the effect of these variables is stronger for whites than African-Americans. The final significant difference between the models can be attributed to the effect of general delinquency at time 2 on peer delinquency at time 3. Here, there is a significant difference in the magnitude of this coefficient where it is significantly higher for African Americans compared to whites.

Again, we can observe differences in effects for which the nested chi-square model test did not yield significant findings. The effect of general delinquency at time 1

on commitment to school at time 2 is significant for whites but not African Americans, although both are in the expected, negative direction. This is reversed for the effect of general delinquency at time 1 on peer delinquency at time 2, where the effect is significant for African Americans compared to whites. While non-significant, there are effects where direction appears to change as well. We observe peer delinquency at time 1 having a negative effect on commitment to school at time 2 for African Americans but a positive effect for whites. This flips in the following time period, where peer delinquency at time 2 has an expected negative effect on commitment to school at time 3 for whites but is positive for African Americans. Peer delinquency at time 2 then has a negative effect on general delinquency for whites but is positive for African Americans. Again, these differences are not very substantive since the coefficients for these effects were found to be non-significant.

Like the model for the top-coded incidence measure of general delinquency we observe very few significant differences between whites and African Americans. Again, only four of the 18 null hypotheses for no change in model fit were rejected. This seems to support the findings of the previous model and imply that overall, generality is observed in the reciprocal effects of the endogenous variables.

Among the observed differences in the multi-group analysis, only two differences have substantively interesting implications. First, as previously noted, the effect of commitment to school at time 2 on top-coded general delinquency at time 3 is significantly different between race groups, both in terms of a change in statistical significance and magnitude. There is also a significant difference in the effect of peer delinquency at time 1 on top-coded general delinquency at time 2, indicating a significant

difference in the magnitude of this effect. These differences are not observed in the model with the variety general delinquency measure. The only substantive difference observed in this model is the effect of general delinquency at time 2 on peer delinquency at time 3. In both models, however, these significant differences did not occur consistently over time, where a significant difference for a coefficient was not found for both $T1 \rightarrow T2$ and $T2 \rightarrow T3$ for a particular parameter. This was especially true for the surprisingly large coefficient sizes in the model with top-coded incidence of general delinquency.

Discussion

This study sought to advance research on racial differences in offending by examining the generality of Thornberry's interactional theory for whites and African Americans. An issue with traditional theories is that many of them "assume universal causal effects throughout social structure" (Thornberry, 1987). It focused on testing whether the levels and reciprocal effects of commitment to school, peer delinquency, and delinquency differed by race. General theories such as interactional theory hypothesize the specific directions of reciprocal effects that match the effects predicted by the traditional theories from which they are based. Commitment to school should have negative effects on peer delinquency and delinquency while peer delinquency should have negative effects on commitment to school and positive effects on delinquency. Finally, delinquency is also expected to yield a positive causal effect on peer delinquency while having a negative causal effect on commitment to school. We can claim support for the generality hypothesis of interactional theory if these expected effects are consistent for both whites and African Americans. Specifically, if interactional theory acts as a general theory, we should observe stability in the significance, direction, and size of the effect of these variables when comparing each effect between race groups.

We see general support for interactional theory in both the white and African American models although findings for the reciprocal effects were not as strong as anticipated. There are consistent stability effects for both race groups. There was generally support for the reciprocal effect of general delinquency on commitment to school and peer delinquency in both groups, but much less support for the reciprocal relationship between commitment to school and peer delinquency.

We also observe comparable findings for both whites and African Americans. Assessment of bivariate relationships indicate that both stable and cross-lagged correlations are in the expected directions for both whites and African Americans. In the SEM analysis, there were no instances of differences in the coefficient effect for both time periods of analysis. In addition, the noted changes in direction were for coefficients which were statistically non-significant. Because of this, and the majority of tests for significant differences that failed to reject the null hypothesis of equal model fit, imply that there are very few differences, if any, between whites and African Americans regarding the nature of the reciprocal effects among endogenous variables.

In addition to the lack of differences found in the effects of these variables, there also does not appear to be a significant difference in the level of causal variables in the model. This is interesting since interactional theory predicts that differences in social structural characteristics (which we find in the test for difference in means between whites and African Americans) should also predict differences in the level of commitment to school and peer delinquency as well as delinquency. While this seems to suggest generality of theories in the way Hirschi (1969) would suggest (race plays no role in shaping the level of causal variables), this may be more of a representation of the individuals of a specific sampling design. There may be a significant difference in causal variables between race groups if individuals from a wider range of social contexts were included.

There are several limitations to the study. The dependent variable, despite adjustments to modify its distribution, does not fit the assumption of normality very well. Since this normality assumption is important in accurately interpreting the results of the

structural equation model used in this study, the results must be interpreted with heavy caution. Future research should use a method similar to path analysis that allows for non-normal distributions. The large difference of sample size between whites and African Americans was also problematic in that the lack of statistical power for whites in this study would make it harder to accurately establish significant effects in the model and therefore question the significant differences observed in the multi-group analysis. Therefore, while the final results showed a small number of statistical differences between the two models, the fact that we observed some significant differences across models although the analysis was biased towards finding no significant differences suggests a need for further examination. Finally, the model run in this study contains only a small part of interactional theory. Considering other factors that may still have an influence on an adolescent's behavior, such as attachment to family may have further implications for interactional theory and the validity of racial differences. This limitation also applies to the timeline under consideration. The data analysis of this study covers a relatively small segment of adolescent development. As interactional theory is also a developmental theory, analyzing a wider range of years (especially in a way that covers key stages in development, like early, mid, and late adolescence) may help to more accurately assess trends in the processes occurring between variables of interest.

Despite the limitations of this study, there seems to be a need to further investigate how these processes remain consistent or differ based on race. Improving the scope of the model may help provide a clearer picture of whether there are substantively different ways in which reciprocal effects between variables may operate over the life course. The consistent finding that general delinquency significantly predicted

commitment to school and peer delinquency further supports the need to examine reciprocal effects between traditionally-labeled causal variables and crime. Given the support for the generality of interactional theory across race, policy efforts can focus on identifying key variables that provide consistent treatment effects across the general population, such as improving individual's attitudes toward school and working to lower their association with delinquent peers by offering more opportunities to socialize with conventional others. Future research should work to expand on this study, extending it to other factors, other race groups, and a larger time frame.

Appendix

Items in Commitment to School scale

How much do you agree or disagree with these statements?

Response categories: 1 (Strongly Disagree), 2 (Disagree), 3 (Agree), 4 (Strongly Agree)

- a. Since school began this year, you like school a lot.
- b. School is boring to you.*
- c. You do poorly at school.*
- d. You don't really belong at school.*
- e. Homework is a waste of time.*
- f. You try hard at school.
- g. You usually finish your homework.
- h. Getting good grades is very important to you.
- i. Sometimes you do extra work to improve your grades.
- j. If you needed advice on something other than school work, you would go to one of your teachers.
- k. You feel very close to at least one of your teachers.
- l. You don't care what your teachers think of you.
- m. You have lots of respect for your teachers.

*reverse-coded for scale

Items in Peer Delinquency scale

Since we interviewed you last time, how many of (your) friends...

Response categories: 1 (None of them), 2 (A few of them), 3 (Some of them), 4 (Most of them)

- a. Used a weapon or force to get money or things from people?
- b. Attacked someone with a weapon or with the idea of seriously hurting them?
- c. Hit someone with the idea of hurting them?
- d. Stole something worth more than \$100?
- e. Stole something worth more than \$5 but less than \$50?
- f. Damaged or destroyed someone else's property on purpose?
- g. Took a car or motorcycle for a ride or drive without the owner's permission?
- h. Skipped classes without an excuse?

Items included in General Delinquency measures

1. Running away from home
2. Truancy
3. Lying about age
4. Hitchhiking
5. Carrying a hidden weapon
6. Public rowdiness
7. Begging
8. Public drunkenness
9. Property damage/destruction
10. Arson
11. Avoiding payment
12. Breaking/entering
13. Theft of < \$5
14. Theft of \$5-50
15. Theft of \$50-100
16. Theft of \$100+
17. Buying/selling stolen goods
18. Joyriding
19. Motor vehicle theft
20. Forgery
21. Illegal credit card use
22. Fraud
23. Attacking with weapon
24. Other assault
25. Gang fight
26. Throwing things at people
27. Robbery
28. Obscene phone calls
29. Paid for having sex
30. Rape

References

- Agnew, R. (1985). Social control theory and delinquency: A longitudinal test. *Criminology* 23(1): 47-61.
- Agnew R. (1992). Foundation for a general strain theory of crime and delinquency. *Criminology* 30(1): 47-88.
- Agnew, R. (2001). Building on the foundation of general strain theory: Specifying the types of strain most likely to lead to crime and delinquency. *Journal of Research in Crime and Delinquency* 38(4): 319-361.
- Agnew, R. (2006). Pressured into crime: An overview of general strain theory. New York, NY: Oxford University Press.
- Akers, R. L., & Burgess, R. L. (1966) A differential association-reinforcement theory of criminal behavior. *Social Problems* 14(2): 128-147.
- Akers, R. L., Krohn, M. D., Lanze-Kaduce, L., & Radosevich, M. (1979). Social learning and deviant behavior: A test of general theory. *American Sociological Review* 44: 636-655.
- Akins, S., Smith, C. L., & Mosher, C. (2010). Pathways to adult alcohol abuse across racial/ethnic groups: An application of general strain and social learning theories. *The Journal of Drug Issues* 40(2): 321-352.
- Antonovics, K. L., & Knight, B. G. (2009). A new look at racial profiling: Evidence from the Boston police department. *The Review of Economics and Statistics* 91(1): 163-177.
- Bachmann, J. G., O'Malley, P. M., Schulenberg, J. E., Johnston, L. D., Feedman-Doan, P., & Messersmith, E. E. (2008). *The education-drug use connection*. Mahwah, NJ: Lawrence Erlbaum.
- Bandura, A., Ross, D., & Ross, S. A. (1961). Transmission of aggression through the imitation of aggressive models. *Journal of Abnormal and Social Psychology* 63(3): 575-582.
- Battin-Pearson, S., Newcomb, M. D., Abott, R. D., Hill, K. G., Catalano, R. F., & Hawkins, J. D. (2000). Predictors of early high school dropout: A test of five theories. *Journal of Educational Psychology* 92(3): 568-582.
- Beckett, K., Nyrop, K., & Pflingst, L. (2006). Race, drugs, and policing: Understanding disparities in drug delivery arrests. *Criminology* 44(1): 105-137.

- Berndt, T. J. (1979). Developmental changes in conformity to peers and parents. *Developmental Psychology* 15(6): 608-616.
- Cernkovich, S. A., & Giordano, P. C. (1992). School bonding, race, and delinquency. *Criminology* 30(2): 261-291.
- Cernkovich, S. A., Giordano, P. G., & Rudolph, J. L., (2000). Race, crime, and the American dream. *Journal of Research in Crime and Delinquency* 37(2): 131-170.
- Clasen, D. R., & Brown, B. B. (1985). The multidimensionality of peer pressure in adolescence. *Journal of Youth and Adolescence* 14: 451-467.
- Dahlberg, L. L., Toal, S. B., Swahn, M., & Behrens, C. B. (2005). *Measuring violence-related attitudes, behaviors, and influences among youths: A compendium of assessment tools*. Atlanta, GA: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control.
- Demant, J., & Van Houtte, M. (2012). School belonging and school misconduct: The differing role of teacher and peer attachment. *Journal of Youth and Adolescence* 41: 499-514.
- Dishion, T. J., Patterson, G. R., Stoolmiller, M., & Skinner, M. L. (1991). Family, school and behavioral antecedents to early adolescent involvement with antisocial peers. *Developmental Psychology* 27(1): 172-180.
- Elliott, D., Huizinga, D., Knowles, B., & Canter, R. (1983). The prevalence and incidence of delinquent behavior: 1976-1980: National estimates of delinquent behavior by sex, race, social class and other selected variables. Boulder, CO: Behavioral Research Institute.
- Enders, C. K., & Bandalos, D. L. (2001). The relative performance of full information maximum likelihood estimation for missing data in structural equation models. *Structural Equation Modeling: A Multidisciplinary Journal* 8(3): 430-457.
- Felson, R. B., & Staff, J. (2006). Explaining the academic performance-delinquency relationship. *Criminology* 44(2): 299-319.
- Felson, R. B., Deane, G., & Armstrong, D. P., (2007). Do theories of crime or violence explain race differences in delinquency? *Social Science Research* 37: 624-641.
- Fordham, S., & Ogbu, J. U. (1986). Black Students' school success: Coping with the "burden of acting white." *The Urban Review* 18(3): 176-206.
- Gardner, L., & Shoemaker, D. J. (1989). Social bonding and delinquency: A comparative analysis. *The Sociological Quarterly* 30(3): 481-499.

- Gottredson, M. & Hirschi, T. (1990). *A General Theory of Crime*. Stanford, CA: Stanford University Press.
- Graham, J. W. (2009). Missing data analysis: Making it work in the real world. *Annual Review of Psychology* 60: 549-576.
- Harding, D. J. (2009). Violence, older peers, and the socialization of the adolescent boys in disadvantaged neighborhoods. *American Sociological Review* 74(3): 445-464.
- Haynie, D. L. (2002). Friendship networks and delinquency: The relative nature of peer delinquency. *Journal of Quantitative Criminology* 18(2): 99-134.
- Hindelang, M. J. (1973). Causes of delinquency: A partial replication and extension. *Social Problems* 21: 471-487.
- Hindelang, M. J. (1978). Race and involvement in common law personal crimes. *American Sociological Review* 43: 93-109.
- Hindelang, M., Hirschi, T., & Weis, J. G. (1981). *Measuring delinquency*. Beverly Hills, CA: Sage Publications.
- Hirschfield, P. J., & Gasper, J. (2011). The relationship between school engagement and delinquency in late childhood and early adolescence. *Journal of Youth and Adolescence* 40: 3-22.
- Hirschi, T. (1969). *Causes of Delinquency*. Berkeley, CA: University of California Press.
- Hoffman, J. P., Erickson, L. D., & Spence, K. R. (2013). Modeling the association between academic achievement and delinquency: An application of interactional theory. *Criminology* 51(3): 629-660.
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives." *Structural Equation Modeling* 6(1): 1-55.
- Huebner B. M. & Bynum, T. S. (2008). The role of race and ethnicity in parole decisions. *Criminology* 46(4): 907-938.
- Jang, S. J. (1999). Age-varying effects of family, school, and peers on delinquency: A multilevel modeling test of interactional theory. *Criminology* 37(3): 643-686.
- Jenkins, P. H. (1997). School delinquency and school social bond. *Journal of Research in Crime and Delinquency* 34: 337-367.

- Junger, M., & Marshall, I. H. (1997). The interethnic generalizability of social control theory: An empirical test. *Journal of Research in Crime and Delinquency* 34: 79-112.
- Kaufman, J. M., Rebellon, C. J., Thaxton, S.T., & Agnew, R. (2008). A general strain theory of racial differences in criminal offending. *The Australian and New Zealand Journal of Criminology* 41(3): 421-437.
- Kellam, S. (1990). Developmental epidemiological framework for family research on depression and aggression. In G. R. Patterson (Ed.), *Depression and aggression in family interaction* (pp. 11-48). Hillsdale, NJ: Earlbaum.
- Kempf, K. L. (1993). The empirical status of Hirschi's control theory. In F. Adler & W.S. Laufer (Eds.), *New directions in criminological theory: Advances in criminology theory* (Vol. 4, pp. 143-185). New Brunswick, NJ: Transaction.
- Knecht, A., Snijders, T. A. B., Baerveldt, C., Steglich, C. E. G., & Raub, W. (2010). Friendship and delinquency: Selection and influence processes in early adolescence. *Social Development* 19(3): 494-514.
- Kochel, T. R., Wilson, D. B., & Mastrofski, S. D. (2011). Effect of suspect race on officers' arrest decisions. *Criminology* 49(2): 473-512.
- Krohn, M.D., & Massey, J. L. (1980). Social control and delinquent behavior: An examination of the elements of the social bond. *The Sociological Quarterly* 21(4): 529-544.
- Krohn, M. D., & Thornberry, T. P. (1999). Retention of minority populations in panel designs. *Drugs & Society* 14: 185-207.
- Krohn, M. D., & Thornberry, T. P. (2001). The development of delinquency: An interactional perspective. In S. O. White (Ed.), *Handbook of law and social science: Youth and justice* (pp. 289-305). New York: Plenum.
- Krohn, M. D., Lizotte, A. J., Thornberry, T. P., Smith, C., & McDowell, D. (1996). Reciprocal causal relationships among drug use, peers, and beliefs: A five-wave panel model. *Journal of Drug Issues* 26(2): 405-428.
- Liska, A. E., & Reed, M. D. (1985). Ties to conventional institutions and delinquency: Estimating reciprocal effects. *American Sociological Review* 50(4): 547-560.
- Lundman, R. J. & Kaufman, R. L. (2002). Driving while black: Effects of race, ethnicity, and gender on citizen self-reports of traffic stops and police actions. *Criminology* 41(1): 195-220.

- MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods* 1(2): 130-149.
- Maguin, E. & Loeber, R. (1996). Academic performance and delinquency. *Crime and Justice* 20: 145-264.
- Matsueda, R. L., & Heimer, K. (1987). Race, family structure and delinquency: A test of differential association and social control theories. *American Sociological Review* 52: 826-840.
- Matsueda, R. L., & Anderson, K. (1998). The dynamics of delinquent peers and delinquent behavior. *Criminology* 36(2): 269-308.
- McCluskey, C. P., Krohn, M. D., Lizotte, A. J., & Rodriguez, M. L. (2002). Early substance use and school achievement: An examination of Latino, white and African American youth. *Journal of Drug Issues* 32(3): 921-944.
- McGloin, J. M. (2009). Delinquency balance: Revisiting peer influence. *Criminology* 47(2): 439-477.
- McLeod, J. D., Uemura, R. & Rohrman, S. (2012). Adolescent mental health, behavior problems, and academic achievement. *Journal of Health and Social Behavior* 53(4): 482-497.
- Mickelson, R. A. (1990). The attitude-achievement paradox among black adolescents. *Sociology of Education* 63: 47-63.
- Monahan, K. C. & Steinberg, L., & Cauffman, E. (2009). Affiliation with antisocial peers, susceptibility to peer influence, and antisocial behavior during the transition to adulthood. *Developmental Psychology* 45(6): 1520-1530.
- Newcomb, M. D., & Bentler, P. M. (1986). Substance use and ethnicity: Differential impact of peer and adult models. *The Journal of Psychology* 120(1): 83-95.
- Ogbu, J. (1991). Minority responses and school experience. *Journal of Psychohistory* 18: 433-456.
- Orcutt, J. D., & Schwabe, A.M. (2012). Gender, race/ethnicity, and deviant drinking: A longitudinal supplication of social structure and social learning theory. *Sociological Spectrum* 32: 20-36.
- Paternoster, R., & Iovanni, L. (1986). The deterrent effect of perceived severity: A reexamination. *Social Forces* 64(3): 751-777.

- Peguero, A. A., Popp, A. M., Latimore, T. L., Shekarkhar, Z., & Koo, D. J. (2011). Social control theory and school misbehavior: Examining the role of race and ethnicity. *Youth Violence and Juvenile Justice* 9: 259-275.
- Piquero, N. L., Gover, A. R., MacDonald, J. M., & Piquero, A. R. (2005). The influence of delinquent peers on delinquency: Does gender matter? *Youth and Society* 36: 251-275.
- Raufelder, D., Jagenow, D., Drury, K., & Hoferichter, F. (2013). Social relationships and motivation in secondary school: Four different motivation types. *Learning and Individual Differences* 24: 89-95.
- Reed, M. D., & Rountree, P. W. (1997). Peer pressure and adolescent substance use. *Journal of Quantitative Criminology* 13(2): 143-180.
- Schaefer, D. R., Rodriguez, N., & Decker, S. H. (2014). The role of neighborhood context in youth co-offending. *Criminology* 52(1): 117-139.
- Siennick, S. E., & Osgood, D. W. (2012). Hanging out with which friends? Determinants of frequency of informal socializing in adolescent friendships. *Journal of Research on Adolescence* 22(4): 646-661.
- Simons, R. L., Chen, Y., Stewart, E. A., & Brody, G. H. (2003). Incidents of discrimination and risk for delinquency: A longitudinal test of strain theory with an African American sample. *Justice Quarterly* 20(4): 827-854.
- Simons, R. L., Whitbeck, L. B., Conger, R. D., Conger, K. J. (1991). Parenting factors, social skills, and value commitments as precursors to school failure, involvement with deviant peers, and delinquent behavior. *Journal of Youth and Adolescence* 20(6): 645-664.
- Spohn, C., Gruhl, J., & Welsh, S. (1981). The effect of race on sentencing: A re-examination of an unsettled question. *Law and Society Review* 16: 71-88.
- Spohn, C., Gruhl, J., & Welch, S. (1987). The impact of the ethnicity and gender of defendants on the decision to reject or dismiss felony charges. *Criminology* 25(1): 175-191.
- Steffensmeier, D., Ulmer, J., & Kramer, J. (1998). The interaction of race, gender, and age in criminal sentencing: The punishment cost of being young, black, and male. *Criminology* 36(4): 763-798.
- Steiger, J. H. (2007). Understanding the limitations of global fit assessment in structural equation modeling. *Personality and Individual Differences* 42(5): 893-898.

- Stewart, E. A. (2003). School social bonds, school climate, and school misbehavior: A multilevel analysis. *Justice Quarterly* 20(3): 575-604.
- Stolzenberg, L., D'Alessio, S. J., Eitle, D. (2015). Race and cumulative discrimination in the prosecution of criminal defendants. *Race and Justice* 5: 33-57.
- Thornberry, T. P. (1987). Toward an interactional theory of delinquency. *Criminology* 25(4): 863-891.
- Thornberry, T. P. (1998). Membership in youth gangs and involvement in serious and violent offending. In R. Loeber & D. P. Farrington (Eds.), *Serious & violent juvenile offenders: Risk factors and successful interventions* (pp. 147-166). Newbury Park, CA: Sage.
- Thornberry, T. P., & Krohn, M. D. (2005). Applying interactional theory to the explanation of continuity and change in antisocial behavior. In D. P. Farrington (Ed.), *Integrated developmental and life-course theories of offending* (pp. 183-209). New Brunswick, NJ: Transaction Publishers.
- Thornberry, T. P., Lizotte, A. J., Krohn, M. D., Farnworth, M., & Jang, S. J. (1991). Testing interactional theory: An examination of reciprocal causal relationships among family, school, and delinquency. *Journal of Criminal Law and Criminology* 82: 3-35.
- Thornberry, T. P., Lizotte, A. J., Krohn, M. D., Smith, C. A. & Porter, P. K. (2003). Causes and consequences of delinquency: Findings from the Rochester Youth Development Study. In T. P. Thornberry & M. D. Krohn (Eds.), *Taking stock of delinquency: An overview of findings from contemporary longitudinal studies* (pp. 11-46). New York: Springer.
- Vazsonyi, A. T., & Belliston, L. M. (2007). The family → low self-control → deviance: A cross-cultural and cross-national test of self-control theory. *Criminal Justice and Behavior* 34(4): 505-530.
- Warr, M., & Stafford, M. (1991). The influence of delinquent peers: What they think or what they do? *Criminology* 29(4): 851-86.