

## ABSTRACT

Title of Thesis: INVESTIGATING THE MODERATING EFFECTS OF SCHOOL CLIMATE ON THE RELATIONSHIP BETWEEN PEER DEVIANCE AND DELINQUENCY

Mei Yang, Master of Arts, 2017

Thesis directed by: Professor, Jean McGloin,  
Department of Criminology and Criminal  
Justice

Peer deviance is one of the strongest and most consistent predictors of delinquency. However, social interactions among adolescents and their peers do not happen in a vacuum. In particular, school is a critical social context for peer interactions. It is possible that school climate may alter the strength of the link between peer deviance and personal delinquency. The current project investigated the potential moderating effects of two dimensions/sub-categories of school climate, school communal social organization and discipline management, on the association between peer deviance and personal delinquency using Add Health data. Results indicated students who were more committed to school were more vulnerable to peer influence, and school-level factors did not have any impact on the peer deviance-delinquency relationship.

INVESTIGATING THE MODERATING EFFECTS OF SCHOOL CLIMATE ON  
THE RELATIONSHIP BETWEEN PEER DEVIANCE AND DELINQUENCY

by

Mei Yang

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  
2017

Advisory Committee:  
Professor Jean McGloin, Chair  
Professor Denise Gottfredson  
Associate Professor Min Xie

© Copyright by  
Mei Yang  
2017

## Dedication

This thesis is dedicated to Ray Paternoster. I miss your jokes.

## Acknowledgements

I would like to extend my great and special thanks to Jean McGloin for reading countless drafts and giving thoughtful comments for each draft. Jean's support and encouragement are not just important to the completion of this thesis, but also to my growth as a graduate student. I would also like to thank my other committee members, Denise Gottfredson and Min Xie. Denise's experiences with research on school climate and Min's extensive knowledge about hierarchical modeling have helped me with improving this project in so many ways. Without them, this thesis would not have been the same. I would like to thank Maryland Population Research Center that provided the data and HLM7, which made this project possible. I would also like to thank my friends in the department for helping me survive the thesis process. Finally, I am forever grateful to my parents and my boyfriend for always having my back.

## Table of Contents

Dedication .....	ii
Acknowledgements .....	iii
Table of Contents .....	iv
List of Tables .....	v
List of Figures .....	vi
Chapter 1: Introduction .....	1
Chapter 2: Literature Review .....	4
Normative Peer Influence .....	4
The Moderating Role of Context .....	6
What about School Climate? .....	7
School communal social organization as a Potential Moderator .....	10
Discipline Management as a Potential Moderator .....	20
Rationale for Current Research .....	25
Hypotheses .....	26
Chapter 3: Data and Method .....	28
Data and Sample .....	28
Measures .....	33
Individual Level .....	33
School Level .....	38
Analytic Plan .....	42
Chapter 4: Results .....	48
Chapter 5: Discussion .....	58
Overview .....	58
Interpretations of Findings .....	58
Limitations and Future Directions .....	63
Conclusion .....	67
Bibliography .....	68

## List of Tables

Table 1a. Z-tests of Difference in Proportions (unweighted) .....	32
Table 1b. T-tests of Difference in Means (unweighted) .....	32
Table 2a. Z-tests of Difference in Proportions for Listwise Deletion (unweighted) ...	32
Table 2b. T-tests of Difference in Means for Listwise Deletion (unweighted) .....	33
Table 3 Descriptive Statistics of Student-Level Variables (weighted) .....	37
Table 4 Descriptive Statistics of School-Level Variables (weighted) .....	40
Table 5a. Random Intercept HGLM with Over-Dispersed Poisson Distribution (N=6,046) .....	49
Table 5b. Random Intercept HGLM with Over-Dispersed Poisson Distribution (with school-level predictors, N=6,046) .....	53

## List of Figures

Figure 1 Sample Attrition after Each Merge and Listwise Deletion .....	31
Figure 2 Distribution of Personal Delinquency Scale.....	44
Figure 3 Interaction Effect of Peer deviance by School Commitment (individual) ...	52

## Chapter 1: Introduction

Peer deviance has been established as one of the strongest predictors of adolescent delinquency (Haynie, 2002; Hubbard and Pratt, 2002; Kim and Goto, 2010; Li and Guo, 2016). However, adolescents with different characteristics may have different levels of resilience or vulnerability to peer influence. For example, research indicated that the impact of peer deviance on personal delinquency might be moderated by a variety of characteristics, including gender (Fagan et al., 2007), age (Warr, 1993), and self-control (Thomas and McGloin, 2013). Indeed, Fagan et al. (2007) found that the association between peer deviance and personal delinquency was stronger for males compared to females.

The literature on moderating effects is informative, but it does not cover the potential role of an important context within which adolescents and their friends may interact: school. School is a primary source of friendships and adolescents spend considerable time interacting with each other at school (Kruse et al., 2016). Research also indicated that the context of social learning and social interactions mattered to the outcomes of learning and interactions (Boeringer et al., 1991). Because peer interactions are often shaped by and occur within the school environment, it is reasonable to assume that school climate may influence the consequences of exposure to peer deviance. Examining how aspects of school climate impact the link between peer deviance and personal delinquency is likely to provide us with more empirical

clarity regarding why exposure to peer deviance seems to be more problematic for some adolescents than others.

At the same time, school climate is identified as theoretically critical to delinquency prevention (Hirschi, 1969; Payne, 2008), and extant studies recognized the association between school climate and delinquent behaviors (Gottfredson et al., 2005; Payne et al., 2003; Roman & Taylor, 2013). This line of research signified the importance of school climate to the understanding of adolescent delinquent behaviors, but provided little information on why school climate may impact delinquent behaviors. Given the interconnectedness among school climate, peer interactions, and adolescent delinquency, perhaps one way for school climate to influence delinquent behaviors is through affecting the social learning processes of peer deviance. Investigating school climate as a potential moderator, therefore, may also move forward our understanding about the how school climate implicitly shape peer interactions and students' behaviors.

Despite the theoretical and empirical importance discussed above, few studies have pursued this line of research. Among extant literature that did examine school climate as a moderator, the samples typically did not have much variation at the school level (Wang and Dishion, 2012), the measures of personal delinquency were limited to minor delinquent behaviors (Zimmerman and Rees, 2014), and the measures of peer deviance were limited to perceptual measures (Spratt, Jenkins and Doob, 2005). In response to this research gap, the current thesis examines the potential moderating effects of school climate on the association between peer deviance and personal delinquency using data from the Add Health study. Drawn

from Cook, Gottfredson, and Na (2010)'s categorization of school climate, this thesis focuses two sub-categories of school climate: school communal social organization and discipline management. Chapter 2 discusses the extant literature on peer deviance and school communal social organization as well as discipline management, with a specific focus on why the two aspects of school climate may moderate the link between peer deviance and personal delinquency. Both potential mechanisms predicted by theories and existing empirical evidence will be discussed. Chapter 3 introduces the current thesis. This chapter includes an overview of the Add Health data and the sample, descriptions of the measures, and an introduction of the analytic plan. Chapter 4 presents the results. Specifically, only individual-level school commitment moderates the peer deviance-delinquency link, and the direction is not consistent with theoretical predictions. Chapter 5 discusses the implications of the results, as well as some limitations and future directions for research.

## Chapter 2: Literature Review

### Normative Peer Influence

Theoretically, the link between peer deviance and personal delinquency is typically tied to arguments regarding normative social influence. Generally speaking, normative social influence refers to the idea that one's social groups impact what one thinks are norms and perceives as acceptable behaviors (Rimal and Real, 2005). From this perspective, people commit crimes because they learn criminal behaviors as normal or acceptable from their social groups.

In the field of criminology, there are three theoretical perspectives under the large umbrella of normative influence: differential association, social learning theory, and symbolic interactionism. According to Sutherland's (1947) differential association theory, people learn definitions favorable and unfavorable towards crime through interactions with intimate social groups. When definitions that are favorable towards crime outweigh unfavorable definitions towards crime, people tend to commit crimes. In his social learning theory, Akers (1998) retains the concepts of definitions and differential associations and further elaborates Sutherland's theory by providing a mechanism of learning. Specifically, he borrows the concept of operant conditioning from psychology and argues that criminal behaviors are either strengthened or weakened through differential reinforcement. Additionally, he brings in the concept of imitation. Drawing from Bandura's (1965) work on observational learning, he proposes that one does not have to learn delinquent behaviors through

engaging in it but also through observing others exhibiting them. Related to differential association and social learning theories, symbolic interactionism also argues that people infer acceptable and unacceptable behaviors through interactions with their social groups. However, what differentiates symbolic interactionism from the other two theoretical perspectives is its emphasis on one's active cognition (Matsueda, 1992). This perspective proposes that one does not just receive information passively. Rather, through nonverbal and verbal communication with others, people adjust their behaviors based on what they think others think about their behaviors. In other words, people may stop or keep exhibiting certain behaviors based on their perceptions of others' reactions to their behaviors.

Built on the notion of normative influence, adolescents could learn delinquent behaviors from their peers through learning definitions favorable towards crimes, being rewarded/seeing their peers being rewarded for engaging in delinquent behaviors (or being punished for not engaging in delinquency), and/or perceiving their peers as confirmative of their delinquent behaviors through communications. Empirically, research has studied the relationship between peer deviance and adolescent delinquency for decades (Chung and Steinberg, 2006; Lansford et al., 2014; Mann et al., 2015; Patterson and Dishion, 1985; Simons et al., 1994). Results generally indicated peer deviance as a robust predictor of involvement in delinquency, with the outcomes ranging from substance use and risky sexual behavior (e.g. Kim and Goto, 2010; Lansford et al., 2014; Monahan et al., 2014), to aggression, violence, and a general delinquency scale (e.g. Haynie, 2002; Haynie, Silver and Teasdale, 2006; Lacourse et al., 2003; Mann et al., 2015; Pratt et al., 2010).

For instance, Haynie (2002) found that both average peer deviance and the proportion of delinquent friends in adolescents' peer networks predicted delinquency, even when accounting for a host of other variables. Similarly, Fagan et al. (2007) found that perceived peer drug use and peer deviance predicted delinquency. They also discovered that chances of being seen as cool if engage in delinquent behaviors, a proxy of the concept of differential reinforcement, was significantly associated with delinquency. This finding was also consistent with the idea of symbolic interactionism, that one's expectation of others' reaction to one's delinquent behaviors predicts delinquency. Relatedly, Pratt et al. (2010) conducted a meta-analysis to assess the empirical status of social learning theory. Results indicated that peers' delinquent behaviors and attitudes favorable towards crimes were robust predictors of crime and delinquency. Though the effect size was smaller, peers' reactions to delinquent behaviors also appeared to be a significant predictor of crime and delinquency. To conclude, peer deviance has been theoretically predicted and empirically proved to be a robust predictor of personal delinquency.

### *The Moderating Role of Context*

The association between peer deviance and personal delinquency is not context invariant. Most of the research examining the moderating role of social context focuses on parental monitoring and supervision (Barnes et al., 2006; Kim and Goto, 2010; Warr, 2005). For instance, Barnes et al. (2006) examined whether parental monitoring and support impacted the link between peer deviance and personal delinquency. They found that peer deviance was related to a greater increase

in alcohol misuse when parental monitoring was low. They also found that high peer deviance and parental monitoring predicted the fastest increase of personal delinquency over time. Kiesner, Poulin, and Dishion (2010) discussed that the context of socializing influenced the relationship between substance co-use with peers and individual substance use. Specifically, they found that the link between substance co-use and individual substance use was stronger when adolescents spent time with their peers on street/park versus at school. Thus, it is clear that normative peer influence may at least in part depend on the social context of peer interactions.

#### *What about School Climate?*

As discussed above, the association between peer deviance and personal delinquency is moderated by social context such as parenting behaviors. Relatedly, it is hard to ignore the impact of school on this link because peer interactions are typically situated in a school environment, which can vary substantially. The varying school environment is usually called school climate. In their 2010 work, Cook, Gottfredson, and Na categorized school climate into four dimensions. The first dimension is called *ecology*. It refers to the physical, external features of the environment. In the school context, this includes, but is not limited to, the physical structure of school buildings, school size, and average class size. The second dimension is called *milieu*. Broadly speaking, it is defined as the average characteristics of the people embedded in the organization. In the school context, specific examples of this dimension include racial composition, average school attendance rate, and SES of the student body.

The third dimension, *social system*, includes two sub-categories. The first one is *school organizational structure*. It is defined as how schools are organized to perform their functions. Specific components of school organizational structure include curricular content and teachers' roles. The second one is *administration management*. A major component of this category is *discipline management*, which has been studied extensively. It does not only include what discipline management policies are incorporated, but also includes how these policies are delivered and communicated to the students.

The fourth dimension, *school culture*, is defined as the quality of interpersonal relationships in schools. This includes two important sub-categories. The first one is *behavioral norms*, which ideally, should be operationalized as students' own beliefs about morality (i.e. what behaviors are perceived as right versus wrong). The second one is *communal social organization*. It typically refers to the bonding between students and teachers as well as among school personnel, but also includes the notion that people in the school have shared goals and feel personally committed.

Empirical literature indicated that many aspects of school climate are important for delinquency prevention and intervention (Bao et al., 2015; Espelage, Low and Jimerson, 2014; Gottfredson et al., 2005; Stewart, 2003; Turner et al., 2014; Wilson, 2004). Specifically, discipline management and school culture are among the categories/dimensions that are more extensively studied and demonstrate strong evidence in decreasing students' problem behaviors compared to other categories of school climate (Cook et al., 2010).

For instance, Gottfredson et al. (2005) found that better discipline management, operationalized as students' perceived clarity and fairness of the rules, was related to lower levels of student delinquency and victimization, and better psychosocial climate was related to less teacher victimization. Similarly, Espelage et al. (2014) demonstrated that disciplinary structure and student support were linked to the prevalence of teasing and bullying. Relatedly, Turner et al. (2014) found that higher levels of social and academic support predicted decrease in bullying victimization and perpetration.

These studies did not directly examine school climate as a moderator on peer influence. However, the findings did suggest certain dimensions of school climate are important to both peer relations and delinquency prevention/intervention. Therefore, this thesis will focus on school culture and discipline management, due to the relatively strong evidence that more positive school culture and better discipline management are associated with less delinquent behaviors and less likely to cultivate a negative peer culture that encourage peer victimization. To be clear, there are still multiple aspects of school culture and discipline management. Due to data availability, the current thesis will focus on the communal social organization aspect of school culture and operationalize it as school attachment and commitment. As for discipline management, it will be operationalized as the strictness of disciplinary policies. The rest of the discussion will focus on the theoretical and empirical evidence that school attachment and commitment as well as the strictness of disciplinary policies, as aspects of school climate, moderate the relationship between peer deviance and personal delinquency.

### School communal social organization as a Potential Moderator

As discussed in the previous section, school culture, one of the dimensions of school climate, include both school communal social organization and students' beliefs about behavioral norms. At the individual level, affective bonding and expectations of behavioral norms are theoretically predicted as important for preventing one from engaging in crime/delinquency. According to Hirschi (1969), bonds to conventional others, institutions, and values prevent one from engaging in delinquent behaviors because people are not willing to risk the ties they have. He specifically discusses four types of bonds, which are *attachment* to intimate social others and conventional institutions, *commitment* to conventional goals, *involvement* in conventional activities, and *beliefs* in conventional values. This thesis will mainly focus on the communal social organization category of school culture. It will be operationalized as school attachment and school commitment. In other words, both bonding to conventional others/institutions and to conventional goals will be considered.

Individual-level research indicated that school attachment was negatively associated with delinquency (e.g. Cernkovich and Giordano, 1992; Dornbush et al., 2001; Gottfredson, 1986; Henry and Slater, 2007; Zhang and Messner, 1996). For example, Zhang and Messner (1996) examined the relationship between school attachment, measured as whether adolescents liked their teachers and whether they liked their schools in general, and official delinquent status (measured as if they were institutionalized). Results indicated that school attachment was associated with a decrease in the likelihood of being an official delinquent. Relatedly, Dornbusch et al.

(2001) investigated the relationship between school connectedness and self-reported delinquency using panel data. They found that Wave 1 school connectedness was negatively associated with Wave 2 self-reported substance use, general delinquency, and violent behaviors after controlling for Wave 1 self-reported delinquency.

When it comes to school commitment, extant literature generally supported the notion that poor school commitment associated with higher delinquency involvement (Catalano et al., 2004; Hirschfield and Gasper, 2011; Liljeberg et al., 2011; Ryan, Testa, and Zhai, 2008). For instance, Liljeberg et al. (2011) found that poor school commitment at Wave I, measured as future achievements and striving for good grades, was positively associated with delinquency at Wave 1 and Wave 2. Similarly, Chui and Chan (2012) discovered that school commitment, measured as self-report of grades, finishing homework, and trying hard in school, was associated with theft and violent crime commission.

The social control perspective seems to be at odds with the social learning perspective, because the two perspectives make different assumptions about human nature and respectively argue that social bonding is a risk and a protective factor of delinquency. However, the two seemingly-conflicting perspectives may be reconciled by treating social control elements as moderators of the relationship between the learning of and involvement in criminal behaviors. Specifically, Akers (1998) discussed the idea that the outcome of differential association is the balance of interactions with all domains of one's social network. Empirically, research demonstrated that it is rare for people to have all domains of social network as deviant (Haynie, 2002; Lonardo et al., 2008). Thus, it is reasonable to assume that

although one may be exposed to delinquency through associations with deviant peers, they are still likely to have ties to intimate social others who hold conventional values (for example, teachers) or conventional institutions (for example, schools) that may prevent them from engaging in criminal behaviors. School bonding, including school attachment and commitment, may thus moderate the learning processes through the following mechanisms at the individual level.

Firstly, school bonding may influence the differential reinforcement processes by acting as either positive or negative punishment. This mechanism stems from operant conditioning, the idea that rewards and punishment can shape the occurrence/disappearance and frequency of behaviors. Empirically, Agnew (1991) demonstrated that both the proportion of delinquent friends and peer approval for delinquency predicted involvement in delinquent behaviors. The author also discovered that the association between delinquent peer exposure and personal delinquency was stronger for adolescents with higher peer pressure and approval for delinquency. The findings suggest that peer deviance may lead to personal delinquency by positively reinforcing delinquency (i.e., receiving peer approval for engaging in delinquency) or negatively reinforcing delinquency (i.e., removing the aversive stimulus of peer pressure and judgment).

While deviant peers reinforce delinquent behaviors, school bonding works as the countervailing reinforcement contingency in the operant conditioning process. Specifically, attachment to school could be a form of internal positive punishment because adolescents who value such bond are likely to feel bad emotionally about engaging in behaviors that their teachers and schools disapprove. At the same time,

involvement in delinquent behaviors may actually damage the ties between adolescents and their teachers or schools. If the adolescents do not want to break these ties, the damage can be viewed as negative punishment because it is the removal of something pleasant from the adolescent. The same mechanism could also be applied to school commitment. Adolescents who have strong school commitment may feel bad about themselves if they engage in behaviors that are conflicting with their academic goals and aspirations (or even identity, if they identify themselves as “good students”), resulting in positive punishment. Relatedly, involvement in delinquent behaviors may result in disciplinary actions that interrupt or even damage their academic aspirations. Adolescents who are strongly committed to academic goals and aspirations are unlikely to be willing to see their goals and aspirations being tempered or interrupted, thus the damage could be viewed as negative punishment. Thus, adolescents with strong school attachment and school commitment should be less likely to be swayed by friends’ rewards for delinquency when compared to those with weak school bonding. As such, school bonding may operate as a buffer to the influence of peers’ reinforcement of delinquency, leading to a weaker link between peer deviance and personal delinquency for adolescents with stronger attachment to school.

Thinking about it from a different, but complementary perspective, adolescents may learn delinquent behaviors by learning definitions favorable towards delinquency from peers and eventually internalizing these definitions (Agnew, 1991). On the other hand, exposure to and internalization of conventional values may prevent one from engaging in delinquency. Specifically, it is likely that adolescents

who have strong school attachment are exposed to more conventional values from their teachers and schools. Furthermore, adolescents with stronger school attachment are likely to put more weight on and internalize the conventional values that they learn from their teachers or schools, as it is reasonable to assume that one is more willing to take in the values instilled by another person if there is high emotional closeness between them. Similarly, because commitment to academic goals and aspirations are, in fact, important components of conventional values for students, adolescents who are more committed to academic goals and aspirations are likely to hold more conventional values to start with. Moreover, the more committed they are to their academic inspirations, the more weight they are likely to put on conventional values and the less susceptible they are to deviant values that are inconsistent with the values and norms they firmly believe in. Because the definitions favorable towards delinquency are against their internal beliefs, adolescents with stronger school attachment and school commitment will be less vulnerable to the influence of peer deviance and less likely to act consistently with the delinquent values.

Finally, rational choice theory provides an alternative explanation on why school bonding may moderate the relationship between peer deviance and personal delinquency. According to Cornish and Clarke (1986), people decide to engage in crime based on the anticipated costs, risks, and rewards associated with the act. If one perceives more costs and risks than rewards, they are likely to choose not to commit that crime. For adolescents with stronger attachment to school, they arguably should perceive meaningful costs and risks associated with engaging in delinquent behaviors because they do not want to disappoint their teachers or break the ties to their

teachers/schools. Similarly, for those with stronger school commitment, they might perceive more risks and costs because they do not want to sacrifice their academic goals and aspirations. The perceived risks and costs counteract the perceived rewards from peers for engaging in delinquency (e.g. peer approval), therefore buffering the adolescents from the influence of peer deviance. In that case, when they are exposed to peer deviance, adolescents with strong school attachment and commitment should be less likely to imitate and exhibit delinquent behaviors compared to those with weak attachment and commitment.

Based on the discussions above, it is theoretically possible that school bonding may moderate the relationship between peer deviance and personal delinquency *at the individual level*. The theoretical predictions and empirical findings at the individual-level may be extended to the school level via the construct of communal social organization. Indeed, Payne (2008) has argued that school bonding matters above and beyond an individual-level construct with regard to delinquency prevention. According to Payne (2008), communal school organization, defined as the extent to which the school is organized as a community. It is indicated by “supportive relationships between and among teachers, administrators, and students; a common set of goals and norms; and a sense of collaboration and involvement” (Payne, 2008: 430). Simply speaking, just as school bonding emphasizing informal social control at the individual-level, communal school organization emphasizes informal social control at the community-level. At the same time, communal school organization may also promote students’ bonding to school at the individual level. When the school feels more like a community, school climate becomes “warmer, more inclusive and

participatory” (p.431), which further promote students’ attachment and commitment to school as well as beliefs in conventional values and goals.

In her study, communal school organization consists of supportive and collaborative relations and common norms and goals. Supportive and collaborative relationships was operationalized as teachers’ feelings of support and perceptions of interpersonal relationships. Common norms and goals was measured by items such as if the goals of the school were clear and if people understand what behaviors were expected in their schools. Results demonstrated that students who attend communally organized schools were less likely to involve in delinquency and more likely to be bonded to their schools. Furthermore, communal school organization interacted with individual-level bonding in the way that individual-level bonding had less of an effect on delinquency in communally organized schools.

These findings suggest that perceived interpersonal relationships among students, teachers, and administrators, as well as beliefs and internalizations of conventional goals and common norms matter above and beyond individual-level bonding. It seems that not only individual-level attachment to school and commitment to conventional goals may moderate the relationship between peer deviance and delinquency, but also the extent to which the people at the school are connected as a community that has shared values and goals may prevent students from learning delinquency from their peers because they know the school disproves such behaviors as a community. Therefore, it is important to consider school bonding not just at the individual level, but to take the potential mechanisms discussed above one step

further and examine if school bonding moderates the relationship as a school-level construct.

As discussed above, investigating adolescents' school bonding as a moderator will not only provide us with some theoretical clarities regarding how social learning and control perspectives can be integrated, but also will contribute to the understanding of the resilience/vulnerability to peer influence. Unfortunately, only a handful of studies has focused on the moderating role of school attachment and school commitment, and none of the studies considered the potential moderating effects of school bonding as a school-level construct (Chan et al., 2017; Spratt, Jenkins & Doob, 2005; Wang and Dishion, 2012). Wang and Dishion (2012) examined if school attachment moderated the relationship between deviant peer affiliation and problem behaviors. Data were acquired from students in eight middle schools, and they were followed from six to eight grades. The outcome variable, problem behaviors, was measured by teachers' report of how often the participating adolescents engaging in a variety of externalizing behaviors. The main independent variable, deviant peer affiliation, was measured by the self-report of participating adolescents about the frequency that they have "hung out" with friends who engage in a variety of delinquent behaviors. School attachment was measured by participating adolescents' perceptions of support and behavioral management they received at school. Results revealed that the association between levels of deviant peer affiliation and frequency of exhibiting problem behaviors was significantly weaker for those with higher perceived behavior management. Researchers also found that the association between the rate of change of affiliation with deviant peers and problem

behaviors was much weaker for adolescents with higher perceived social support from teacher, indicating that adolescents who have higher school attachment were more resilient to the influence of deviant peers.

However, the adolescents in this sample were nested in only eight schools. Although there may be enough variation at the individual level (because adolescents are likely to have different perceptions of their schools even if they attend the same school), it is unlikely that there is much variation at the school level that can objectively contribute to the differential experience of adolescents. It seems to be particularly problematic for this study because the authors used the term “school climate”, which should essentially be a school-level construct. Thus, it seems necessary to further investigate the moderating effects with more variation at the school level.

Similarly, Sprott, Jenkins and Doob (2005) examined if school bonding moderated the association between exposure to deviant peer group and problem behaviors. The data were drawn from the Canadian National Longitudinal Study of Children and Youth. This study utilized the first two waves of the data of the adolescents who were 10-11 years old at Wave 1. Exposure to deviant peer group (a binary measure) and school bonding, operationalized as both how well they were doing at school (commitment) and how much they liked school (attachment), were measured at Wave1 through self-report. Involvement in delinquent behaviors was measured by self-report of both nonviolent and violent delinquency at Wave 2 (when they were 12 or 13 years old). Results indicated that the positive association between

deviant peer group exposure and nonviolent delinquent behaviors was stronger for the adolescents with weaker school bonding.

Despite the findings being consistent with theoretical predictions, there are still limitations left for further research to address. Perhaps most importantly, the measure of deviant peer group did not capture much variation. Haynie (2002) discussed that most of the adolescent friendship groups are mixed and consist of both delinquent and nondelinquent adolescents. It is therefore problematic to measure exposure to deviant peer group in an all-or-none fashion, as it does not capture the composition of the peer group, the composition that may influence the intensity and frequency of exposure to peer deviance.

Chan et al. (2017) examined if school commitment moderates the link between peer drug use and personal drug use. The sample consisted of 9,966 students from Grade 7, 9, and 11. Both males and females were included and each gender contributed to about one half of the sample. Peer drug use was measured as the students' perceptions about how many of their best friends having ever used illicit drugs or alcohol. School commitment was measured as the extent to which the students think school work is important. Being inconsistent with theoretical predictions, school commitment did not interact with peer drug use in their study. However, school commitment was associated with a lower likelihood of engaging in drug use.

Because the delinquent behaviors investigated are limited to substance use, further examinations are needed to explore if the same results apply to other behaviors, or if they are limited to drug and alcohol use only. Furthermore, due to the

fact that the number of studies exploring this question is so limited, replications and future investigations are necessary to validate/clarify the extant findings.

### *Discipline Management as a Potential Moderator*

Discipline management is one component of the social system dimension of school climate. It includes what discipline management policies and practices are being implemented, as well as how these policies and practices are communicated to the students. The current thesis will focus on one aspect of discipline management, the strictness of school discipline. Unlike school bonding, which has been constantly shown as negatively associated with delinquency, the relationship between the strictness of school discipline and delinquency is not crystal clear (Arcia, 2006; Cook et al., 2010; Iselin, 2011). However, one does have theoretical reasons to believe that the strictness of school discipline may moderate the relationship between peer deviance and delinquency.

From the rational choice and deterrence perspectives, strict school discipline may increase one's resilience to the influence of peer deviance. As discussed in the section of school bonding, people weigh costs, rewards, and risks before committing crimes. If one perceives more costs and risks than rewards, crime is less likely to be a viable option (Cornish and Clarke, 1986). Integrating this argument with the broader deterrence perspective, disciplinary policies may have deterrent effect on people by increasing the perceived risk and costs associated with committing crimes.

Additionally, Stafford and Warr (1993) re-conceptualized the deterrence perspective, arguing that both punishment and punishment avoidance influence one's risk perception. They further maintained that not just direct experience, but indirect

experience (what you observe and vicarious experience) of punishment and punishment avoidance matter to one's perception of risks and costs.

Integrating the rational choice and deterrence perspectives with the learning theories discussed in the previous sections, the strictness of school discipline may moderate the association between peer deviance and personal delinquency through three possible mechanisms. First, stricter discipline may decrease adolescents' likelihood of imitating and modeling peers' delinquent behaviors because they may perceive more risk and potential costs of doing so. This may especially be the case when school discipline target specific behaviors. For example, when adolescents see their peers using drugs and their school has formal sanctions that target drug usage specifically, they are likely to use drugs themselves due to it being very clear that there are risks and costs associated with imitating this behavior. The association between peer deviance and personal delinquency is, therefore, expected to be weaker for adolescents attending schools with stricter discipline because these adolescents are more resilient to the temptations of imitating peers' delinquent behaviors as they perceive more costs and risks of engaging in delinquency.

Second, school discipline may also moderate the relationship between peer deviance and personal delinquency by weakening the impact of peers' reinforcement of delinquent behaviors on personal delinquency. According to Wikström (2006, 2010), school discipline act as high moral rules that may counterbalance the motivational factors of offending, such as peer deviance. In one way, peers may reinforce delinquent behaviors by offering approval or removing ridicule, but the behaviors could be punished as a consequence of violating school discipline. The

impact of peers' reinforcement will be counteracted by the experiences of punishment, leading to a weaker association between peer deviance and personal delinquency for adolescents attending schools with stricter discipline. In another way, delinquent peers themselves may be sanctioned by school discipline as a consequence of delinquent behaviors. Based on the argument of Stafford and Warr (1993), this vicarious experience of punishment will also influence perception of risk and generate deterrence effect. Even though the adolescents are exposed to peer deviance, the positive punishment followed as a consequence of peer deviance will lead them to perceive more risks and costs associated with such behaviors and thus being more resilient to the influence of peer deviance.

Another possible mechanism for the strictness of school discipline to alter this relationship is through the internalization of school discipline. Drawing a parallel to the literature on the moderating role of gender, it has been argued that girls are more likely to invoke social control compared to boys even under conditions without parental supervision for the reason that they have internalized the supervision and control associated with the gendered expectations (Augustyn and McGloin, 2013; McCarthy, Felmlee and Hagan, 2004). Similarly, adolescents may internalize school discipline and incorporate them as part of the conventional values that they hold. Such internal conventional values may counteract the definitions favorable to criminal behaviors learned from social interactions with deviant peers, making the adolescents that are more committed to the conventional values less influenced by exposure to peer deviance.

Even though it seems theoretically reasonable that school discipline may have an impact on the association between deviant peer affiliation and personal delinquency, there is only one study by Zimmerman and Rees (2014) that examined school discipline as a potential moderator. They used Add Health data, which is a multi-wave panel dataset that collects information from parents, children, and school administrators to investigate the factors that influence children's health and development. Personal deviance was measured as smoking, fighting and drinking both at Wave 1 and Wave 2. Peer deviance was measured at Wave 1 as the proportion of friends that were delinquent relative to the respondent. School sanction policies data were obtained from school administrators, with three questions asking policies regarding drinking, fighting and smoking. Findings indicated that the association between peer deviance at Wave 1 and change in delinquency between Wave 1 and Wave 2 was weaker for adolescents that attend schools with formal sanctions of the three delinquent behaviors. Specifically, respondents who went to schools with expulsion policy for fighting exhibited weaker association between peer fighting and respondent fighting. The same effect was found for drinking and smoking as well.

However, this study only looked at three types of delinquent behaviors and it is unknown that if the same effect will apply to other delinquent behaviors, especially more serious ones. Thus, it is important for future research to look at a broader range of delinquent behaviors. Furthermore, as discussed in previous sections, there are multiple dimensions of school climate. They are interrelated and many of the dimensions are negatively associated with delinquency. By only accounting for school discipline, the potential moderating effects of other dimensions/categories of

school climate were ignored and the effect of school discipline might have been overestimated. For instance, even though the study controlled for the effect of school attachment at the individual level, it failed to control for school attachment or commitment at the school level nor did the study investigate school bonding as a moderator, which might lead to an overestimation of the moderating effects of school discipline.

On the other hand, research examining the effectiveness of disciplinary and security practices at school is largely mixed and inconclusive. In fact, empirical literature provides little evidence that disciplinary actions like suspension, expulsion, and zero-tolerance are effective in controlling students' behavioral problems at the individual level (Arcia, 2006; Cook et al., 2010; Iselin, 2011; Raffaele-Mendez, 2003). For instance, Arcia (2006) conducted a retrospective longitudinal analysis on the outcomes of suspensions. She found significant associations between suspension and lower reading achievement score as well as between suspension and drop-out rates. The ineffectiveness of strict school discipline in general seems to contradict with the preliminary evidence that disciplinary policies mitigate the impact of deviant peers on personal delinquency. Thus, it is important to replicate Zimmerman and Rees' study (2014) with more rigorous controls and to investigate if the moderating effects are robust and consistent across different measures of school discipline, or instead, are only found for the school discipline that they examined.

### *Rationale for Current Research*

Based on the review of relevant theories and extant literature in the previous section, there are three reasons to justify the necessity of the current project. First, school bonding is theoretically predicted to moderate the relationship between peer deviance and personal delinquency, but only a handful of studies investigated the potential moderating effects. Among the studies that examined this question, none of the studies recognized school bonding as a school-level construct that may both influence individual-level bonding and moderate the relationship between peer deviance and delinquency (Payne, 2008). At the same time, the samples and measures did not capture much variation at the school level or across peer groups (Chan et al., 2007; Sprott et al., 2005; Wang and Dishion, 2012). It is therefore important to reinvestigate this question in order to provide more theoretical clarities regarding the integration of social learning and social control perspectives, to test the robustness of the moderating effect with another dataset and different measures of the major variables, and to examine school bonding as one component of school climate and a school-level construct.

Second, as predicted by the rational choice and deterrence perspectives, students attending schools with stricter discipline are expected to be more resilient to the influence of delinquent peers as they perceive more costs and risks associated with involving in delinquency. However, very few studies ever investigated it as a potential moderator. At the same time, extant literature on the effectiveness of strict school discipline on problem behaviors showed mixed evidence (For example, see Arcia, 2006; Iselin, 2011). Thus, examining school discipline as a potential moderator

may not only offer some empirical clarities regarding why some adolescents seem to be more resilient to peer influence, but also may provide some insight on the effectiveness of school discipline by considering it from a different angle.

Third, extant literature examining the moderating effects of school climate focus on either school bonding or school discipline, but not both at the same time. By focusing on both aspects of school climate, the current project could provide a contrast and comparison between different aspects of school climate to see how these two aspects of school climate act on the link between peer deviance and personal deviance differently and/or similarly. This may provide some insight about what aspects of school climate worth paying attention to in terms of delinquency intervention purposes. Investigating the two aspects concurrently could also help prevent one from overestimating the influence of either aspect.

### Hypotheses

For school attachment it is hypothesized that 1) *the association between peer deviance and personal delinquency is weaker for students with stronger individual-level school attachment* and 2) *the association between peer deviance and personal delinquency is weaker for students who attend schools with stronger school-level school attachment*. For school commitment it is hypothesized that 3) *the association between peer deviance and personal delinquency is weaker for students with stronger individual-level school commitment* and 4) *the association between peer deviance and personal delinquency is weaker for students who attend schools with stronger school-level school commitment*. With regard to school discipline, adolescents should perceive more risk and costs if the schools have more serious sanctions of delinquent

behaviors (Cornish and Clarke, 1986; Stafford and Warr, 1993). Thus, it is hypothesized that 5) *the association between peer deviance and personal delinquency is weaker for students who attend schools with stricter disciplinary policies.*

## Chapter 3: Data and Method

### Data and Sample

The data being used for the current study come from the National Longitudinal Study of Adolescent to Adult Health (Add Health). It consists of a national representative sample of students in grades 7-12 at 1994-1995, when the first wave of the data was collected (Harris, 2013). A variety of topics were covered, including demographics, physical health, mental health, risk and delinquent behaviors, family background, school characteristics, friends network, and so on. The current project will use the data of the first two waves, which contain relevant information of peer networks and school characteristics.

The sampling procedure is school-based (Harris, 2013). 132 schools were selected with unequal probability, stratified by region, urbanicity, school type, ethnic mix, and size. The sampling methods incorporated ensured that the schools are nationally representative (Harris et al., 2009). Students attending these schools completed the in-school interview that was conducted on a single school day in 1994, which surveyed about school context, friendship networks, risk behaviors and other information. Over 90,000 students completed the in-school interview. At the same time, school administrators of 130 schools completed a questionnaire that inquires about school-level information, such as basic school characteristics and school disciplinary policies.

The students were further stratified by sex and grade, and about 17 students were selected from each strata. This resulted in a core sample of 12,105 students that

are nationally representative. The core sample, along with special supplemental samples, further received an in-home interview in 1995 (N=20,745), during which they were asked about more detailed and sensitive questions, including serious delinquent behaviors. Subjects from this wave were then followed up in 1996 for another wave of in-home interview (N=14,738), during which they were surveyed again about sensitive health-related and risk-taking behaviors.

Based on the research questions being asked, the sample being used needs to have valid data on both waves of in-home interviews, as well as valid peer network information and school-level information. Moreover, to account for design effects such as oversampling, relevant weight files are required to generate unbiased point estimates (Chen and Chantala, 2014). Merging all the necessary files results in a final sample of 9,948 adolescents nested within 112 schools. Out of the 9,948 adolescents, 8,259 have valid peer deviance data. The sample attrition for each step of merging is shown in Figure 1.

The sample size decreased from 20,745 to 14,736 from Wave 1 to Wave 2. All the students who were in Grade 12 during Wave 1 interview were no longer eligible for the interview due to graduation and were not followed up (N=3,356). Reasons for attrition other than graduation were not available in the survey documentation or data files. However, the administration of Add Health provided an article examining predictors of attrition from Wave 1 to Wave 2. Specifically, Kalsbeek, Yang, and Agans (2002) created a conceptual framework of potential reasons for sample attrition. They categorized reasons for nonparticipation into four groups, which include contactability, unwillingness, inability, and participation and

looked for predictors. They found multiple predictors of these outcomes of recruitment. For contactability issues, neighborhood security, household being above poverty, and current smoking status were important predictors. For unwillingness, race and prior smoking behavior were important predictors. For inability, smoking behavior or if they live in a rural area were important. They also found that a household was more likely to participate in Wave 2 if the student was nonwhite, if their parents had gone to college and if they had volunteered in school's PTA.

To compare if and how the adolescents retained after all merges are different from the adolescents who were excluded (i.e. those who participated in the Wave 1 and Wave 2 in-home interviews but were not in the final sample due to missing information), Z-tests of differences in unweighted proportions were run on biological sex and race (Table 1a). T-tests of differences in unweighted means were run on delinquency scale and age (Table 1b). Results indicated that those who are retained are more likely to be females ( $p < .05$ ) and Asian Americans ( $p < .001$ ), but less likely to identify themselves as members of other races ( $p < .001$ ). Adolescents who are retained after merges are also younger ( $p < .05$ ), and score lower on the delinquency scale ( $p < .001$ ). Therefore, the adolescents retained are different from those who are excluded with regard to both demographics and the average level of delinquency, and cautions should be used when generalizing the results.

Figure 1 Sample Attrition after Each Merge and Listwise Deletion

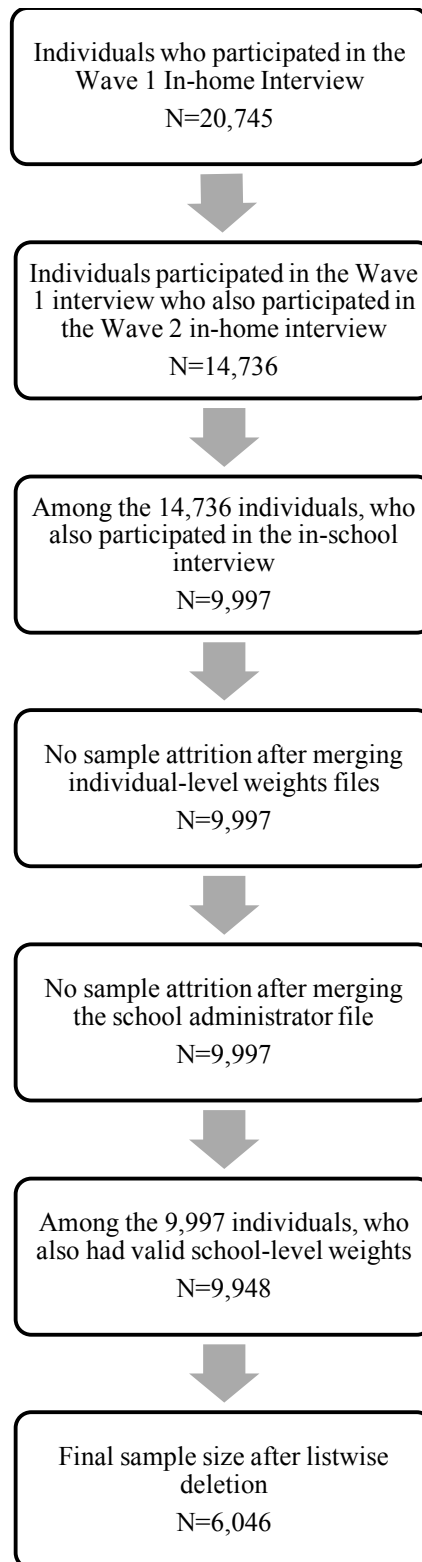


Table 1a. Z-tests of Difference in Proportions (unweighted)

<i>Variable</i>	<i>Proportion of Final Sample</i>	<i>Proportion of Excluded Subjects</i>	<i>Difference</i>	<i>z</i>
Biological Sex (Male=1)	0.483	0.499	-0.016	-1.824*
Race				
White	0.584	0.592	-0.008	-0.907
Black	0.211	0.201	0.01	1.421
Asian	0.07	0.049	0.021	4.843***
Native	0.012	0.015	-0.003	-1.575
Other	0.071	0.095	-0.024	-4.975***
Multi-race	0.052	0.049	0.003	0.963

Table 1b. T-tests of Difference in Means (unweighted)

<i>Variable</i>	<i>Mean of Final Sample</i>	<i>Mean of Excluded Subjects</i>	<i>difference</i>	<i>t</i>
Age	15.287	15.35	-0.063	-2.194*
Delinquency Scale	2.751	3.033	-0.282	-3.937***

\*p<.05 \*\* p<.01 \*\*\*p<.001

Because missing data problems are addressed using listwise deletion, 3,884 additional cases are lost, resulting in a final sample of 6,064 used in the multivariate analyses. Another round of attrition analyses is conducted to test if the sample after listwise deletion differs from the adolescents that are excluded due to listwise deletion. From Table 2a. and 2b., adolescents included in the multivariate analyses are less likely to be male ( $p<.001$ ), more likely to be White ( $p<.001$ ), and less likely to be Black ( $p<.001$ ), Asian ( $p<.001$ ), or members of other races ( $p<.01$ ). They are also younger ( $p<.001$ ). However, they do not appear to be more or less delinquent than the 3,884 adolescents who are excluded from the multivariate analyses.

Table 2a. Z-tests of Difference in Proportions for Listwise Deletion (unweighted)

<i>Variable</i>	<i>Proportion of Final Sample</i>	<i>Proportion of Excluded Subjects</i>	<i>Difference</i>	<i>z</i>
Biological Sex (Male=1)	0.450	0.535	-0.085	-8.273***
Race				
White	0.630	0.511	0.119	11.700***
Black	0.188	0.247	-0.060	-7.092***
Asian	0.054	0.094	-0.040	-7.58***
Native	0.011	0.013	-0.002	-0.996
Other	0.066	0.080	-0.014	-2.657**
Multi-race	0.051	0.054	-0.003	0.677

Table 2b. T-tests of Difference in Means for Listwise Deletion (unweighted)

<i>Variable</i>	<i>Mean of Final Sample</i>	<i>Mean of Excluded Subjects</i>	<i>Difference</i>	<i>t</i>
Age	15.139	15.520	-0.381	-11.850***
Delinquency Scale	2.726	2.791	-0.065	-0.806

## Measures

### **Individual Level**

#### Dependent Variable: Personal delinquency

The dependent variable is measured by a delinquency scale. During the Wave 2 in-home interview, adolescents were surveyed about the engagement in a broader range of delinquent behaviors. These behaviors include painting graffiti on someone else's property, property damage, lying to your parents, taking something without paying, running away from home, driving a car without owner's permission, stealing more than 50, breaking in house to steal something, using weapon to get something, selling drugs, stealing less than 50, acting unruly, and fighting. Responses range from 0 (never) to 5 or more times, corresponding to a scale from 0 to 3. The delinquency scale is calculated as the sum of the 13 items

(Cronbach's  $\alpha=.819$ ). The weighted average personal delinquency is 2.815 ( $n=9,500$ ,  $SD=3.991$ ), with a minimum of 0 and a maximum of 39 (see Table 3).

#### Independent Variable: Peer Deviance

During the in-school interview, students were asked to name up to 5 male and 5 female friends from the roster, respectively. Because students on the roster also participated in the in-school survey, it is able to link the in-school interview data of the friends of the 9,948 adolescents in the final sample and obtain the self-report of delinquent behaviors from the friends themselves. One advantage suggested by empirical work is that objective peer deviance contributes to a more conservative estimate of the strength of the link between peer deviance and personal delinquency (Young et al., 2011, though some researchers argue that perceived measures are more in line with the theoretical constructs, e.g. McGloin and Thomas, 2016). To note, the current project will use the data of the send-network to construct peer deviance (i.e., those who the adolescents in the final sample nominated as friends). The reasoning behind this choice is that if adolescents do not perceive someone as their friends, they are not likely to model their behaviors because they do not value these peers' opinions or do not think what they do is cool (Payne and Cornwell, 2007).

Specifically, adolescents were surveyed about the frequency that they smoke cigarettes, drink alcohol, get drunk, race on a bike/car/boat, do something dangerous because they dare to, lie to parents, and skip school without excuse<sup>1</sup>. Responses to the five items range from 0, never, to 6, nearly every day. Peer deviance is constructed by the average of the responses to all the items (Cronbach's  $\alpha=.775$ ). The weighted

average peer deviance is .778 ( $n=7,967$ ,  $SD=.660$ ), with a minimum of 0 and a maximum of 6. Descriptive statistics of peer deviance are presented in Table 3.

#### Moderator: School Attachment (Individual-Level)

School attachment is measured by the attachment to the school as a whole and to the people embedded in the school. During the Wave 1 in-home interview, adolescents were asked about their perceptions of their closeness to teachers and other students, or to their schools in general. The items include “I feel close to people at this school”, “I feel like I’m part of this school”, “the students at this school are prejudiced”, “I am happy to be at this school”, and “the teachers at this school treat students fairly”. The answers are in the form of a Likert scale, ranging from “strongly agree” to “strongly disagree”. In the original dataset, strongly agree is coded as 1, agree is coded as 2, and up until 5, where higher values represent a lower extent of endorsement of the statement. Therefore, the responses for four items except for “the students at this school are prejudiced” are reverse coded so that a higher value represent a higher level of school attachment. The final school attachment scale is the average of the responses to the five items (Cronbach’s  $\alpha=.695$ ). The weighted average school attachment is 3.553 ( $n=9,462$ ,  $SD=.717$ ), with a minimum value of 1 and a maximum of 5 (see Table 3).

#### Moderator: School Commitment (Individual-Level)

During the Wave 1 in-home interview, adolescents were asked about their commitment to academic goals. Two of the items ask adolescents “how likely is that you will go to college” and “how likely is that you want to go to college”. Responses range from 1, low, to 5, high. Two of the items include “since school started this year,

how often did you have trouble paying attention to school/finishing homework”. The responses range from 0, never, to 4, every day. The responses are reverse coded using the values from 1 to 5 to be consistent with the other two items. The school commitment scale is calculated as the average of the responses to the four items (Cronbach’s  $\alpha=.642$ ). The weighted average school commitment is 4.083 ( $n=9,456$ ,  $SD=.720$ ), with a minimum value of 1 and a maximum value of 5 (see Table 3).

### Control Variables

*Parental Attachment:* Drawn from theory (Hirschi, 1969), adolescents who are more attached to their parents are less likely to involve in delinquent behaviors, and extant literature in general support such notion (for instance, see Cernkovich and Giordano, 1987; Hoeve et al., 2012; Kim and Goto, 2010). Parental attachment is therefore controlled for in the current study. Attachment to parents is measured by two items that ask for feelings of closeness to mother and how much one thinks his/her mother cares about him/her. Responses range from a scale of 1 to 5. The weighted average attachment to mother is 4.722 ( $n=9,151$ ,  $SD=.526$ )

*Self-control:* Gottfredson and Hirschi (1990) argues that self-control is the cause of crime, and any relationship between peer deviance and personal delinquency is due to selecting into deviant peer groups. Empirical work indicated that self-control is one of the strongest correlates of crime (Pratt and Cullen, 2000). Therefore, self-control is included in order to account for possible selection effects and to avoid overestimating the effect of peer deviance. Self-control is measured by a single item that captures impulsivity (Arneklev, Grasmick, and Bursik, 1999). This item asks the adolescents if

they usually follow their gut feelings when making decisions without thinking too much about consequences/alternatives (see Paternoster and Pogarsky, 2009, which also used this single measure; also see Nagin and Pogarsky, 2004, which used this measure to capture poor impulse control). Answers range from 1, strongly agree, to 5, strongly disagree, where higher values represent higher levels of self-control. The weighted average self-control is 2.994, with a standard deviation of 1.106.

*Demographics:* Following the lead of previous studies examining peer deviance and personal delinquency (Haynie, 2001, 2002; Kreager and Haynie, 2011; Warr, 1993; Zimmerman and Rees, 2014), several demographic characteristics that may confound the relationship among major variables of interest are included. A variable that taps into family's SES, *whether the mother receives public assistance*, is included. Other demographic variables include *whether the adolescent lives with both biological parents* (Haynie, 2001), *race* (Mason et al., 2014), *age* (Warr, 1993), and *if the adolescent is male* (Augustyn and McGloin, 2013). Race is coded as if one identified himself/herself as White only, Black only, Asian only, Native American only, other races, or multirace (when the respondent picked more than one category). Age are calculated by subtracting adolescents' DOB from the date of the interview. Biological sex is coded dichotomously, where 1 stands for male and 0 stands for female. All individual-level control variables are taken from Wave 1 in-home interviews. The descriptive statistics of student-level control variables with sampling weights taken into account are presented in Table 3.

Table 3. Descriptive Statistics of Student-Level Variables (weighted)

<i>Variable Name</i>	<i>Valid N</i>	<i>Mean</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
personal delinquency scale	9,500	2.815	3.991	0	39
peer deviance	7,967	1.171	0.660	0	6

school attachment	9,462	3.553	0.717	1	5
school commitment	9,456	4.080	.720	1	5
maternal attachment	9,151	4.722	0.526	1	5
self-control	9,523	2.994	1.106	1	5
age	9,571	14.957	1.611	11	20
male	9,575	0.492	0.500	0	1
race					
<i>White</i>	9,564	0.709	0.454	0	1
<i>African American</i>	9,564	0.152	0.360	0	1
<i>Asian</i>	9,564	0.038	0.190	0	1
<i>Native American</i>	9,564	0.009	0.094	0	1
<i>Other</i>	9,564	0.050	0.219	0	1
<i>Multi-race</i>	9,564	0.041	0.198	0	1
mother receive public assistance	9,075	0.093	0.291	0	1
live with both biological parents	9,575	0.569	0.495	0	1

## School Level

### Moderator: School Attachment (school-level)

The same items that are used to create the individual-level attachment to school scale are combined, averaged, and further aggregated within each school to create the school attachment measure of school climate. Data used are from the in-school interview, in order to get a more representative measure of school climate. The average school level attachment has a mean of 3.450 (n=112, SD=.227), with a min of 2.917 and a max of 4.130 (see Table 4).

### Moderator: School Commitment (school-level)<sup>1</sup>

<sup>1</sup> Collapsing and averaging the items may seem arbitrary. A set of sensitivity analyses is conducted for all models using standardized measures of school commitment and discipline strictness, and the results remain substantively intact.

Three items in the in-school interview are used to create the school-level commitment to school. Two of the same items from the individual-level commitment scale, “since school started this year, how often did you have trouble paying attention to school/finishing homework”, are kept. Another item, “in general, how hard do you try to do well at school”, is incorporated. The answers include 1, “I try very hard to do my best”, 2, “I try hard enough, but not as hard as I could”, 3, “I don’t try very hard, and 4, “I never try at all”. The responses are reverse coded so that a higher value represents higher school commitment. Because the first two items are on a 5-point scale and the third is on a 4-point scale, two of the possible answers, “every day” and “nearly every day”, are collapsed so that all the items are on the same scale. The items are combined, averaged, and aggregated within each school to get the measure of school-level commitment ( $\alpha=.638$ ). The weighted average school-level commitment is 2.661 ( $n=112$ ,  $SD=.117$ ), with a min of 2.409 and a max of 3.023 (see Table 4).

#### Moderator: Strictness of School Discipline

The strictness of school discipline is measured in objective terms. During Wave 1, school administrators were asked about the implementation of disciplinary actions regarding a variety of delinquent behaviors. Add Health asked school administrators about the consequences of the delinquent behaviors for both first and second occurrence. Nevertheless, the problem of using both first and second occurrence is that students may be expelled for first occurrence, making the action for second occurrence not applicable. Thus, this moderator is constructed by items of first occurrence only. Possible answers range from 1 (no action) to 7 (expulsion, which is

the most serious punishment that school can enforce), ranked by the strictness of the punishment. The behaviors include fighting with another student, injuring another student, possessing a weapon, and physically injuring a teacher, cheating, possessing alcohol, possessing an illegal drug, drinking alcohol, using illegal drug, smoking, verbally abusing teacher, and stealing school property. The strictness scale is the average of the responses to all the 12 items discussed above ( $\alpha=.786$ ), with a weighted average of 5.707 ( $n=100$ ,  $SD=.455$ ). Descriptive statistics of school discipline strictness scale are presented in Table 4.

Table 4. Descriptive Statistics of School-Level Variables (Weighted)

<i>Variable Name</i>	<i>Valid N</i>	<i>Mean</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
school attachment	112	3.450	.227	2.917	4.130
school commitment	112	2.661	.117	2.409	3.023
school discipline strictness	100	5.707	0.455	4.916	6.5
school community disorganization					
<i>female headed household</i>	112	.190	.131	0	.525
<i>percent receiving assistance</i>	112	.094	.096	0	1
<i>urbanicity</i>					
urban	112	0.215	0.412	0	1
suburban	112	0.588	0.494	0	1
rural	112	0.197	0.400	0	1
region					
<i>West</i>	112	0.097	0.297	0	1
<i>Midwest</i>	112	0.417	0.495	0	1
<i>South</i>	112	0.330	0.472	0	1
<i>Northeast</i>	112	0.156	0.364	0	1
public school	112	0.844	0.364	0	1
school grade	112	9.41	1.307	7.41	10.9
school size					
<i>small school</i>	112	0.572	0.497	0	1
<i>medium school</i>	112	0.334	0.474	0	1
<i>large school</i>	112	0.094	0.294	0	1
daily attendance rate	112	4.367	0.842	1	5
average class size	112	22.504	5.866	12	38

## Control Variables

*School Community Disorganization*<sup>2</sup>: Community disorganization is defined as the inability for a community to recognize shared values and solve jointly experienced problems (Bursik, 1988). Theoretically, five exogenous factors may lead to community disorganization: SES, residential mobility, ethnic heterogeneity, family disruption, and urbanization (Sampson and Groves, 1989). School climate researchers argue that a similar process could also happen within the school context, where structural factors within schools and surrounding neighborhoods negatively impact schools' functions and stability, which further leads to school community disorganization and increases the risk of negative behavioral outcomes (Bradshaw, Sawyer, and O'brennan., 2009; Edwards and Neal, 2017). Empirically, different indicators of school community disorganization, including divorce rate, concentrated poverty, and student mobility, were found to be associated with victimization, delinquency, and bullying (e.g. Bradshaw et al., 2009; Edwards and Neal, 2017; Gottfredson et al., 2005; Payne, 2008). The current research uses one item of urbanicity from the administrator interview to measure urbanization. Two other measures from Wave 1 in-home interview, if the student lives with a single mother and if the mother receives public assistance, are aggregated within each school to

---

<sup>2</sup> To clarify, school communal social organization and school community disorganization are not the same concept in the current thesis. Communal social organization captures the extent to which the school is organized as a community and is a pure school-level concept. School community disorganization captures the extent to which structural disadvantage may influence delinquency through influencing schools' normal functions, and taps into both school (i.e. percent students living in female headed household within a school) and neighborhood characteristics (i.e. whether the school locates at a urban, suburban, or rural neighborhood).

create school-level family disruption and SES, respectively. Descriptive statistics of measures of school community organization are presented in Table 4.

*Other School-Level Covariates:* School-level controls include several basic school characteristics (Gottfredson et al., 2005), such as *region*, *school size* (small, medium, and large), *type* (private versus public), *school grade* (by averaging students' response to the grade they were in within each school from in-school interview), *average daily attendance rates*, and *average class size*. These are the school-level factors that may have an influence on criminal activity at the school level (Cook et al., 2010; Zhang et al., 2016), and may influence peer interactions (for instance, see Rathunde and Csikszentmihalyi, 2014). It is recognized that school security practices are also important covariates. However, the dataset measured security practices by grade levels (i.e. do you have dress code for 7<sup>th</sup>, 8<sup>th</sup>, and 9<sup>th</sup> grade?), making it hard to manipulate. Thus, the security practice variables are not included, which is a potential limitation of the current study. All the descriptive statistics of school-level controls are presented in Table 4.

### *Analytic Plan*

The independent variables and potential moderators incorporated in the current project are at two levels of analyses. While peer deviance, school attachment, and school commitment are measured at the individual level, school disciplinary practices and other aggregated measures only vary at the school level (in other words, students are nested in schools). Using traditional regression leads to biased estimates of the parameters and standard errors, because the students are nested within schools and correlations of the error terms within macro-level units (schools) violate the

traditional regression assumption of error term independence (Johnson, 2010). To address this problem, the current study will use hierarchical generalized linear models (Bryk and Raudenbush, 1992; Haynie et al., 2006; Raudenbush and Bryk, 1986). Through adding an additional error term to the traditional regression model, hierarchical generalized linear models (HGLM) allow group mean to vary at the group level. This type of models provides less biased estimates of the parameters by correcting for error term correlations and allowing different degrees of freedom at different levels of analyses. All the analyses are conducted with HLM7 (Raudenbush, Bryk, and Congdon, 2011)

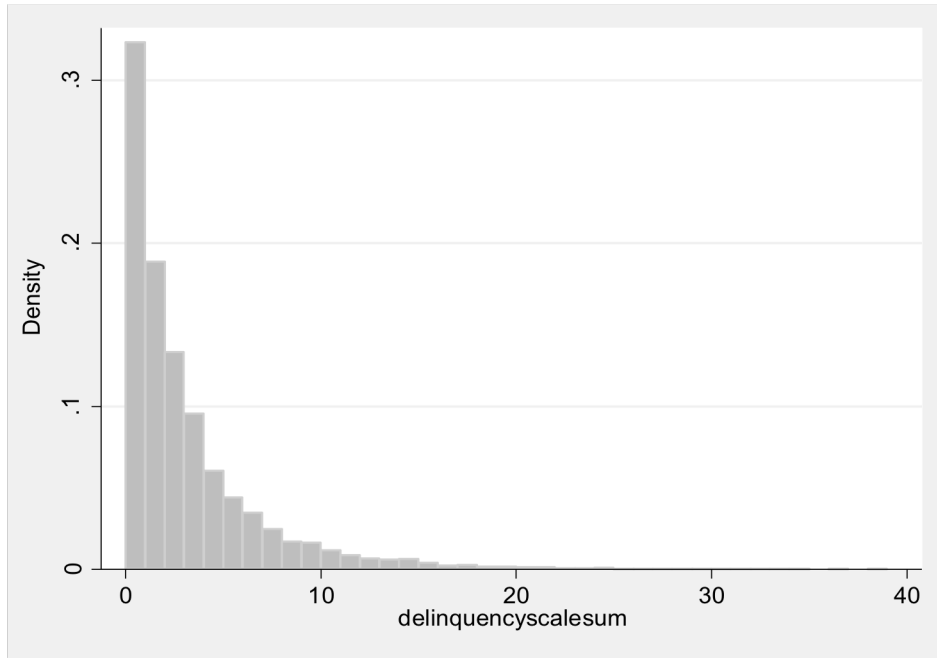
Moreover, the dependent variable is a count measure where only integers are possible values (McGloin and Shermer, 2009). The distribution involves a lot of 0 (See Figure 2) and is over-dispersed (i.e. that variance of the dependent variable is larger than its mean, see Table 2). Therefore, the dependent variable is assumed to follow an over-dispersed Poisson distribution, and the model being estimated is denoted as:

$$\text{Exp}(\text{Delinquency}_{ij}|\beta_j) = \lambda_{ij}$$

Where  $\lambda_{ij}$  refers to the expected delinquency scale for student  $i$  in school  $j$ . The standard log link function for the poisson regression model is written as:

$$\log(\lambda_{ij}) = \eta_{ij}$$

Figure 2 Distribution of Personal Delinquency Scale



The analysis will start first with an unconditional model:

$$\eta_i = \gamma_{00} + u_{0j}$$

where  $\gamma_{00}$  refers to level 1 fixed effects and  $u_{0j}$  refers to level 2 random effects (variance). Because the poisson model has one important feature that the variance is also the mean, the model only contains one error term at level 2. Under the condition that variance does not equal to the mean, level 1 variance is captured by the term  $\sigma^2/\lambda_{ij}$  (in other words, as a variance-to-mean ratio).

The unconditional model allows one to see how much of the total variance in delinquency is explained by between-individual and between-school variance, respectively (Johnson, 2010; Lee, 2000). Intra-class variation is calculated, but whether to conduct multilevel analyses is decided based on the significance of level 2

variance<sup>3</sup>. If school-level variance of delinquency is significant, a conditional HGLM that includes level 1 and 2 predictors and specifies an over-dispersed Poisson distribution will be utilized (DiPietro and McGloin, 2012; Johnson, 2010), as discussed in previous paragraphs.

At level 1, peer deviance, school attachment, school commitment, the interaction terms of peer deviance by school attachment and by school commitment, and other individual-level control variables are entered. This level is not different from a traditional regression that specifies an over-dispersed Poisson distribution. At level 2, strictness of school discipline, aggregated school attachment and school commitment, cross-level interaction terms of peer deviance by the strictness of school discipline and school-level attachment and commitment, along with other school-level control variables, are entered. Each interaction term is estimated in its own separate model in order to obtain a cleaner look of the potential interaction effects and to ease the interpretation of each interaction term. The general form of level 1 model is shown as:

$$\eta_{ij} = \beta_{0j} + \beta_{1j}*(X_{1ij}) + \beta_{2j}*(X_{2ij}) + \beta_{3j}*(X_{3ij}) + \dots + \beta_{pj}*(X_{pij})$$

where  $X_{pij}$  is a level 1 predictor that varies for student  $i$  nested in school  $j$ . The level 2 model is:

---

<sup>3</sup> There are some inconsistencies with regard to whether to report level 1 variance and ICC for multi-level poisson models, for the reason that there is no level 1 error term in the usual sense (nor do multi-level poisson models have a latent continuous distribution as probit and logit models do, see Goldstein et al., 2002). For instance, Osgood and Anderson (2004) chose not to report level 1 variance for their over-dispersed multi-level poisson models for reasons listed here, while other people do (e.g. Huebner, 2003). Because HLM7 does return a level 1 variance component, it is reported for the unconditional model and used to calculate ICC. However, because the accuracy of the ICC is less clear for poisson models (Stryhn et al., 2006 discussed different ways to estimate ICC for poisson models, but it is not clear how HLM7 estimates the level 1 variance), the significance of level 2 variance will be used to justify multi-level analyses.

$$\beta_{0j} = \gamma_{00} + \gamma_{01}*(W_{1j}) + \gamma_{02}*(W_{2j}) + \dots + \gamma_{0m}*(W_{mj}) + u_{0j}$$

To create the cross-level interaction terms, the coefficients of strictness of school discipline, school-level attachment, and school-level commitment, are entered as predictors of the coefficient of peer deviance. Because cross-level interaction effects can occur without allowing the coefficient of peer deviance to vary randomly across schools (Johnson, 2010), the decision of using random coefficient model or not is made based on whether the results differ substantively between random intercept versus random coefficient models. For instance, the interaction between X1, a level 1 predictor, and W1, a level 2 predictor, can be written as:

$$\beta_{1j} = \gamma_{10} + W_{1j} + (\mu_{1j})$$

Where  $\mu_{1j}$  represents the random effects of  $\beta_{1j}$  across schools. All predictors are grand-mean centered to make the intercepts substantively interpretable (Britt, 2000; Haynie et al., 2006).

As discussed above, the sampling procedure of Add Health is more complicated than simple random sampling. Students are clustered within schools with unequal probability of selection. At the school-level, weights are calculated to account for the unequal probability of a school being selected due to nonresponse and ineligibility (Tourangeau and Shin, 1999). At the individual level, certain groups of adolescents, such as high SES black adolescents, twins, and disabled youth, are oversampled. Failure to account for the probabilities of being selected into the sample will result in biased estimates of parameters as well as variance (Chen and Chantala, 2014). The weights for running multilevel analyses are given in the survey document to account for the probability of the school being selected and the probability of the

student being selected given that his/her school is selected. These weights are used in the multilevel models to generate unbiased estimates of parameters and variance (Chen and Chantala, 2014).

## Chapter 4: Results

The analyses began with an unconditional model that includes level 1 (individual) fixed effects and level 2 (school) random effects. The variance explained at the school level is statistically significant ( $u_{0j} = .119, p < .001$ ). The variance explained at the individual level is  $4.9^4$ , and the intra-class correlation coefficient is .0238, about 2 percent. The significance of school-level variance warrants further unrestricted models with predictors.

Model 1 is the random intercept model that includes only level 1 predictors. This model allows level 1 predictors to explain both level 1 and level 2 variation. As shown in Table 5a., peer deviance is positively associated with delinquency. ( $\beta = .186, p < .001$ ). The coefficient suggests that a 1-unit increase in peer deviance predicts a 20% increase in the delinquency scale. At the same time, both school attachment and commitment are negatively associated with delinquency. For school attachment, 1-unit increase in the scale is associated with about 9 percent decrease in the delinquency scale ( $\beta = -.093, p < .05$ ). For school commitment, 1-unit increase in the commitment scale is associated with about 26% decrease in the delinquency scale ( $\beta = -.301, p < .001$ ).

---

<sup>4</sup> As discussed in the previous chapter, there is no level 1 error term but level 1 variance can be estimated.

Table 5a. Random Intercept HGLM with Over-Dispersed Poisson Distribution (N=6,064)

	<u>Model 1</u>			<u>Model 2</u>			<u>Model 3</u>		
<i>Variable Name</i>	$\beta$	<i>IRR</i>	<i>SE</i>	$\beta$	<i>IRR</i>	<i>SE</i>	$\beta$	<i>IRR</i>	<i>SE</i>
<b>Level 1</b>									
peer deviance	0.186***	1.204	0.026	0.186***	1.205	0.026	0.211***	1.235	0.030
school attachment	-0.093*	0.911	0.047	-0.094*	0.910	0.048	-0.093*	0.911	0.047
school commitment	-0.301***	0.739	0.04	-0.302***	0.739	0.040	-0.319***	0.727	0.038
peer deviance X school attachment	--	--	--	0.005	1.005	0.048	--	--	--
peer deviance X school commitment	--	--	--	--	--	--	0.085*	1.089	0.034
maternal attachment	-0.177***	0.838	0.036	-0.177***	0.838	0.036	-0.176***	0.839	0.036
self-control	-0.068*	0.934	0.029	-0.068*	0.934	0.029	-0.068*	0.934	0.029
age	-0.095***	0.909	0.017	-0.095***	0.909	0.017	-0.098***	0.907	0.017
male	0.088	1.092	0.061	0.087	1.091	0.061	0.088	1.092	0.062
race (reference category=other)									
<i>White</i>	-0.323***	0.725	0.132	-0.316	0.729	0.130	-0.318*	0.728	0.135
<i>African American</i>	-0.233^	0.792	0.124	-0.234	0.791	0.124	-0.227^	0.797	0.125
<i>Asian</i>	-0.017	0.983	0.16	-0.017	0.983	0.160	0.001	1.001	0.162
<i>Native American</i>	0.033	1.034	0.219	0.033	1.033	0.219	0.031	1.032	0.221
<i>Multi-Race</i>	0.023	1.023	0.149	0.023	1.023	0.149	0.025	1.026	0.150
mother receive public assistance	-0.228**	0.796	0.088	-0.228	0.796	0.088	-0.227**	0.797	0.088

live with both biological parents	-0.030	0.97	0.047	-0.030	0.970	0.047	-0.031	0.969	0.047
constant	0.906***	2.473	0.051	0.928***	2.529	0.056	0.924***	2.518	0.056
<b>Level 2 Random Effect</b>									
Variance	.073			.073			.073		
Chi-square	459.976***			459.858***			460.405***		
(d.f.)	99			99			99		

Note: ^p<.1 \*p<.05 \*\*p<.01 \*\*\*p<.001, two-tailed test. IRR=Incident Rate Ratio. SE=Standard Error.

The individual-level interaction term of deviance by school attachment is added in Model 2, and does not appear to be statistically significant. The direction of the coefficient is also not consistent with theoretical predictions. Adding the interaction term does not change any substantive findings of major variables of interest compared to Model 1. Model 3 presents the results after adding the interaction of peer deviance by school commitment. The coefficient is significant but positive ( $\beta = .085$ ,  $df=5949$ ,  $p < .01$ ). The nature of this interaction effects is illustrated in Figure 3. From the plot, while all the other variables are held constant, the link between peer deviance and delinquency is stronger for students with higher school commitment. For students with very low commitment to school, the line representing the peer deviance-delinquency relationship becomes nearly flat. This finding should not be interpreted as school commitment exerting negative impact on adolescents' behavioral outcomes, however. Instead, the plot demonstrates that adolescents with high school commitment consistently have lower expected involvement in delinquency compared to those with low school commitment, which is consistent with the direction of the school commitment coefficient.

Figure 3 Interaction Effect of Peer deviance by School Commitment (individual)

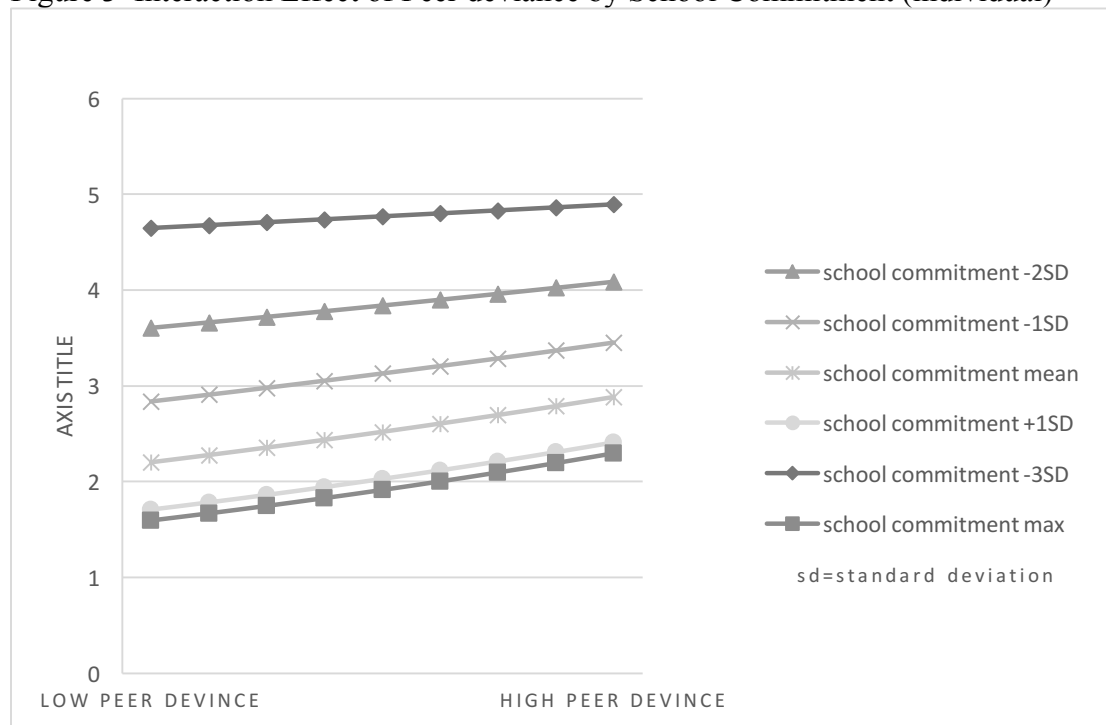


Table 5b. presents the results with level 2 predictors added. In Model 4, level 2 predictors except for interaction terms are added<sup>5</sup>. The addition of level 2 predictors did not change the substantive findings for level 1 predictors compared to Model 2 and 3. School-level attachment to school, school-level commitment, and the strictness of school discipline seem to have no significant influence on delinquent behaviors. Nevertheless, several other school characteristics are found to be significantly associated with delinquency. Specifically, students that attend urban ( $\beta = .217, p < .05$ ) and suburban schools ( $\beta = .175, p < .05$ ) have higher involvement in delinquency compared to those who attend rural schools. At the same time, higher average daily attendance rate at the school-level is associated with higher involvement in

<sup>5</sup> All the models are fitted without random coefficients for level 1 predictors. The algorithm would not converge with random coefficients specified. Literature documented that cross-level interaction is possible without allowing level 1 predictors to vary randomly at level 2 units. For instance, see LaHuis and Ferguson (2009).

delinquency at the individual level ( $\beta = .108, p < .01$ ). The measure of school-level SES, percent of students whose family receive public assistance, is positively associated with delinquency level ( $\beta = .934, p < .1$ ).

Table 5b. Random Intercept HGLM with Over-Dispersed Poisson Distribution (with school-level predictors, N=6,046)

<i>Variable Name</i>	<i><u>Model 4</u></i> $\beta$	<i>IRR</i>	<i>SE</i>	<i><u>Model 5</u></i> $\beta$	<i>IRR</i>	<i>SE</i>
<b>Level 1</b>						
peer deviance	0.181***	1.198	0.027	0.182***	1.199	0.027
school attachment	-0.097*	0.908	0.047	-0.097*	0.907	0.046
school commitment	-0.299***	0.742	0.041	-0.299***	0.742	0.041
maternal attachment	-0.177***	0.838	0.036	-0.175***	0.839	0.037
self-control	-0.071*	0.931	0.029	-0.071*	0.932	0.029
age	-0.088***	0.916	0.019	-0.088***	0.916	0.019
male	0.095	1.100	0.061	0.095	1.100	0.061
race (reference category=other)						
<i>White</i>	-0.278*	0.758	0.112	-0.277*	0.758	0.111
<i>African American</i>	-0.166	0.847	0.120	-0.166	0.847	0.119
<i>Asian</i>	-0.035	0.965	0.134	-0.039	0.962	0.191
<i>Native American</i>	0.116	1.123	0.192	0.118	1.126	0.191
<i>Multi-race</i>	0.057	1.059	0.139	0.060	1.062	0.138
mother receive public assistance	-0.231*	0.794	0.093	-0.233*	0.792	0.092
live with both biological parents	-0.029	0.971	0.046	-0.029	0.972	0.046
<b>Level 2</b>						
school attachment	-0.193	0.824	0.216	-0.199	0.819	0.199
school commitment	-0.102	0.903	0.427	-0.060	0.942	0.389
school discipline	-0.014	0.986	0.075	-0.017	0.983	0.079
peer deviance X school attachment	--	--	--	0.181	1.198	0.113
peer deviance X school commitment	--	--	--	--	--	--
peer deviance X school discipline	--	--	--	--	--	--
school community disorganization						
<i>female headed</i>	-0.318	0.728	0.413	-0.318	0.728	0.489

<i>household</i>						
<i>percent receiving assistance</i>	0.934 <sup>^</sup>	2.546	0.489	0.908 <sup>^</sup>	2.480	0.490
<i>urbanicity (reference category=rural)</i>						
urban	0.217*	1.242	0.109	0.211 <sup>^</sup>	1.234	0.109
suburban	0.175*	1.191	0.086	0.169 <sup>^</sup>	1.185	0.086
<i>region (reference category=Northeast)</i>						
<i>West</i>	-0.012	0.989	0.101	0.006	1.006	0.101
<i>Midwest</i>	-0.181 <sup>^</sup>	0.834	0.093	-0.173 <sup>^</sup>	0.841	0.094
<i>South</i>	-0.449***	0.638	0.077	-0.446***	0.640	0.076
public school	-0.178	0.837	0.115	-0.189	0.828	0.114
<i>school size (reference category=large)</i>						
<i>small school</i>	-0.186 <sup>^</sup>	0.830	0.102	-0.193 <sup>^</sup>	0.824	0.102
<i>medium school</i>	-0.009	0.991	0.075	-0.013	0.987	0.074
school grade	-0.002	0.998	0.033	-0.002	0.998	0.033
daily attendance rate	0.108**	1.114	0.040	0.105*	1.110	0.040
average class size	0.006	1.006	0.007	0.007	1.007	0.006
constant	0.922***	2.514	0.027	0.926***	2.525	0.027
<b>Level 2 Random Effect</b>						
Variance	.020***			.020***		
Chi-square	208.489			207.413		
d.f.	83			83		

Note: <sup>^</sup>p<.1 \*p<.05 \*\*p<.01 \*\*\*p<.001, two-tailed test. IRR=Incident Rate Ratio. SE=Standard Error.

Model 5, 6 and 7 present the results with adding the interaction terms of peer deviance by school-level attachment, peer deviance by school-level commitment, and peer deviance by discipline strictness, respectively. All three interaction terms have a coefficient signs that are inconsistent with theoretical predictions, but none of them are statistically significant.

Table 5b. Continued

<i>Variable Name</i>	<i>Model 6</i>			<i>Model 7</i>		
	$\beta$	<i>IRR</i>	<i>SE</i>	$\beta$	<i>IRR</i>	<i>SE</i>
<b>Level 1</b>						
peer deviance	0.181***	1.199	0.026	0.180***	1.198	0.026
school attachment	-0.098*	0.907	0.047	-0.097*	0.907	0.046
school commitment	-0.299***	0.742	0.041	-0.298***	0.742	0.041
maternal attachment	-0.176***	0.838	0.037	-0.178***	0.837	0.037
self-control	-0.071*	0.932	0.029	-0.071*	0.931	0.029
age	-0.088***	0.916	0.019	-0.087***	0.916	0.019
male	0.096	1.101	0.061	0.095	1.100	0.061
race (reference category=other)						
<i>White</i>	-0.279*	0.757	0.112	-0.276*	0.759	0.111
<i>African American</i>	-0.165	0.848	0.120	-0.165	0.848	0.119
<i>Asian</i>	-0.035	0.965	0.134	-0.033	0.967	0.135
<i>Native American</i>	0.114	1.121	0.194	0.122	1.130	0.193
<i>Multi-race</i>	0.057	1.059	0.140	0.056	1.057	0.139
mother receive public assistance	-0.233*	0.793	0.092	-0.228*	0.796	0.092
live with both biological parents	-0.029	0.972	0.046	-0.029	0.972	0.046
<b>Level 2</b>						
school attachment	-0.178	0.837	0.197	-0.188	0.828	0.194
school commitment	-0.109	0.897	0.376	-0.107	0.899	0.381
school discipline	-0.016	0.984	0.079	-0.017	0.983	0.079
peer deviance X school attachment	--	--	--	--	--	--
peer deviance X school commitment	0.219	1.245	0.240	--	--	--
peer deviance X school discipline	--	--	--	0.095	1.099	0.076
school community disorganization						
<i>female headed household</i>	-0.318	0.728	0.487	-0.297	0.743	0.487
<i>percent receiving assistance</i>	0.943^	2.568	0.489	0.944^	2.570	0.488
<i>urbanicity (reference category=rural)</i>						
urban	0.214^	1.239	0.109	0.217*	1.242	0.109
suburban	0.173*	1.189	0.086	0.173*	1.189	0.086

region (reference category=Northeast)						
<i>West</i>	-0.001	0.999	0.099	-0.019	0.981	0.101
<i>Midwest</i>	-0.177 <sup>^</sup>	0.838	0.093	-0.186*	0.831	0.093
<i>South</i>	-0.447***	0.640	0.076	-0.454***	0.635	0.077
public school	-0.187	0.829	0.114	-0.177	0.838	0.116
school size (reference category=large)						
<i>small school</i>	-0.196 <sup>^</sup>	0.822	0.103	-0.187 <sup>^</sup>	0.829	0.102
<i>medium school</i>	-0.016	0.984	0.075	-0.010	0.990	0.074
school grade	-0.002	0.998	0.032	-0.002	0.998	0.032
daily attendance rate	0.108***	1.114	0.040	0.110***	1.117	0.040
average class size	0.006	1.006	0.007	0.007	1.007	0.007
constant	0.924***	2.519	0.027	0.922***	2.514	0.027
<b>Level 2 Random Effect</b>						
Variance	.020***			.020***		
Chi-square	206.837			206.589		
d.f.	83			83		

Note: <sup>^</sup>p<.1 \*p<.05 \*\*p<.01 \*\*\*p<.001, two-tailed test. IRR=Incident Rate Ratio. SE=Standard Error.

Overall, none of the five hypotheses are supported. Neither individual-level or school-level attachment to school seem to moderate the relationship between peer deviance and delinquency. Although individual-level commitment to school appears to be a significant moderator on the peer deviance-delinquency link, the direction is not consistent with theoretical predictions. As for school-level commitment and discipline strictness, neither the main effects nor the interaction effects are found<sup>6</sup>.

<sup>6</sup> Sensitivity analyses are conducted using dummy indicators to retain cases that are lost due to missingness in control variables (N=7,140). It should be noted that this method added more than 1,000 variables (larger than the number of missingness in mother receiving public assistance, which is the control variable with the most missingness). This is because subjects with missing data on control variables may not be the same group of people (for instance, one subject with only race missing and another with only mother receiving public assistance missing). The results are substantively the same. However, both the interaction terms of school attachment and commitment at the school-level shift from non-significant to significant, and the signs remain positive. While the shift in significance for attachment seems to be due to the decrease in the size of standard error, the reason for commitment interaction appears to be the drastic increase in the size of the coefficient. However, because the results

---

presented above are more similar to other sets of sensitivity analyses (standardized scales and combined school communal social organization measure), they are kept as the main results.

## Chapter 5: Discussion

### Overview

Normative influence perspectives argue that people learn crime/delinquency from intimate social others (Akers, 1998; Matsueda, 1992; Sutherland, 1947). Empirically, research consistently found peer deviance to be a significant predictor of personal delinquency (Haynie, 2002; Pratt et al., 2010). On the other hand, adolescents seem to differ in resilience to peer deviance (Barnes et al., 2006; Fagan et al., 2007; Thomas and McGloin, 2013). One factor that may also influence adolescents' resilience towards the influence of peer deviance is school climate (Hirschi, 1969; Payne, 2008), but it was seldom examined in empirical literature. This thesis examined two aspects of school climate, school communal social organization and discipline management (Cook et al., 2010), on the relationship between peer deviance and personal delinquency. These two aspects were operationalized as school attachment/commitment and strictness of school discipline.

### Interpretations of Findings

Results do not support any of the five hypotheses. The first hypothesis states that the association between peer deviance and delinquency is weaker for students with stronger individual-level school attachment. Findings indicate that individual-level attachment to school is negatively associated with delinquency, but the

interaction term is not significant. The null finding could potentially be explained by how school attachment is measured. Specifically, two of the items actually tap into these adolescents' relationships with school peers ("the students at this school are prejudiced; I feel close to people at this school"). It is possible that school attachment also partially reflects attachment to peers. In that case, school attachment could go hand in hand with exposure to peer deviance, rather than mitigate the influence of peer deviance on delinquency. This could be especially likely considering only school friends are included.

The second hypothesis states that the association between peer deviance and delinquency is weaker for students with stronger individual-level school commitment, and is not supported. Some interesting findings emerge, however. Specifically, while individual-level commitment to school is negatively associated with delinquency across all models, it appears to magnify the effect of peer deviance on delinquency. Such findings do not suggest that school commitment predict negative behavioral outcomes, but simply demonstrate that students who are highly committed to school are in fact more vulnerable to the influence of peer deviance. These findings are indeed inconsistent with theoretical predictions and extant literature (Hirschi, 1969; Sprott et al., 2005). Nevertheless, there could be two potential explanations to these mixed findings.

One possibility is that the stronger connection between peer deviance and delinquency could simply reflect more interactions and contacts, as well as higher importance of school peers for those who have high school commitment. At the same time, because adolescents that have lower school commitment constantly have higher

expected delinquency scale, it is possible that school peers is not the only, or even the most important source, to learn delinquent behaviors from. In fact, literature indicates that adolescent boys in disadvantaged neighborhoods are more likely to associate with older peers in the neighborhood in order to get safety and protection, but a by-product of getting protection is being socialized with delinquent and criminal values, and becoming less engaged in school (Harding, 2009). Therefore, it might not be that school commitment is magnifying the impact of peer deviance on delinquency, but that the finding reflects the relative importance of school peers for adolescents with low and high school commitment. Such interpretations are consistent with the findings for both the main effect and interaction effect. Because the analyses only include the deviant behaviors of school peers, such a possibility could not be ruled out.

Another possible explanation draws from the literature that examines differential susceptibility to peer influence between immigrant youth and native-born youth (DiPietro and McGloin, 2012). Specifically, the authors found that exposure to peer deviance seemed to be more criminogenic for first- and second-generation immigrant youth, compared to the third-generation immigrant adolescents. However, first- and second-generation immigrant youth are less likely to engage in violence compared to third-generation adolescents. The interpretation proposed by the authors is that because parents of immigrant youth typically monitor their children more closely, immigrant youth have additional hurdles to overcome in order to achieve autonomy. Consequently, having good standing among peers is likely to be more important for them compared to native-born youth. In other words, immigrant youth

have less exposure to peer deviance in general, but are more vulnerable to the influence once they are exposed to peer deviance. The findings are somewhat similar here in the current thesis, and the same interpretations could be applied to the finding of stronger association between peer deviance and delinquency for adolescents with higher school commitment. Perhaps the adolescents with high school commitment are less exposed to peer deviance, so that peer deviance is going to be a greater “shock” to them once they are exposed deviant behaviors<sup>7</sup>.

Hypotheses 3 and 4, which state that the association between peer deviance and delinquency are weaker for adolescents who attend schools with higher school-level commitment and attachment, are both not supported. Specifically, School-level commitment and attachment do not predict delinquency or moderate the relationship between peer deviance and delinquency. Despite the sign of the coefficients of the main effect being consistent with theoretical predictions and extant research that school communal social organization is negatively associated with delinquency (Cook et al., 2010; Payne et al., 2003; Payne, 2008), they do not reach statistical significance. However, the null finding is not without explanations. In fact, at the school-level, school commitment has a 95 percent confidence interval of (2.618, 2.704), and school attachment has a 95 percent confidence interval of (3.373, 3.526). Because the original items are on 4-point and 5-point scales respectively, there does not seem to be a lot of heterogeneity across schools. At the same time, school-level variance contributes to about 8 percent of total variance of school attachment, and

---

<sup>7</sup> In fact, the negative correlation between school commitment and peer deviance provide some preliminary support for such interpretation ( $r = -.207$ )

only about 2 percent of total variance of school commitment (contrastingly, the two measures of school communal social organization in Payne 2008 both have ICCs that are larger than 20 percent). Thus, the null finding could simply due to the lack of variation for school commitment and attachment at the school-level. As for the null result of interaction effects, the interpretation used for the peer deviance by individual-level attachment interaction could also be applied. Specifically, the cohesiveness of schools could go hand in hand with how much adolescents value their school peers, rather than mitigate the influence of their peers<sup>8</sup>.

For the fifth and final hypothesis that states the peer deviance-delinquency association is weaker for students who attend schools with stricter discipline, no findings support either the main effect or the interaction effect. The null finding is not consistent with the predictions of rational choice perspective (Cornish and Clarke, 1986). However, it is clear that rational choice theory is about how the subjective decisions of engaging in crime and delinquency, and the decisions are influenced by subjective perceptions of risks, costs, and rewards of involving in such acts. Therefore, ideally, school discipline strictness should be measured perceptually and subjectively. Because such measures are not available in the Add Health data, the hypothesis cannot be tested with measures that are more consistent with the theoretical constructs. There is indeed some evidence that when school discipline management is measured more consistently with the theoretical constructs of rational

---

<sup>8</sup> Another potential interpretation is that school commitment and attachment are highly correlated at the school level. Zero-order correlation proved that they are correlated moderately ( $r=.59$ ). Sensitivity analyses are conducted with the two scales combined as one measure of school communal social organization. Main effect remains nonsignificant, and the interaction term shifts to marginally significant with the sign remains positive ( $p<.1$ ).

choice theory, such as students' perceived clarity and fairness of rules, it is negatively associated with school disorder (Gottfredson et al., 2005).

At the same time, the null finding is not consistent with Zimmerman and Rees' (2014) finding that expulsion policy moderates the relationship between peer deviance and delinquency. It should be noted, however, that Zimmerman and Rees (2014) looked at the moderating effect of expulsion that targets a specific behavior on the relationship between peers' involvement in that specific behavior and personal involvement in that specific behavior (for example, expulsion policy for smoking on the relationship between peer smoking and personal smoking). Contrastingly, the measure used in the current thesis assess the general punitiveness and strictness of school discipline and found null interaction effect. These two sets of findings are not contradicting with each other. Instead, these findings may jointly suggest that discipline policies are effective in mitigating the effect of exposure to peer deviance when they clearly target specific behaviors, but a general punitive tendency is not effective.

#### Limitations and Future Directions

There are certainly limitations with the current thesis. First, attrition analyses revealed that adolescents in the final sample are likely not nationally representative. Importantly, while sensitivity analyses are conducted to test the robustness of the findings with accounting for missingness in control variables, there is nothing could possibly be done to address the potential biases due to sample loss in the process of merging. Therefore, results should be generalized with caution. Future research is suggested to test the hypotheses with a nationally representative sample.

Second, despite that potential mechanisms are discussed extensively to justify the theoretical foundations to investigate these research questions, the results speak little to the actual mechanisms of why individual-level bonding and aspects of school-climate may or may not have an impact on the peer deviance-delinquency relationship. The interpretations of the results (or null results) remain assumptions at best, unless information regarding adolescents' experiences with peer deviance, especially their thoughts about why they choose to (or not to) imitate peers' deviant behaviors, could be gathered. Nevertheless, adolescents' internal thoughts about the learning processes are hardly quantifiable. Instead, qualitative interviews could have the potential to tap into why school climate and individual bonding may or may not influence their decisions to imitate their peers' deviant behaviors. These interviews, in turn, may actually provide some ideas to quantitative researchers in terms of how these potential mechanisms could be quantified.

Third, the measures used in the current thesis do not capture the whole picture of school communal social organization. Communal social organization is a much broader concept than students' emotional closeness to school and how committed they are to their school work. To name a few, it also includes the relationship and mutual support among teachers and administrators, as well as whether the school has clear goals and behavioral expectations (Payne et al., 2003). These components of communal social organization could also have an impact on the peer deviance-delinquency relationship. For instance, if the teachers feel more supportive within their institutions, adolescents may be less likely to imitate peers' deviant behaviors simply because teachers are more effective in detecting and intervening deviant peer

groups. Moreover, other components of school climate, such as the other component of school culture, behavioral norms, are likely to moderate this relationship as well. If a school as a community have consensus on what behaviors are morally correct, students within this institution are less likely to be influenced by deviant values. Future research may explore the potential moderating relationship with other measures of communal social organization and school climate in general.

Finally, the measure of school discipline used in the current thesis only captures a general tendency of discipline punitiveness, and therefore, does not include any information about how students are placed after being disciplined. On the other hand, some disciplinary practices may actually be more impactful, at least theoretically, on the peer deviance-delinquency. Specifically, research suggest that exclusionary policies could actually marginalize the students who are disciplined and excluded from academic activities (Brown, 2007; Rocque and Paternoster, 2011). Some of these exclusionary practices actually include removing adolescents that engage in delinquency from classroom and group them together to receive “special education (Kupchik, 2012; Silver and Eddy, 2006). Sometimes adolescents are suspended at home and receive no supervision (Gifford-Smith et al., 2005). Both conditions remove adolescents from their conforming peers and increase their exposure and bond to deviant peers, which eventually could make them more susceptible to the influence of peer deviance. Because the data do not include details about adolescents’ placement after being excluded from normal school work, such possibilities cannot be explored by the current thesis. However, it could be fruitful for future research to explore if practices that remove students from classrooms and

group deviant students together have any moderating effect on the peer deviance-delinquency link.

Third, the analyses do not account for influence from neighborhood friends. This is a major limitation for two reasons. For one, how influential school peers are is likely to be positively associated with individual-level attachment and commitment to school. This leads to the difficulty to draw the conclusion that adolescents with higher commitment are more vulnerable to the influence of exposure to peer deviance, because this finding may simply reflect peers from school, as part of the school environment, entails more importance for adolescents with higher school commitment. On the other hand, the influence of neighborhood peers may not overlap with attachment or commitment to school, which could potentially offer a cleaner interpretation of why affective bonding and school communal social organization may or may not impact the peer deviance-delinquency relationship.

For the other, the analyses do not include adolescents who do not attend school or do not have any friends at school. It is likely, however, that these adolescents have older peers in their neighborhood. These adolescents typically have worse outcomes compared to those that are more embedded in school life (Harding, 2009; McCarthy et al., 2004). Therefore, the current analyses may have excluded the group of adolescents who are more marginalized and exhibit worse life outcomes, which in turn, need more attention (but see Ingoldsby et al., 2006). For future research, it would be fruitful to examine the relationship between neighborhood friend behaviors and delinquency, if affective bonding and school climate moderate the relationship between neighborhood friend deviance and delinquency, and more

extensively, what may affect street youth's susceptibility to peer influence because they are not embedded in a school environment.

### Conclusion

The current thesis adds to the extant literature on the vulnerability and resilience to peer deviance by indicating that the relationship between peer deviance and delinquency is stronger for adolescents who are more committed to school. Despite being inconsistent with theoretical predictions, this finding suggest that there is no simple answer to what factors and how these factors may influence adolescents' response to peer deviance. At the same time, by considering punitive discipline from a different angle, it again failed to demonstrate effectiveness. Future research should explore the factors that may influence adolescents' vulnerability to peer influence by using a nationally representative sample, by using different methodologies to get a sense of potential mechanisms, by using a more extensive measure of school communal social organization, discipline management, and school climate in general, and by examining the role of neighborhood peers.

## Bibliography

- Akers, R. L. (1998, 2011). *Social learning and social structure: A general theory of crime and deviance*. Transaction Publishers.
- Agnew, R. (1991). The interactive effects of peer variables on delinquency. *Criminology*, 29(1), 47-72.
- Arcia, E. (2006). Achievement and enrollment status of suspended students outcomes in a large, multicultural school district. *Education and Urban Society*, 38(3), 359-369.
- Arneklev, B. J., Grasmick, H. G., & Bursik, R. J. (1999). Evaluating the dimensionality and invariance of "low self-control". *Journal of Quantitative Criminology*, 15(3), 307-331.
- Augustyn, M. B., & McGloin, J. M. (2013). The risk of informal socializing with peers: Considering gender differences across predatory delinquency and substance use. *Justice Quarterly*, 30(1), 117-143.
- Bandura, A. (1965). Influence of models' reinforcement contingencies on the acquisition of imitative responses. *Journal of personality and social psychology*, 1(6), 589.
- Bao, Z., Li, D., Zhang, W., & Wang, Y. (2015). School climate and delinquency among Chinese adolescents: analyses of effortful control as a moderator and deviant peer affiliation as a mediator. *Journal of abnormal child psychology*, 43(1), 81-93.
- Barnes, G. M., Hoffman, J. H., Welte, J. W., Farrell, M. P., & Dintcheff, B. A. (2006). Effects of parental monitoring and peer deviance on substance use and delinquency. *Journal of Marriage and Family*, 68(4), 1084-1104.
- Boeringer, S. B., Shehan, C. L., & Akers, R. L. (1991). Social contexts and social learning in sexual coercion and aggression: Assessing the contribution of fraternity membership. *Family Relations*, 58-64.
- Bradshaw, C. P., Sawyer, A. L., & O'brennan, L. M. (2009). A social disorganization perspective on bullying-related attitudes and behaviors: The influence of school context. *American journal of community psychology*, 43(3-4), 204-220.
- Britt, C. L. (2000). Social context and racial disparities in punishment decisions. *Justice Quarterly*, 17(4), 707-732.
- Brown, T. M. (2007). Lost and turned out: Academic, social, and emotional experiences of students excluded from school. *Urban Education*, 42(5), 432-455.

- Bryk, A. S., & Raudenbush, S. W. (1992). Hierarchical linear models: Applications and data analysis methods. Newbury Park, CA: Sage.
- Bursik, R. J. (1988). Social disorganization and theories of crime and delinquency: Problems and prospects. *Criminology*, 26(4), 519-552.
- Catalano, R. F., Oesterle, S., Fleming, C. B., & Hawkins, J. D. (2004). The importance of bonding to school for healthy development: Findings from the Social Development Research Group. *Journal of School Health*, 74(7), 252-261.
- Cernkovich, S. A., & Giordano, P. C. (1987). Family relationships and delinquency. *Criminology*, 25(2), 295-319.
- Cernkovich, S. A., & Giordano, P. C. (1992). School attachment, race, and delinquency. *Criminology*, 30(2), 261-291.
- Chan, G. C., Kelly, A. B., Carroll, A., & Williams, J. W. (2017). Peer drug use and adolescent polysubstance use: Do parenting and school factors moderate this association?. *Addictive Behaviors*, 64, 78-81.
- Chen, P., & Chantala, K. (2014). *Guidelines for analyzing Add Health data*. [http://www.cpc.unc.edu/projects/addhealth/documentation/guides/wt\\_guidelines\\_20161213.pdf](http://www.cpc.unc.edu/projects/addhealth/documentation/guides/wt_guidelines_20161213.pdf)
- Chui, W. H., & Chan, H. C. O. (2012, August). An empirical investigation of social bonds and juvenile delinquency in Hong Kong. In *Child & Youth Care Forum* (Vol. 41, No. 4, pp. 371-386). Springer US.
- Chung, H. L., & Steinberg, L. (2006). Relations between neighborhood factors, parenting behaviors, peer deviance, and delinquency among serious juvenile offenders. *Developmental psychology*, 42(2), 319.
- Cook, P. J., Gottfredson, D. C., & Na, C. (2010). School crime control and prevention. *Crime and Justice*, 39(1), 313-440.
- Cornish, D. B., & Clarke, R. V. (Eds.). (1986, 2014). *The reasoning criminal: Rational choice perspectives on offending*. Transaction Publishers.
- DiPietro, S. M., & McGloin, J. (2012). Differential susceptibility? Immigrant youth and peer influence. *Criminology*, 50(3), 711-742.
- Dornbusch, S. M., Erickson, K. G., Laird, J., & Wong, C. A. (2001). The relation of family and school attachment to adolescent deviance in diverse groups and communities. *Journal of Adolescent Research*, 16(4), 396-422.

- Edwards, K. M., & Neal, A. M. (2017). School and community characteristics related to dating violence victimization among high school youth. *Psychology of violence*, 7(2), 203.
- Espelage, D. L., Low, S. K., & Jimerson, S. R. (2014). Understanding school climate, aggression, peer victimization, and bully perpetration: Contemporary science, practice, and policy. *School psychology quarterly*, 29(3), 233.
- Fagan, A. A., Van Horn, M. L., Hawkins, J. D., & Arthur, M. W. (2007). Gender similarities and differences in the association between risk and protective factors and self-reported serious delinquency. *Prevention Science*, 8(2), 115-124.
- Gifford-Smith, M., Dodge, K. A., Dishion, T. J., & McCord, J. (2005). Peer influence in children and adolescents: Crossing the bridge from developmental to intervention science. *Journal of abnormal child psychology*, 33(3), 255-265.
- Goldstein, H., Browne, W.J. and Rasbach, J. (2002). Partitioning variation in multilevel models. *Understanding Statistics*, 1, 223-232.
- Gottfredson, D. C. (1986). An Empirical Test of School-Based Environmental and Individual Interventions to Reduce the Risk of Delinquent Behavior. *Criminology*, 24(4), 705-731.
- Gottfredson, G. D., Gottfredson, D. C., Payne, A. A., & Gottfredson, N. C. (2005). School climate predictors of school disorder: Results from a national study of delinquency prevention in schools. *Journal of Research in Crime and Delinquency*, 42(4), 412-444.
- Harris, K. M. (2013). *The add health study: design and accomplishments*. Retrieved from <http://www.cpc.unc.edu/projects/addhealth/documentation/guides/DesignPaperWIIV.pdf>
- Harris, K.M., C.T. Halpern, E. Whitsel, J. Hussey, J. Tabor, P. Entzel, and J.R. Udry. 2009. The National Longitudinal Study of Adolescent to Adult Health: Research Design. Retrieved from <http://www.cpc.unc.edu/projects/addhealth/design>.
- Haynie, D. L. (2001). Delinquent peers revisited: Does network structure matter? *American journal of sociology*, 106(4), 1013-1057.
- Haynie, D. L. (2002). Friendship networks and delinquency: The relative nature of peer delinquency. *Journal of Quantitative Criminology*, 18(2), 99-134.
- Haynie, D. L., Silver, E., & Teasdale, B. (2006). Neighborhood characteristics, peer networks, and adolescent violence. *Journal of Quantitative Criminology*, 22(2), 147-169.

- Harding, D. J. (2009). Violence, older peers, and the socialization of adolescent boys in disadvantaged neighborhoods. *American Sociological Review*, 74(3), 445- 464.
- Henry, K. L., & Slater, M. D. (2007). The contextual effect of school attachment on young adolescents' alcohol use. *Journal of school health*, 77(2), 67-74.
- 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(1), 3-22.
- Hirschi, T. (1969, 2002). *Causes of delinquency*. Transaction publishers.
- Hoeve, M., Stams, G. J. J., van der Put, C. E., Dubas, J. S., van der Laan, P. H., & Gerris, J. R. (2012). A meta-analysis of attachment to parents and delinquency. *Journal of abnormal child psychology*, 40(5), 771-785.
- Hubbard, D. J., & Pratt, T. C. (2002). A meta-analysis of the predictors of delinquency among girls. *Journal of Offender Rehabilitation*, 34(3), 1-13.
- Huebner, B. M. (2003). Administrative determinants of inmate violence: A multilevel analysis. *Journal of Criminal Justice*, 31(2), 107-117.
- Ingoldsby, E. M., Shaw, D. S., Winslow, E., Schonberg, M., Gilliom, M., & Criss, M. M. (2006). Neighborhood disadvantage, parent-child conflict, neighborhood peer relationships, and early antisocial behavior problem trajectories. *Journal of abnormal child psychology*, 34(3), 293-309.
- Iselin, A. M. (2010). Research on School Suspension. *Center for Child and Family Policy, Duke University (NC)*.
- Johnson, B. D. (2010). Multilevel analysis in the study of crime and justice. In *Handbook of quantitative criminology* (pp. 615-648). Springer New York.
- Kalsbeek, W. D., Yang, J., & Agans, R. P. (2002, August). Predictors of nonresponse in a longitudinal survey of adolescents. In *ASA Proceedings of the Joint Statistical Meetings* (pp. 1740-1745).
- Kim, T. E., & Goto, S. G. (2000). Peer delinquency and parental social support as predictors of Asian American adolescent delinquency. *Deviant Behavior*, 21(4), 331-347.
- Kiesner, J., Poulin, F., & Dishion, T. J. (2010). Adolescent substance use with friends: Moderating and mediating effects of parental monitoring and peer activity contexts. *Merrill-Palmer quarterly (Wayne State University. Press)*, 56(4), 529.

- Kreager, D. A., & Haynie, D. L. (2011). Dangerous liaisons? Dating and drinking diffusion in adolescent peer networks. *American sociological review*, 76(5), 737-763.
- Kruse, H., Smith, S., van Tubergen, F., & Maas, I. (2016). From neighbors to school friends? How adolescents' place of residence relates to same-ethnic school friendships. *Social Networks*, 44, 130-142.
- Kupchik, A. (2010). *Homeroom security: School discipline in an age of fear*. NYU Press.
- Lacourse, E., Nagin, D., Tremblay, R. E., Vitaro, F., & Claes, M. (2003). Developmental trajectories of boys' delinquent group membership and facilitation of violent behaviors during adolescence. *Development and psychopathology*, 15(01), 183-197.
- LaHuis, D. M., & Ferguson, M. W. (2009). The accuracy of significance tests for slope variance components in multilevel random coefficient models. *Organizational Research Methods*, 12(3), 418-435.
- Lansford, J. E., Dodge, K. A., Fontaine, R. G., Bates, J. E., & Pettit, G. S. (2014). Peer rejection, affiliation with deviant peers, delinquency, and risky sexual behavior. *Journal of youth and adolescence*, 43(10), 1742-1751.
- Lee, V. E. (2000). Using hierarchical linear modeling to study social contexts: The case of school effects. *Educational psychologist*, 35(2), 125-141.
- Li, Y., & Guo, G. (2016). Peer influence on aggressive behavior, smoking, and sexual behavior: a study of randomly-assigned college roommates. *Journal of health and social behavior*, 57(3), 297-318.
- Liljeberg, J. F., Eklund, J. M., Fritz, M. V., & af Klinteberg, B. (2011). Poor school bonding and delinquency over time: Bidirectional effects and sex differences. *Journal of Adolescence*, 34(1), 1-9.
- Lonardo, R. A., Giordano, P. C., Longmore, M. A., & Manning, W. D. (2009). Parents, friends, and romantic partners: Enmeshment in deviant networks and adolescent delinquency involvement. *Journal of youth and adolescence*, 38(3), 367-383.
- Mann, F. D., Kretsch, N., Tackett, J. L., Harden, K. P., & Tucker-Drob, E. M. (2015). Person  $\times$  environment interactions on adolescent delinquency: sensation seeking, peer deviance and parental monitoring. *Personality and individual differences*, 76, 129-134.
- Matsueda, R. L. (1992). Reflected appraisals, parental labeling, and delinquency: Specifying a symbolic interactionist theory. *American Journal of*

- Sociology*, 97(6), 1577-1611.
- Mason, M. J., Mennis, J., Linker, J., Bares, C., & Zaharakis, N. (2014). Peer attitudes effects on adolescent substance use: the moderating role of race and gender. *Prevention Science*, 15(1), 56-64.
- McCarthy, B., Felmlee, D. & Hagan, J. (2004). Girl friends are better: Gender, friends, and crime among school and street youth. *Criminology*, 42: 804-835.
- McGloin, J. M. (2009). Delinquency balance: Revisiting peer influence. *Criminology*, 47:439-478.
- McGloin, J. M., & O'Neill Shermer, L. (2009). Self-control and deviant peer network structure. *Journal of Research in Crime and Delinquency*, 46(1), 35-72.
- McGloin, J. M., & Thomas, K. J. (2016). Considering the elements that inform perceived peer deviance. *Journal of Research in Crime and Delinquency*, 53(5), 597-627.
- Monahan, K. C., Rhew, I. C., Hawkins, J. D., & Brown, E. C. (2014). Adolescent Pathways to Co-Occurring Problem Behavior: The Effects of Peer Delinquency and Peer Substance Use. *Journal of research on adolescence*, 24(4), 630-645.
- Nagin, D. S., & Pogarsky, G. (2004). Time and punishment: Delayed consequences and criminal behavior. *Journal of Quantitative Criminology*, 20(4), 295-317.
- Osgood, D. W., & Anderson, A. L. (2004). Unstructured socializing and rates of delinquency. *Criminology*, 42(3), 519-550.
- Paternoster, R., & Pogarsky, G. (2009). Rational choice, agency and thoughtfully reflective decision making: The short and long-term consequences of making good choices. *Journal of Quantitative Criminology*, 25(2), 103-127.
- Patterson, G. R., & Dishion, T. J. (1985). Contributions of families and peers to delinquency. *Criminology*, 23(1), 63-79.
- Pratt, T. C., & Cullen, F. T. (2000). The empirical status of Gottfredson and Hirschi's general theory of crime: A meta-analysis. *Criminology*, 38(3), 931-964.
- Pratt, T. C., Cullen, F.T., Sellers, C.S., Winfree, L.T. Jr., Madensen, T.D., Daigle, L.E., Fearn, N.E., and Gau, J.M.. (2010). The empirical status of social learning theory: A meta-analysis. *Justice Quarterly* 27:765–802.
- Payne, A. A., Gottfredson, D. C., & Gottfredson, G. D. (2003). Schools as communities: The relationships among communal school organization, student

- bonding, and school disorder. *Criminology*, 41(3), 749-778.
- Payne, D. C. & Cornwell, B. (2007). Reconsidering Peer Influences on Delinquency: Do Less Proximate Contacts Matter? *Journal of Quantitative Criminology*, 23:127-49
- Payne, A. A. (2008). A multilevel analysis of the relationships among communal school organization, student bonding, and delinquency. *Journal of Research in Crime and Delinquency*, 45(4), 429-455.
- Payne, A. A. (2012). Communal school organization effects on school disorder: Interactions with school structure. *Deviant Behavior*, 33(7), 507-524.
- Raffaele-Mendez, L. M. (2003). Predictors of suspension and negative school outcomes: A longitudinal investigation. In J. Wald & D. J. Losen (Eds.), *New directions for youth development: Vol. 99. Deconstructing the school-to-prison pipeline* (pp. 17–34). San Francisco: Jossey-Bass.
- Rathunde, K., & Csikszentmihalyi, M. (2014). The social context of middle school: Teachers, friends, and activities in Montessori and traditional school environments. In *Applications of Flow in Human Development and Education* (pp. 189-213). Springer Netherlands.
- Raudenbush, S.W., Bryk, A.S, & Congdon, R. (2011). HLM 7.00 for Windows [Computer software]. Lincolnwood, IL: Scientific Software International, Inc.
- Raudenbush, S., & Bryk, A. S. (1986). A hierarchical model for studying school effects. *Sociology of education*, 1-17.
- Rimal, R. N., & Real, K. (2005). How behaviors are influenced by perceived norms a test of the theory of normative social behavior. *Communication Research*, 32(3), 389-414.
- Rocque, M., & Paternoster, R. (2011). Understanding the antecedents of the "school-to-jail" link: The relationship between race and school discipline. *The Journal of Criminal Law and Criminology*, 633-665.
- Roman, C. G., & Taylor, C. J. (2013). A multilevel assessment of school climate, bullying victimization, and physical activity. *Journal of school health*, 83(6), 400-407.
- Ryan, J. P., Testa, M. F., & Zhai, F. (2008). African American males in foster care and the risk of delinquency: The value of social bonds and permanence. *Child Welfare*, 87(1), 115.
- Sampson, R. J., Raudenbush, S. W., & Earls, F. (1997). Neighborhoods and violent

- crime: A multilevel study of collective efficacy. *Science*, 277(5328), 918-924.
- Sampson, R. J., & Groves, W. B. (1989). Community structure and crime: Testing social-disorganization theory. *American journal of sociology*, 94(4), 774-802.
- Silver, R. B., & Eddy, J. M. (2006). Based Prevention Programs and Practices for Delivery in Schools That Decrease the Risk of Deviant Peer Influence. *Deviant peer influences in programs for youth: Problems and solutions*, 253.
- Simons, R. L., Wu, C. I., Conger, R. D., & Lorenz, F. O. (1994). Two routes to delinquency: Differences between early and late starters in the impact of parenting and deviant peers. *Criminology*, 32(2), 247-276.
- Sprott, J. B., Jenkins, J. M., & Doob, A. N. (2005). The importance of school protecting at-risk youth from early offending. *Youth Violence and Juvenile Justice*, 3(1), 59-77.
- Stafford, M. C., & Warr, M. (1993). A reconceptualization of general and specific deterrence. *Journal of research in crime and delinquency*, 30(2), 123-135.
- Stewart, E. A. (2003). School social bonds, school climate, and school misbehavior: A multilevel analysis. *Justice Quarterly*, 20(3), 575-604.
- Stryhn, H., Sanchez, J., Morley, P., Booker, C., & Dohoo, I. R. (2006, August). Interpretation of variance parameters in multilevel Poisson regression models. In Proceedings of the 11th International Symposium on Veterinary Epidemiology and Economics.
- Sutherland, E. H. (1947). *Principles of criminology*.
- Thomas, K. J., & McGloin, J.M.. (2013). A dual-systems approach for understanding differential susceptibility to processes of peer influence. *Criminology*, 51(2), 435-474.
- Tourangeau, R., & Shin, H. (1998). National longitudinal study of adolescent health grand sample weight. Retrieved from <http://www.cpc.unc.edu/projects/addhealth/documentation/guides/weights.pdf>
- Turner, I., Reynolds, K. J., Lee, E., Subasic, E., & Bromhead, D. (2014). Well-being, school climate, and the social identity process: A latent growth model study of bullying perpetration and peer victimization. *School psychology quarterly*, 29(3), 320.
- Wang, M. T., & Dishion, T. J. (2012). The trajectories of adolescents' perceptions of school climate, deviant peer affiliation, and behavioral problems during the middle school years. *Journal of Research on Adolescence*, 22(1), 40-53.

- Warr, M. (1993). Age, peers, and delinquency. *Criminology*, 31(1), 17-40.
- Wikström, P. H. (2006). Linking individual, setting, and acts of crime: Situational mechanisms and the explanation of crime. In P. H. Wikström, & R. J. Sampson (Eds.), *The Explanation of Crime: Contexts, Mechanisms, and Development* (pp. 31–60). Cambridge, UK: Cambridge University Press.
- Wikström, P. H. (2010). Explaining crime as social actions. In S. Hitlin, & S. Vaisey (Eds.), *Handbook of Sociology of Morality* (pp. 211–240). New York: Springer.
- Wilson, D. (2004). The interface of school climate and school connectedness and relationships with aggression and victimization. *Journal of School Health*, 74(7), 293-299.
- Young, J. T., Barnes, J. C., Meldrum, R. C., & Weerman, F. M. (2011). Assessing and explaining misperceptions of peer delinquency. *Criminology*, 49(2), 599-630.
- Zhang, A., Musu-Gillette, L., & Oudekerk, B. A. (2016). Indicators of School Crime and Safety: 2015. NCES 2016-079. NCJ 249758. *National Center for Education Statistics*.
- Zhang, L., & Messner, S. F. (1996, June). School attachment and official delinquency status in the People's Republic of China. In *Sociological Forum* (Vol. 11, No. 2, pp. 285-303). Kluwer Academic Publishers-Plenum Publishers.
- Zimmerman, G. M., & Rees, C. (2014). Do school disciplinary policies have positive social impacts? Examining the attenuating effects of school policies on the relationship between personal and peer delinquency. *Journal of Criminal Justice*, 42(1), 54-65.