The Pennsylvania State University

The Graduate School

College of Health and Human Development

FRIENDSHIP DYNAMICS AND VICTIMIZATION: TESTING THREE HYPOTHESES
USING ACTOR-ORIENTED NETWORKING MODELS

A Thesis in
Human Development and Family Studies

by

Deborah A. Temkin

© 2010 Deborah A. Temkin

Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Master of Science

May 2010
The thesis of Deborah A. Temkin was reviewed and approved* by the following:

Scott D. Gest  
Associate Professor of Human Development and Family Studies  
Thesis Adviser

D. Wayne Osgood  
Professor of Sociology

Dana L. Mitra  
Assistant Professor of Education

Steve Zarit  
Professor of Human Development and Family Studies  
Human Development and Family Studies Department Head

*Signatures are on file in the Graduate School
Abstract

Peer victimization among early adolescents is pervasive and detrimental to both concurrent and future social and emotional functioning. As part of youth’s social world, it is important to consider how friendship both affects and is affected by victimization. Three main hypotheses emerge from the literature regarding friendship dynamics and victimization. The Friendship Protection Hypothesis asserts that having friends protects individuals from victimization (Boulton et al., 1999; Malcolm et al., 2006). At the same time, the Self Preservation Hypothesis proposes that victimized youth lose friendships with non-victimized youth and that having a victimized friend puts individuals at risk for future victimization (Ellis & Zabartany, 2007; Pellegrini et al., 1999). Finally, the Common Predictor Hypothesis suggests that both victimization and lack of friends are predicted by low self worth (Bollmer et al., 2005; Bukowski & Sippola, 2001; Hodges et al., 1999). These hypotheses have previously been tested without consideration of the others. This paper uses the actor-oriented networking modeling software, SIENA, to test these hypotheses in a single model while controlling for exogenous social network forces that influence friendship formation, and finds that components of all three hypotheses contribute to the dynamics between friendship and victimization.
TABLE OF CONTENTS

LIST OF TABLES................................................................................................................................. V

ACKNOWLEDGEMENTS........................................................................................................................ VI

CHAPTER 1: INTRODUCTION .................................................................................................................. 1

  PREVALENCE AND IMPACT OF VICTIMIZATION ............................................................................. 2

  FRIENDSHIP AND SOCIAL ADJUSTMENT .......................................................................................... 5

  FRIENDSHIP AND VICTIMIZATION .................................................................................................. 8

    Friendship Protection Hypothesis .................................................................................................. 9

    Self Preservation Hypothesis ...................................................................................................... 12

    Common Predictor Hypothesis .................................................................................................... 15

  FRIENDSHIP NETWORK DYNAMICS .............................................................................................. 18

  PRESENT STUDY ............................................................................................................................... 19

CHAPTER 2: DATA AND METHODS ...................................................................................................... 21

  RESEARCH HYPOTHESES .............................................................................................................. 21

  PARTICIPANTS ................................................................................................................................. 21

  PROCEDURES ................................................................................................................................. 22

  DATA ANALYSIS PLAN .................................................................................................................. 25

CHAPTER 3: RESULTS .......................................................................................................................... 31

  OLS AND LOGISTIC REGRESSION TESTS ...................................................................................... 31

  SIENA-BASED MODELS .................................................................................................................. 34

CHAPTER 4: DISCUSSION, IMPLICATIONS, AND FUTURE DIRECTIONS ............................................. 38

REFERENCES ........................................................................................................................................ 45
LIST OF TABLES

Table 1
Descriptive Information for Network and Behavioral Variables 23

Table 2
Testing Three Hypotheses of Friendship-Victimization Dynamics using Regression Models 31

Table 3
Common Predictors (Controls) Across All SIENA-based Models 34

Table 4
Testing Three Hypotheses of Friendship-Victimization Dynamics using SIENA 35
Acknowledgements

I would like to thank my advisor, Scott Gest, for his guidance and support at every step through this thesis process, from picking a topic, to learning SIENA, to providing the data for me to use. I would also like to thank Kelly Rulison and Lauren Molloy for their help and guidance in using SIENA, including the preparation of certain data files for use with the program as well as their support in narrowing down model parameters and meanings. In addition, I would like to thank Wayne Osgood for his support, including sending me to the KU Stats Kamp summer course on SIENA, and Dana Mitra for her helpful advice and valuable input on my master’s committee.

Finally, I would like to thank my parents and friends for their unwavering support throughout my academic career.
Chapter 1: INTRODUCTION

Peer victimization among pre-adolescent and adolescent youth is a significant and pervasive issue that is associated with many negative outcomes. Nearly 32% of American youth report being victimized by their peers during a given school year (National Center for Educational Statistics, 2009). At its most extreme, peer victimization has been shown to be one of the most common factors leading to the string of school shootings that inundated the 1990s (Leary et al., 2003). Though only few victimized youth might be at risk for such extreme retaliation, in general, victimization is linked to increases in internalizing behaviors including depression and suicidal ideation, social problems including social anxiety disorders, and decreased academic functioning that can persist through adulthood (Hawker & Boulton, 2000; Ledley et al., 2003; Rigby, 2001; Nansel et al., 2001). In the United States, schools and policy-makers have recognized the potential negative consequences of peer victimization and have enacted both school- and state-level anti-bullying policies as well as prevention programs in order to combat the issue. Yet, even as more focus is put on peer victimization, the risk factors leading to victimization are not fully understood. Additionally, as part of youths' social worlds, victimization’s relation with other components of peer relationships, including friendships, needs to be further explored.

The research surrounding victimization has often focused on two etiological questions: what is it about victims that leads to peer victimization; and, what protective and risk factors exist in victims’ environments that potentially moderate individual factors (Rodkin & Hodges, 2003)? A recent focus of many victimization studies
surrounds a common observation that victimized youth have fewer friendships than non-victimized peers (Bukowski, 2001; Hodges, Malone, & Perry, 1997; Smith, Shu, & Madsen, 2001; Smith et al., 2004). Friendships serve an increasingly important role in adolescence, as friends exert more influence over behavior and choices (Wentzel & Battle, 2001). Understanding why victimized youth have fewer friends thus becomes an especially important consideration for understanding victimization. Several theories have been proposed surrounding this dynamic, and each has at least some empirical support, yet these hypotheses have rarely been considered in tandem. Further, none of the existing studies directly considers other characteristics related to the social network that have been shown to impact the friendships beyond individual characteristics (Steglich, Snijders, & Pearson, in press). This thesis explores three hypotheses surrounding friendship and victimization dynamics using an actor-oriented networking model able to model both the behavioral development of victimization and friendship formation while controlling for other network dynamics.

**Prevalence and Impact of Victimization**

Peer-victimization refers, for purposes of this paper, to victimization as a result of aggressive behaviors, more commonly referred to in the research literature as bullying (Olweus, 1993). These behaviors often include minor physical aggression (pushing, shoving, hitting), verbal aggression (teasing, name-calling), or relational aggression (social exclusion, rumors, negative body language). Though peer-victimization may also refer to incidents of physical- or sexual- assault, these are not included in the scope of this paper.
The most recent National Center on Educational Statistics’ (NCES) Indicators of School Crime and Safety (2009) reported that during the 2007-2008 school year, nearly 32% of participants in a nationally representative sample of middle and high school students reported being victims of bullying at any point during the school year. Sixteen percent of participants reported being bullied on a regular basis, either daily or once or twice a week. These numbers have continually increased since NCES began collecting such indicators in the late 1990s.

Peer-victimization among pre-adolescent and adolescent youth has been associated with several negative outcomes both concurrently and through the life-course. In a nationally representative student self-report survey, being bullied was related to increased tobacco usage, low school engagement, and lower academic achievement (Nansel et al., 2001). Chronically rejected and victimized students were also found to be more likely to later perform poorly in academics, avoid school, and decrease participation in classroom setting, in prospective longitudinal studies (Buhs, Ladd & Herald, 2006; Woods & Wolke, 2004). Victimization has also been linked to internalizing problems and interpersonal difficulties, including depression and social anxiety disorder (Hawker & Boulton, 2000; La Greca & Lopez, 1998; Storch & Masia-Warner, 2004; Walker, 2000; Walters & Inderbitzen, 1998). The direction of the relation between internalizing behavior and victimization is somewhat unclear, however. As will be discussed later in this review, internalizing behaviors have been shown to be both antecedents and consequences of victimization (Hodges & Perry, 1997). The vast majority of evidence surrounding this evidence is cross-sectional and correlational. Some longitudinal work has suggested that internalizing behaviors do increase after victimization (Egan & Perry,
1998), however additional longitudinal work is needed to understand the direction of this relation. Still, in a meta-analysis of research on bullying and victimization conducted prior to 1997, Hawker and Boulton (2000) conclude that there is substantial evidence that chronic victimization is associated with prolonged feelings of loneliness, depression, generalized anxiety, social anxiety, lower global self esteem, and lowered social self competence.

These outcomes are found not only within the years immediately following victimization, but persistent well beyond the duration of victimization. College students who recalled being bullied in childhood, in a study by Ledley and colleagues (2003), were more likely to have difficulty in their current interpersonal relationships, show anxious attachment style in relationships and have lower self esteem. As with all retrospective studies, caution is needed when interpreting these findings, as these differences may have occurred prior to victimization and may have elicited that victimization. Simarly, Rigby (2001) found that victimization significantly predicted lower general health and higher health complaints three years after the victimization was measured, even after controlling for current victimization and prior health status.

Many researchers have linked victimization to suicidal idealization (Olweus, 1993; Rigby, 2001) and extreme retaliation (Leary et al., 2003). Leary and colleagues, in their analysis of fifteen school shootings in the United States during the 1990s found that, in at least twelve cases, there was clear and consistent evidence that the school shooters were victimized by their peers. This has recently been debated, at least in the case of Columbine, by other investigators (see Cullen, 2009), however victimization continues to be one of the only common threads through most of the school shootings of the 1990s.
(Department of Education, 2002). It is important to note here that these outcomes are rare and certainly not the norm for the vast majority of victimized youth. However, the shock factor and broader social impact of these outcomes has contributed to the growth in interest, policies, and prevention programming that emerged in the past two decades (Limber & Small, 2003).

Understanding the causal risk factors associated with victimization, and using this information to develop prevention programs to combat victimization, is therefore essential in promoting the general health, well-being, and safety of school-aged youth. Yet, current research surrounding victimization is often focused on the outcomes of victimization rather than risk factors. Further, the research that does address risk factors for victimization is often conflicting. For example, a well-replicated finding is that victimized youth have fewer friends than non-victimized youth. Several different theories have emerged to explain this phenomenon, but many current bullying prevention programs frame their approaches and theories of change on the directionality implied by one of these theories, without regard for other possibilities (see for instance the Sheffield project, Smith & Sharp, 1994). Establishing a broader scientific understanding of the role friendship dynamics in victimization is critical for the development of effective bullying prevention programs.

**Friendship and Social Adjustment**

Adolescent friendships are a primary and important context in the lives of youth. As parts of the social domain, victimization and friendship are inherently linked by their reliance on the actions of peers. The normative role of friendship in adolescents’ lives is thus important to understand in order to frame how friendship and victimization interact.
There are several components of the friendship relationship in pre-adolescence and adolescence, and a large body of research exploring each. As this paper focuses on the relation between victims and the friendship relationship, this section will focus on the normative importance of friendship. Of course, there are several potential negative outcomes from friendship, including peer influence towards deviant and destructive behavior (Dishon & Owen, 2002). I focus instead on why having friends, regardless of their behavior, is important in the lives of pre-adolescent and adolescent youth and is a normative component of adolescent development.

Friendship is an instinctive and fundamental component of normative human development (Bukowski, 2001). Both ancient and modern philosophers alike, including Aristotle (nd./1986) and Derrida (1997) premise that friendship and its converse, betrayal, are the greatest influences in human life. Friendship is evident in even the youngest children. Within the first two years of life, toddlers show the basic premises of friendship—preferences for certain peers and differentiation of behaviors between different peers (Howes, 1989). The friendship relationship continues to develop through childhood and, as youth transition from childhood to adolescence, friends become increasingly important to overall social development (Wentzel & Battle, 2001).

The friendship relationship serves a unique and distinctive role for youth, unlike relationships with family, teachers, or romantic partners. Bukowski (2001) outlines three unique functions the friendship relationship has for youth. First, friends serve as mirrors and reinforcers for the development of self-identity, perspective taking, and compassion. The parental and familial relationship, he argues, is by definition hierarchical and automatic—parents must love their children. As such, the friendship relationship
necessitates an understanding of how to attract and care for others, preparing youth for general social functioning. That is, beyond the friendship relationship itself, youth learn how to achieve their goals without alienating others around them.

Second, friendship provides a learning environment in which youth can challenge each other to enhance cognitive functioning beyond what is provided by teachers, parents, or non-friend peers. Youth are better able to internalize criticism from friends than non-friends, and show greater growth from such exchanges. Friends have been shown to provide better scaffolding than non-friends, resulting in greater academic achievement (Azmitia & Montgomery, 1993).

Bukowski (2001) further argues that friends introduce each other to new cultures and bring to the relationship their own experiences from which their friend can learn. Again, these experiences can be positive—such as a broader understanding of a different race or ethnicity—or negative—such as a culture of deviancy. Still, these relationships provide youth with a broader understanding of the social world around them. Friends can influence each other on everything from fashion choices to career paths.

The friendship relationship promotes, enhances, and grows social adjustment in youth, but at the same time, many researchers use having friends as an indicator of social adjustment (Hartup & Stevens, 1997). This means that friendship presents a paradox: you need good social skills to make and keep friends, but you need friends to develop strong social skills. This implies that if you do not have friends at one point, you will be at a disadvantage in developing the skills to have friends later; and, that if you have low social skills you are at a disadvantage in forming new friendships. The two are inherently correlated and bidirectional.
Similarly, there are a number of studies that show that having friends in middle childhood and adolescence is associated with less maladjustment in adulthood, including clinical referral for psychological services as well as job, familial, and academic success (Bagwell, Newcomb, & Bukowski, 1996). Hartup & Stevens (1997) theorized that friends act as a buffer from life’s emotional stress that might otherwise lead to such problems. Ladd and Burgess (2001) argued that there is a linear relationship with number of close friends and psychological health. It is clear, then, that friendship in middle childhood and adolescence is important, and its absence may be detrimental (Ladd & Burges, 2001; Rubin, Burgess, & Coplan, 2002). Thus, just as victimization puts individuals at risk for negative outcomes, so, too, does lack of friendship.

**Friendship and Victimization**

Several studies focused on friendship and victimization demonstrate that victimized youth tend to have fewer close friends than non-victimized youth and report lower friendship quality with the friends they have. The evidence is built on several studies, using various forms of methodology including self-report, peer-nominations, and observation/ethnography (e.g. Bukowski, 2001; Hodges, Malone, & Perry, 1997; Smith, Shu, & Madsen, 2001; Smith et al., 2004). The differences in number of friends that emerge are often small but significant, and are highly dependent on the methodologies used. For instance, Smith, Shu, and Madsen found that victimized youth had, on average, half a friend fewer than their non-victimized peers. Many studies do not report the descriptive statistics surrounding this difference, however, and only report a significant association between number of friends and victimization (Boulton, 1999; Hodges, Malone, & Perry, 1997).
Theories surrounding friendship and victimization dynamics and have generally been associated with one of three general hypotheses. Some argue that friendships serve as a protective factor for children, reducing their risk of victimization (Boulton et. al, 1999). This “friendship protection” hypothesis has the most support in the literature, and has served as the basis for many peer-support and befriending victimization interventions (Cowie et al., 2002; Dellasega & Adamshick, 2005; Naylor & Cowie, 1999). Others argue that victims may have friends at the onset of victimization, but that those friends break their friendship ties to victims as a means of self-preservation (Bukowski & Sippola, 2001). This “self preservation” hypothesis has not been studied extensively, but it is well defined from a sociological perspective (Simmel, 1904). Still others argue that both peer-victimization and friendlessness are related to individual internalizing and self-withdrawing behavior. This “common predictor” hypothesis suggests that lowered self worth precedes and predicts both increased victimization and fewer friendship ties. Each of these hypotheses, and the literature supporting them, are detailed in the sections below.

Friendship Protection Hypothesis

The Friendship Protection Hypothesis (coined by Boulton et al., 1999), asserts that having friends protects youth from victimization. In other words, a lack of friendship puts youth at risk for victimization. Friends are able to moderate other risk factors including provocative behaviors by standing up for and defending the targeted child, preventing prolonged victimization (Hodges, Malone, & Perry, 1997). This relationship is argued to be the most protective for the most vulnerable youth and has therefore become the basis for several bullying and victimization interventions (Cowie et al., 2002; Dellasega & Adamshick, 2005; Naylor & Cowie, 1999), which have been argued to be the most efficacious of those bullying interventions currently available.
This hypothesis has been based on a large body of research establishing that those with friends are less likely to be victims, both concurrently and longitudinally. In the most direct study of this hypothesis, Boulton and colleagues (1999) used a same-year longitudinal study of early adolescents (Mean age=11.3) in the United Kingdom to demonstrate that those with at least one reciprocated friend were less likely to be nominated by peers as victimized at a later wave. Boulton and colleagues asked each participant to name their “very best friend” and name classmates who fit four victimization items. Victimization scores were computed by calculating the number of nominations each child received for any of the four items divided by the total number of nominations made. Reciprocated friends represented those who named each other as their “very best friend.”

Victimization nominations increased between time 1 and time 2 for those without a reciprocated friend, but decreased for those with a reciprocated friend. The protective nature of friendships seemed to persist even after friendships were lost. Those with a reciprocated friend at time 1 were less likely to be nominated as a victim at time 2, regardless of friendship at time 2, and those who gained a friend at time 2, but did not have a friend at time 1, were still more likely to be nominated as a victim at time 2. Boulton and colleagues argued that this “inoculating effect” (pg. 465) indicated that having friends in the recent past still provides protection from victimization. This effect might, however, represent a reputation effect rather than an effect from friendship, since Boulton and colleagues operationalized victimization as percentage of classmates recognizing each individual as a victim, and this percentage remains statistically
unchanged for the friend at Time 2 only group. It is likely that should those late friendships continue over a longer time span, victimization nominations would decrease.

Boulton et al. operationalized the friendship protection hypothesis with a discreet categorical variable (“has a reciprocated friend” versus “does not have a friend”), but others have demonstrated a direct, negative linear relationship between number of friends and victimization. Hodges, Malone and Perry (1997) found a correlation of $r = -.47$ for victimization and number of reciprocated friendships using a cross-sectional study involving proportion of peer-nominated victimization and three same-sex friendship nominations. Though friendship nominations were also restricted in the study by Hodges and colleagues, they were able to demonstrate that protection from friends is likely additive.

Other research suggests that the victimization status of friends likely determines their protective ability. For example, Pelligrini, Bartini, and Brooks (1999) found a significant negative correlation between number of friends and victimization ($r = -.45$), but they only found this relation for non-victimized friends. Having victimized friends had a non-significant positive correlation ($r = .24, ns$) with victimization in this cross-sectional study.

Many have argued additionally that simply having friends is not enough to provide protection for victims. Rather, friendships must be “high quality” or come from peers who are viewed as capable of protecting victims, either through high social status or physical dominance (Malcolm et al., 2006; Schmidt & Bagwell, 2007). Malcolm and colleagues, for instance, in a study of victimization and same-sex friends, found that perception of overall friendship quality had a stronger linear relationship with
victimization than raw number of reciprocated friends. Still, even when friendship quality was entered stepwise into their regression equations, the effect for number of reciprocated friends remained significant, implying that though friendships with higher quality provide perhaps more protection, simply having friends provides protection in and of itself.

Similarly, Boulton and colleagues (1999), in their study described above, tested whether perceived conflict and betrayal in reciprocated best friendships accounted for some of the variance the relation between that friendship and future victimization. Entering the self-reported betrayal score stepwise, they found a significant relation between the conflict and betrayal scores and victimization for those with reciprocated best friendships, indicating that friendships low on conflict and betrayal had greater protective benefits. Both terms for reciprocated friendship and betrayal score were significant, but adding the betrayal term represented only a small change in variance explained--an $R^2$ change of .05. Boulton et al. therefore concluded that regardless of the characteristics of a reciprocated friendship, its existence protected youth from victimization over time.

In sum, the Friendship Protection Hypothesis has a good deal of emerging support for its premise that friendships, specifically those from non-victimized peers, protect youth from victimization. This hypothesis does not address, however, why victims have fewer friends.

_Self Preservation Hypothesis_

The Self-Preservation Hypothesis consists of two components. It posits that (1) friendships with victimized youth increase risk for victimization and therefore (2) non-victimized youth sever friendships with victimized youth as a means of self-preservation.
This does not necessarily contradict the premises of the Friendship Protection Hypothesis, but merely further explains friendship and victimization dynamics beyond the role of friends in the lives of victimized youth.

Bukowski and Sippola (2001) argue that friends move away from victimized youth in order to preserve their standing in the social network. From a sociological perspective, victimization impacts not only the individual but the entire social network, particularly the part of the network most connected to an individual -- the individual's subgroup. Individuals who are not conforming to certain goals of the subgroup are forced out through active isolation, of which victimization is a part. The targeted child is made an example of in order to maintain the boundaries of groups and maintain and define the goals and norms of those groups (Simmel, 1904). Thus, any individual still connected to a victim is theoretically at risk of losing status in the group, since the victim is not a part of the group and is a symbolic representation of what the group is against. Regardless of the individual characteristics of the members within the group, uniting against a victim gives solidarity to the group, and thus maintains status for each member of the group. In other words, any member who maintains ties to a victim is, too, breaking the norms of the group, and is thus at risk for victimization.

There is very little evidence regarding whether being friends with a victimized youth increases risk of victimization. Crick and Nelson (2002) demonstrated that having victimized friends is stressful and dissonant, and could itself lead to friends' internalizing and externalizing behaviors, but friends’ own victimization status and change in friendship ties were not part of this study. There is limited evidence that having victimized friends leads to victimization and, conversely, that victims having non-
victimized friends are more likely to be pulled back into the social group. Browning, Cohen, and Warman (2003) found, for instance, that youth identified as victims at year 1 of their two-year longitudinal study were more likely to become non-victims at year 2 if they had a greater proportion of non-victimized friends. Unfortunately, Browning, Cohen, and Warman did not find that “became victims,” or youth who were not victimized at time 1 but became victimized by time 2, had a greater proportion of victimized friends than “never victims.” Similarly, Mouttapa and colleagues (2004) also did not find a significant relationship between friends’ victimization and likelihood of becoming victimized.

The second important component of the Self Preservation Hypothesis is that victimized youth do have friends at one point in time and lose them over time. This point is often overlooked in many considerations of the Friendship Protection Hypothesis, especially when friendship is dichotomized between having a friend and not having a friend. Yet, the vast majority of studies considering friendship and victimization find that though victimized youth have fewer reciprocated friends, their mean number of friendships is not zero (Mouttapa et al., 2004; Pelligrini, Bartini, & Brooks, 1999 Smith, Shu, & Madsen, 2001; Smith et al., 2004). In fact, Mouttapa and colleagues found that though victimized youth received fewer friendship nominations, the proportion of those that are reciprocated was not different from non-victimized youth. This suggests that victimized youth have the same underlying desire for friendship (i.e., the same tendency to reciprocate friendship nominations) but may not have the opportunity to achieve it, based on the friendship choices and preferences of their peers.
The empirical literature surrounding the Self-Preservation Hypothesis is limited. Many studies exploring this hypothesis focus on victimization’s impact on friendship formation as opposed to, or in addition to, friendship’s impact on victimization (Ellis and Zabartany, 2007; Mouttapa et al., 2004). In one such study, Ellis and Zabartany (2007) used a two wave same year longitudinal study to predict friendship stability, instability, and formation in relation to victimization and aggression. Considering only those participants who had at least one reciprocated same-sex friend at time 1 and who gave nominations at time 2, victimized girls with a high proportion of non-victimized friendships at time 1 had lower friendship stabilities than non-victimized girls and both victimized and non-victimized boys. Ellis and Zabartany do not specify, however, at which time point victimization classification was determined and whether they considered change in victimization status in their analyses. Still, this study demonstrates that friendship is, at least for girls, dependent on victimization status, and that victims tend to lose friends over time.

Thus, the Self-Protection hypothesis still remains largely untested and requires additional empirical analysis to test both components.

Common Predictor Hypothesis
The Common Predictor Hypothesis argues that the association between friendship and victimization is not causal, and that both a diminished number of friendships and victimization are likely driven by the same underlying characteristic of the victim, mainly low self worth and internalizing behavior. As Hodges and Perry (1997) posited, youth with low self worth may attract victimization because they are easily provoked and often do not have the skills to resist such harassment. Victimization subsequently lowers their
already diminished sense of self, inviting additional victimization, creating a “vicious cycle.”

Support for lowered self worth and internalizing behavior preceding victimization comes from a study by Schwartz, Dodge and Coie (1999), in which they randomly assigned groups of previously unfamiliar African-American pre-adolescent boys to play together over the course of three sessions. Using an observation system where observers coded interactions between the participants, Schwartz, Dodge, and Coie found that youth who were observed to be socially withdrawn and timid during the first play session were more likely to be victimized by the other participants at subsequent sessions. Further, those who were rated as socially withdrawn were less likely to have meaningful, positive, interactions with other participants. Because the boys had no prior history together, Schwartz, Dodge, and Coie were able to conclude that victims’ socially withdrawn behaviors elicited peers’ rejection and harassment.

This hypothesis has also been tested through several cross-sectional and longitudinal quasi-experiments. Egan and Perry (1998) found, for instance, that 3rd through 7th grade youth who reported low self-regard on Harter's (1982) global and social subscales were at risk for increases in peer nominated victimization. Using the same measures with a sample of third through fifth graders over two school-years, Browning, Cohen and Warman (2003) used discriminant function analysis based on the social self-concept subscale at both time points to place participants into one of four groups: never victimized, became victimized, discontinued victimized, and always victimized. The discriminant function was significant and successfully classified 83.9% of participants into their correct groups. “Always victims” tended to have lower social self-concepts at
both time points and “became victims” had lower social self-concepts at time 1 than did “never victims”.

Dill and colleagues (2002) similarly theorized that social withdrawal and internalizing behaviors explain some of the relation between victimization, friendlessness, and negative affect. Using self-reported victimization and teacher-reported social withdrawal over a two-wave longitudinal study, Dill and colleagues found strong support that social withdrawal explained at least part of the relation between victimization and fewer friends. Additionally, they found that victimized youth at time 1 had lower reports of social withdrawal at time 2, supporting the theory that internalizing behaviors are both an antecedent and consequence of victimization.

In perhaps the most direct test of this hypothesis, Bukowski and Sippola (2001) demonstrated that passive withdrawal, or self-isolation, is significantly and positively related to increases in active isolation, or peer exclusion behaviors, and victimization over time. Active isolation was defined here as exclusion, but it is at least plausible that the same finding would be obtained with regard to friendship behaviors. Rubin, Burgess, and Coplan (2002) in fact defined withdrawal as self-isolation, and they proposed that socially withdrawn children have few to no friends. Further, they argued that social withdrawal is characterized by low self-worth and low social self-concept, emerging at early childhood and staying relatively stable through childhood and adolescence.

This is not to say that being socially withdrawn renders children incapable of making friendships. It may be the case that if a withdrawn youth has a friend, that friend may still play a protective role. In this way, then, the Common Predictor hypothesis is not necessarily incompatible with the Friendship Protection hypothesis. Hodges, Bovin,
Vitaro & Bukowski (1999) found, in fact, that though internalizing behaviors significantly predicted increases in victimization over time, but only for those who lacked a reciprocated friendship. Schmidt and Bagwell (2007) similarly found that friendship quality moderated the relationship between victimization and social concerns for girls. Those with high friendship quality had a non-significant association between social concerns and victimization, but those with lower friendship quality had a significant association. Though friendship quality was self-reported, and number of friends was not controlled for, Schmidt and Bagwell argued that having a friend moderates the risk posed by being uncertain in the social world. This moderation has not been found to be the case in all studies, however. Bollmer, Milich, Harris, and Maras (2005) found that higher internalizing problems were strongly related to more frequent victimization and that relationship was not moderated by friendship quality. Here, there was no difference in the association between internalization and risk for victimization regardless of the quality of friendship. Importantly, in each of these studies, friendships and friendship quality were not predicted by the internalizing behavior. It may be the case that those with the highest levels of internalizing behaviors cannot get the benefit of friendship because their drive for self-isolation is so high. Still, it is important to note here that internalizing behavior interacts with friendship protection.

**Friendship Network Dynamics**

Each of the three hypotheses relating friendship and victimization make two fundamental assumptions about the nature of friendship dynamics. First, each hypothesis assumes that individuals *select* their friends based on any number of characteristics (e.g. their victimization status or their display of internalizing behaviors). Second, each
hypothesis assumes that individuals are *influenced* by the characteristics of their friends. Further, these processes are assumed to occur at the individual level, and are often assumed to happen independently of the choices and changes of other members of the social network.

Yet, as Steglich, Snijders, & Pearson (in press) demonstrated, networks operate in specific and systematic ways. Networks tend to move towards states of structural balance, in which there exists high levels of reciprocity (i.e., the tendency to reciprocate friendship nominations made by others) and high levels of transitivity (i.e., the tendency for friends of friends to become friends). In cases of unbalance (e.g., a friendship tie is not reciprocated) the drive for stability in the network will contribute to whether that tie gets reciprocated or dissolved. These structural network forces, or forces beyond the individual, are numerous and can involve several different combinations of patterns that drive friendship choices above and beyond the characteristics of individual members of the network. Though it is beyond the scope of this paper to go into detail about each of these combinations, a full review is available in Steglich, Snijders & Pearson (in press).

Any model involving friendship tie formation and dissolution must thus take into account the non-independent nature of those choices. Typical regression-based models assume independence of actors (Howell, 2006) and as such cannot represent the evolving contexts of friendship formation in a network setting.

**Present Study**

The present study contributes to the existing literature in two important ways. First, it uses a longitudinal dataset consisting of four waves of 6th and 7th grade data. This dataset additionally is unique to any of the studies reviewed above because it allows
participants a relatively unrestricted number of friendship nominations and does not restrict friendships to only be between same-sex participants. Previous explorations into this dataset suggest that victimized youth might in fact have more cross-sex ties than non-victimized youth (Temkin, Gest, & Rulison, 2008). This thus allows a broader, less restricted understanding on the nature of friendships among victimized youth.

Second, this study models each proposed hypothesis in the context of broader friendship network dynamics, testing the contributions of each hypothesis to a larger understanding of the dynamics of friendship and victimization. This is done in both a standard regression format as well as utilizing recent advancements in network modeling that account for exogenous network forces on friendship formation and dissolution as described above. These network models additionally allow me to utilize the power from all four waves of data to model the less frequently occurring victimization behavior, allowing me to better detect potential relationships.

Together, these unique features of the data set and the network-sensitive approach to modeling all three hypotheses simultaneously should provide a stronger empirical foundation for the development of victimization prevention efforts that depend of friendship and peer components.
Chapter 2: DATA AND METHODS

Research Hypotheses

Drawing upon the literature reviewed above, this paper tests three hypotheses regarding the relation between youths' friendships and their experiences of victimization:

*H1: Friendship Protection.* There is a negative linear relation between number of reciprocated non-victimized friends and likelihood of victimization. Youth with several reciprocated friendships with non-victimized classmates are less likely to be victimized by peers over time than are youth who have one or fewer such friendships.

*H2: Self-Preservation.* Youth who name victimized classmates as friends are more likely to become victimized over time; and youth will be more likely to discontinue their friendships with victimized classmates than their friendships with non-victimized classmates.

*H3: Common Predictor.* Victimization and fewer friendships are predicted by a common individual attribute, social self-concept, such that those with lower social self-concept will name fewer friends and those with lower social self-concept are more likely to become victimized over time.

Participants

Participants were drawn from two consecutive middle school cohorts from a single middle school, serving a small, working-class community in the northeastern United States. Participants entered 6th grade in either the Fall of 2003 (n=167) or 2004
(n=156), and were followed through the Spring of 7th grade. Between 90 and 93% (n=145-150) of students received parental consent and completed the survey at wave 1. Parental consent was solicited for new students at each wave of assessment, allowing students moving into the middle school during the assessment period to be included. The current sample represents participants who completed the survey during at least one wave of assessment (n=171 cohort 1, n=162 cohort 2). Breakdowns of the number of students at the school and in our sample by assessment period are detailed in Table 1.

Nearly all students in our sample school were Caucasian (99%), consistent with the demographics of the community served by the school. The sample consisted of slightly more boys (53.8%) than girls (46.2%).

**Procedures**

As part of a larger investigation of youth peer relations and school adjustment, participants completed several items regarding their friendships, self-ratings, and peer nominations. Participants were asked to fill out the survey during the Fall (October) and Spring (May) of both sixth and seventh grade. Items used for the current analyses are described below. Means and SD for each measure are reported in Table 1.

*Friendships.* Participants were prompted to list the names of friends in their grade. There were no restrictions on the number of friends to be listed, but the survey form contained 10 distinct spaces, so most youth named no more than 10 friends. Participants were not given a roster of students to select from. This information was used in conjunction with victimization status (see below) to calculate the number of reciprocated victimized friends and the number of reciprocated non-victimized friends. Friendship
nominations were additionally compiled into adjacency matrices for use with the SIENA-based models described below.

*Victimization.* Participants were prompted to nominate an unlimited number of their grade-mates who matched each of two behavioral descriptors: “who gets hit or pushed a lot” and “who gets picked on a lot.” Students receiving two or more nominations on either item were classified as victims. Across the four assessments, the percentage of students classified as victims ranged from 12% to 20%, Mean = 16%. These percentages are similar to those obtained in surveys of a nationally representative sample of 6th and 7th grade students in the 2004-2005 school year (National Center for Educational Statistics, NCES, 2007): in that study, 18.1% of 6th during that grade graders and 14.2% of 7th graders reported being victimized at least once or twice a week.

*Social Self-Concept.* Participants were asked to complete items from the Self Perception Profile for Children (Harter, 1982) to assess social self-concept. Students chose which of two statements was more true for them, then indicated whether the statement was “sort of true” or “really true”. Each item was thus scored on a four-point scale, with “really true” of either statement representing either 1 or 4. The items included in this scale were: find it easy to make friends; have lots of friends; feel that most kids like them; popular with others their age. This scale has strong reliability (α = .86) with means across the four waves of assessments ranging from 3.37-3.53 for non-victimized youth and 2.91-3.25 for victimized youth.
### Table 1
Descriptive Information for Network and Behavioral Variables

<table>
<thead>
<tr>
<th>Summary of Survey Participation</th>
<th>Cohort 1</th>
<th>Cohort 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6th Grade</td>
<td>7th Grade</td>
</tr>
<tr>
<td></td>
<td>Fall</td>
<td>Spring</td>
</tr>
<tr>
<td>Total N in School (All Students)</td>
<td>167</td>
<td>171</td>
</tr>
<tr>
<td>Total N in School (Current Sample)</td>
<td>164</td>
<td>167</td>
</tr>
<tr>
<td>Total N Completing the Survey</td>
<td>150</td>
<td>153</td>
</tr>
<tr>
<td>% who Completed the Survey</td>
<td>0.90</td>
<td>0.89</td>
</tr>
</tbody>
</table>

### Network Characteristics

<table>
<thead>
<tr>
<th>Density</th>
<th>0.05</th>
<th>0.05</th>
<th>0.05</th>
<th>0.05</th>
<th>0.06</th>
<th>0.06</th>
<th>0.06</th>
<th>0.06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Number of Nominations</td>
<td>9.23</td>
<td>9.16</td>
<td>9.05</td>
<td>9.01</td>
<td>9.68</td>
<td>10.09</td>
<td>9.49</td>
<td>9.60</td>
</tr>
<tr>
<td>Number of Friendship Ties</td>
<td>1303</td>
<td>1311</td>
<td>1279</td>
<td>1297</td>
<td>1273</td>
<td>1290</td>
<td>1335</td>
<td>1297</td>
</tr>
<tr>
<td>Missing Fraction</td>
<td>0.17</td>
<td>0.16</td>
<td>0.17</td>
<td>0.16</td>
<td>0.19</td>
<td>0.21</td>
<td>0.13</td>
<td>0.17</td>
</tr>
</tbody>
</table>

### Behavioral Characteristics

| Total Number Victims | 28  | 28    | 25   | 33    | 20  | 25    | 21   | 19    |
| % Victims            | 0.17| 0.17  | 0.15 | 0.20  | 0.14| 0.17  | 0.14 | 0.12  |
| Average Number Non-Victimized Friends, Non-Victims | 3.52 (2.38) | 3.50 (2.37) | 3.47 (2.27) | - | 3.52 (2.13) | 3.68 (2.23) | 3.69 (2.38) | - |
| Average Number Non-Victimized Friends, Victims | 1.36 (1.31) | 1.50 (1.71) | 1.36 (1.22) | - | 2.10 (1.62) | 2.00 (1.68) | 1.29 (1.59) | - |
| Mean Social Self Concept, Non-Victims | 3.46 (0.72) | 3.40 (0.69) | 3.38 (0.71) | 3.53 (0.64) | 3.37 (0.69) | 3.37 (0.74) | 3.39 (0.72) | 3.46 (0.69) |
| Mean Social Self Concept, Victims | 2.92 (1.00) | 2.96 (0.90) | 2.92 (0.97) | 2.97 (1.01) | 3.25 (0.85) | 2.91 (1.02) | 2.90 (0.85) | 3.06 (1.06) |
Data Analysis Plan

To test the proposed hypotheses, I first used a series of ordinary least squares and logistic regressions to replicate findings from the existing literature. Then, I used the Simulation Investigation for Empirical Network Analysis Package (SIENA, Snijders et al., 2007) in R (RSienaTest v. 1.1.10), as described below, to model each hypothesis separately, and together, while controlling for well-established systematic network closure and selection dynamics that are not taken into account by approaches based on the general linear model.

General Linear Model approaches

Friendship Protection. A logistic regression predicting spring victimization (1=victimized) from fall victimization and number of non-victimzed reciprocated friends (NVRF) was run to test the Friendship Protection Hypothesis (i.e., whether friendship protects youth from victimization).

Self Preservation. Two types of regression models were run to test the two components of the Self Preservation Hypothesis. First, to test the premise that friends of victimized youth discontinue those friendships, two OLS regressions were run -- one for each school year -- predicting NVRF at the spring assessment from victimization status at Fall assessment while controlling for number of NVRF at fall assessment. Second, to test the premise that those who remain friends with victims are more likely to become victimized, two logistic regressions were run, predicting Spring victimization from number of victimized reciprocated friends (VRF) at Fall assessment while controlling for Fall victimization.
Common Predictor. The Common Predictor Hypothesis was also modeled by two types of regression models. First, to test the theory that those with low social self-concept (SSC) self-isolate, an OLS regression predicting individuals’ Spring out-degree, that is the number of friendship nominations made, from Fall outdegree and Spring SSC. Second, to test the premise that those with low SSC are more likely to be victimized, a logistic regression was run predicting Spring victimization from Fall victimization and Fall SSC.

Combined Model. A combined logistic regression was run predicting Spring victimization from each of the predictors previously modeled for each of the three hypotheses: NVRF (Friendship Protection), VRF (Self Preservation), and SSC (Common Predictor) while controlling for Fall victimization. Though this model does not capture elements of both the Self Preservation or Common Predictor hypotheses, this model provides an initial indication of how these hypotheses might work in conjunction with the others.

Simulation Investigation for Empirical Network Analysis (SIENA)

The SIENA modeling package (Snijders et al., 2007) allows for simultaneous modeling of longitudinal network changes with changes in behavioral dependent variables. Each observed network configuration and behavioral distribution is modeled through a series of “micro-steps” between each observation. At each micro-step, an individual actor in the network can move a single step on any of the dependent variables – the network or behavioral variables. At the network level, at each micro-step the individual can either make a new friendship tie, sever a friendship tie, or make no change.
At the behavioral level, at each micro-step the individual can move up or down one level or stay the same. The factors contributing to each individual’s movement on the network and behavioral dependent variables are the parameters specified for the model. In essence, each of these parameters represents the unique odds of an actor changing ties or changing behaviors based on the individual’s or the network’s value on that parameter. The parameter estimates produced by SIENA are not inherently comparable to one another, however, because scaling is based on the scaling of the covariate. Still, a significant parameter represents one that uniquely contributes to change in behavior or change in network.

SIENA provides two important advantages over standard regression or structural equation models. First, SIENA controls for network change due to network closure dynamics, which do not depend on the characteristics of the individuals within the network. For instance, SIENA is able to control for selection based on reciprocity (directed ties either become reciprocated or are broken) and transitivity (friends of friends tend to also become friends). Second, SIENA is able to account for the interdependence of individuals in a network. Any change in an individual’s network or an individual’s behavior will necessarily influence other individuals in the network. Other models cannot capture this influence and their underlying assumption of independence is violated (Steglich, Snijders, & Pearson, in press).

Since two of the three hypotheses have both a network and behavioral component, SIENA was the appropriate approach for modeling the three friendship and victimization hypotheses. The current version of SIENA (RSienaTest 1.1.10) additionally allows modeling of two networks simultaneously. This model assumes the same contributions
from each included parameter for both networks, but allows the rate of behavioral and network change to vary between networks. Modeling both networks simultaneously allowed me to garner needed power from both cohorts, while recognizing that rates of victimization varied between the cohorts. As with the basic regression models, each hypothesis was modeled separately, and then combined into a single model.

*Base Model.* Before testing any of my substantive hypotheses, a base model was constructed in order to control for dynamics of network closure, as well as influences on the network beyond the scope of the hypotheses. The parameters included in this model were determined through a collaborative process with others using this dataset, and were established through a series of theoretical discussions followed by model-comparison testing within SIENA (i.e., fixed score-testing of each individual parameter). All SIENA models must contain parameters for network outdegree, network reciprocity, rates indicating change between each period for network and behaviors, and distribution (shape) indicators for each behavior. All other parameters were first fixed at zero in the model and tested as to whether their parameter values would be significantly different from zero if added to the model. If a parameter was significant, it was added to the base model.

The resulting model contains rate terms for each cohort’s network, victimization, and SSC as well as distribution (shape) terms for each behavior in addition to parameters controlling for network closure, in-degree covariates, out-degree covariates, and homophily covariates. Network closure was controlled for by reciprocity as well as three terms modeling different forms of transitivity—transitive triplets, three-cycles, and balance. In-degree popularity controlled for the tendency for those with high in-degree
(number of nominations received) to attract more nominations (e.g. “the rich get richer”). Transition “ego”, or a dummy code representing the transition from 6th to 7th grade for every member of the model, controlled for any variation in number of nominations resulting from that transition. Finally, gender homophily controlled for the tendency for youth networks to be segregated by gender.

*Friendship Protection (Model 1).* In addition to the parameters modeled in the base model, the Friendship Protection Hypothesis was modeled by the addition of a parameter representing the influence on victimization from individuals’ NVRF.

*Self Preservation (Model 2).* To model part a of the Self Preservation Hypothesis – that victimized youth tend to not be selected as friends – a term representing victimization’s effect on in-degree was added. To model part b – that being friends with victimized youth influences one's own victimization – a term representing influence on victimization from individuals’ VRF was added. Based on advice from the developers of the SIENA program, terms for victimization’s effect on out-degree as well as homophily due to victimization were also added to stabilize the model.

*Common Predictor (Model 3).* To model part a of the Common Predictor Hypothesis – that victimized youth self isolate – a term for SSC effect on out-degree was added. To model part b – that SSC influences victimization – a term representing SSC’s effect on victimization was added. A term representing victimization’s effect on SSC was also added based on research indicating that victimized youth often display internalizing behaviors following victimization. Finally, SSC effect on in-degree and homophily based on SSC were added to the model for stability.
Combined Model (Model 4). The combined model incorporates all parameters described in Models 1, 2 and 3 in order to model the three hypotheses concurrently.
Chapter 3: RESULTS

OLS and Logistic Regression Tests

All results are reported in Table 2.

Friendship Protection. Logistic regressions predicting spring victimization (victim = 1) reveal statistically significant associations between number of reciprocated non-victimized friends (NVRF) in both 6th grade (β = -0.23, p=.02) and 7th grade (β = -0.40, p<.001). Consistent with the friendship protection hypothesis, these results indicate that each additional non-victimized friend decreases the odds of becoming victimized by about .8 at 6th grade and .7 at 7th grade.

Self Preservation. Ordinary least squares regressions predicting NVRF at Spring assessment reveal a statistically significant negative association with Fall victimization for both 6th (β = -0.94, p=.02) and 7th (β = -1.16, p<.001) grade, indicating that victimized youth lose friends from the Fall to the Spring. Logistic regressions predicting Spring victimization from number of reciprocated victimized friends (VRF) reveal a statistically significant association at 6th grade (β=0.61, p=.03) but not at 7th grade (β=0.25, p=ns). Each reciprocated victimized friend at 6th grade makes an individual 1.8 times more likely to become victimized.

Common Predictor . Individuals’ Spring outdegree, that is the number of friendship nominations made, was modeled as a proxy variable for self-isolation. Results indicate a modest concurrent association between Spring outdegree and Spring social self competence (SSC) for both 6th (β=0.42, p=.03) and 7th (β=.59, p=.005) grades indicating that outdegree is positively correlated with social self-concept. Those with low social self-concept thus make fewer friendship nominations.
Spring victimization was also predicted by Fall SSC through a logistic regression. Results for this association were mixed between 6\textsuperscript{th} and 7\textsuperscript{th} grades, with no association apparent at 6\textsuperscript{th} grade ($\beta$= -0.18, p=ns) and a modest association in 7\textsuperscript{th} grade ($\beta$= -0.62, p=.006). At 7\textsuperscript{th} grade, each scale point lower on SSC increases odds of victimization by .5.

**Combined Model.** A combined logistic regression was run in which all previously reported predictors of Spring victimization were run in a single model. NVRF (representing the Friendship Protection Hypothesis) remained significant for both 6\textsuperscript{th} ($\beta$= -0.33, p=.004) and 7\textsuperscript{th} ($\beta$= - 0.44, p<.001) grades. Neither VRF (a component of the Self-Protection Hypothesis) nor SSC (a component of the Common Predictor Hypothesis) emerged as significant, though VRF approached significance in the 6\textsuperscript{th} grade model ($\beta$=0.45, p=0.09) and SSC approached significance in the 7\textsuperscript{th} grade model ($\beta$= -0.41, p=0.07). This suggests that the friendship protection hypothesis maintains support even after the other hypotheses are concurrently modeled.
### Table 2
Testing Three Hypotheses of Friendship-Victimization Dynamics using Regression Models

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Sixth Grade</th>
<th>Seventh Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE</td>
</tr>
<tr>
<td><strong>Friendship Protection Hypothesis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring Victimization (victim=1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-1.70***</td>
<td>0.35</td>
</tr>
<tr>
<td>Fall Victimization</td>
<td>2.66***</td>
<td>0.39</td>
</tr>
<tr>
<td># of Reciprocated Non-Victimized Friends, Fall</td>
<td>-0.23*</td>
<td>0.10</td>
</tr>
<tr>
<td><strong>Self Preservation Hypothesis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring Non-Victimized Friends</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>1.57***</td>
<td>0.21</td>
</tr>
<tr>
<td># of Reciprocated Non-Victimized Friends, Fall</td>
<td>0.56***</td>
<td>0.05</td>
</tr>
<tr>
<td>Fall Victimization</td>
<td>-0.94**</td>
<td>0.31</td>
</tr>
<tr>
<td>Spring Victimization (victim=1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-2.64***</td>
<td>0.20</td>
</tr>
<tr>
<td>Fall Victimization</td>
<td>2.89***</td>
<td>0.31</td>
</tr>
<tr>
<td># of Reciprocated Victimized Friends, Fall</td>
<td>0.61*</td>
<td>0.27</td>
</tr>
<tr>
<td><strong>Common Predictor Hypothesis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring Friendship Nominations Made</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>3.39**</td>
<td>1.08</td>
</tr>
<tr>
<td>Fall Friendship Nominations Made</td>
<td>0.42***</td>
<td>0.07</td>
</tr>
<tr>
<td>Spring Social Self Concept</td>
<td>0.67*</td>
<td>0.31</td>
</tr>
<tr>
<td>Spring Victimization (victim=1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-1.73*</td>
<td>0.81</td>
</tr>
<tr>
<td>Fall Victimization</td>
<td>3.05***</td>
<td>0.40</td>
</tr>
<tr>
<td>Fall Social Self Concept</td>
<td>-0.18</td>
<td>0.23</td>
</tr>
<tr>
<td><strong>Combined Model</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring Victimization (victim=1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-1.58</td>
<td>0.87</td>
</tr>
<tr>
<td>Fall Victimization</td>
<td>2.63***</td>
<td>0.42</td>
</tr>
<tr>
<td># of Reciprocated Non-Victimized Friends, Fall</td>
<td>-0.33**</td>
<td>0.11</td>
</tr>
<tr>
<td># of Reciprocated Victimized Friends, Fall</td>
<td>0.45†</td>
<td>0.27</td>
</tr>
<tr>
<td>Fall Social Self Concept</td>
<td>0.03</td>
<td>0.25</td>
</tr>
</tbody>
</table>

*p < .1, *p < .05, ** p < .01, *** p < .001
**SIENA-Based Models**

All SIENA-Based models reported here successfully converged, indicated by t-ratios (i.e., the average iteration deviations divided by this standard deviation) being less than .1 in absolute value (Ripley & Snijders, 2009). A base model containing all network-closure and selection control variables as well as rate and shape (distribution) descriptive for each dependent variable was first established. This model is reported in Table 5. All parameters contained within this initial model are also present in each subsequent test model. Because these parameters did not vary to any significant degree, they are not reported.¹ As predicted, network closure effects (transitive triplets, three-cycles, and balance) are all significant in predicting network change (all p<.001) and the network is highly segregated by gender (p<.001). Table 6 reports SIENA parameter estimates for each of the three hypotheses.

**Friendship Protection (Model 1).** Friendship Protection was modeled with a changing covariate representing each individual’s number of non-victimized reciprocated friends effecting victimization. Entered in addition to the base control model, this parameter is negative and significant (p<.001) indicating that those with more non-victimized reciprocated friends are less likely to become victims.

**Self-Preservation (Model 2).** Both components of this hypothesis--selection away from victimized youth (represented as Effect on In-Degree, victimization) and influence of number of victimized friends --are significant (both p<.01) and in the predicted directions. The additional parameter of homophilic selection on victimization, which was added based on recommendations of SIENA developers and is not a direct part of the

¹ As with any modeling program that is dependent on iterations, estimates between models may vary slightly. None of the base model parameters changed more than .03 across models, and significance levels did not change for any of the parameters.
Self-Preservation Hypothesis, is also a significant predictor of network change (p<.001). This effect indicates that victimized youth are more likely to be friends with other victimized youth and, in parallel, non-victimized youth are more likely to be friends with other non-victimized youth.

*Common Predictor (Model 3).* The first component of the Common Predictor hypothesis, that those with low SSC self-isolate was not significant (p=ns). The second component, indicating that those with lower SSC are at increased risk for victimization was significant and negative (p<.01). Additionally, victimization effect on SSC was also significant and negative (p<.01), indicating those who are victimized subsequently have lower SSC.

*Combined Model (Model 4).* All parameters representing the components of both the Friendship Protection Hypothesis and the Self Preservation Hypothesis remain significant. Both parameters representing the Common Predictor Hypothesis are non-significant, but there is some indication of a trend for the effect of SSC on victimization, (p=.07), indicating that those with lower social self-concept may be at more risk for becoming victimized. Homophily due to victimization additionally remains significant in this model.
Table 3
Common Predictors (Controls) Across All SIENA-based Models

<table>
<thead>
<tr>
<th>Model Parameter</th>
<th>Est.</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rate Parameters</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Network Dynamics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rate: Fall - Spring 6th, cohort 1</td>
<td>4.10</td>
<td>0.92</td>
</tr>
<tr>
<td>Rate: Spring 6th - Fall 7th, cohort 1</td>
<td>5.03</td>
<td>1.36</td>
</tr>
<tr>
<td>Rate: Fall - Spring 7th, cohort 1</td>
<td>4.38</td>
<td>0.94</td>
</tr>
<tr>
<td>Rate: Fall - Spring 6th, cohort 2</td>
<td>5.38</td>
<td>1.38</td>
</tr>
<tr>
<td>Rate: Spring 6th - Fall 7th, cohort 2</td>
<td>6.94</td>
<td>1.80</td>
</tr>
<tr>
<td>Rate: Fall - Spring 7th, cohort 2</td>
<td>4.12</td>
<td>0.81</td>
</tr>
<tr>
<td>Outdegree Effect on Rate</td>
<td>0.16</td>
<td>0.03</td>
</tr>
<tr>
<td><strong>Victimization Dynamics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rate: Fall - Spring 6th, cohort 1</td>
<td>0.51</td>
<td>0.14</td>
</tr>
<tr>
<td>Rate: Spring 6th - Fall 7th, cohort 1</td>
<td>0.40</td>
<td>0.17</td>
</tr>
<tr>
<td>Rate: Fall - Spring 7th, cohort 1</td>
<td>0.78</td>
<td>0.25</td>
</tr>
<tr>
<td>Rate: Fall - Spring 6th, cohort 2</td>
<td>0.80</td>
<td>0.22</td>
</tr>
<tr>
<td>Rate: Spring 6th - Fall 7th, cohort 2</td>
<td>0.38</td>
<td>0.15</td>
</tr>
<tr>
<td>Rate: Fall - Spring 7th, cohort 2</td>
<td>0.61</td>
<td>0.22</td>
</tr>
<tr>
<td><strong>Social Self Concept Dynamics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rate: Fall - Spring 6th, cohort 1</td>
<td>1.00</td>
<td>0.21</td>
</tr>
<tr>
<td>Rate: Spring 6th - Fall 7th, cohort 1</td>
<td>1.06</td>
<td>0.23</td>
</tr>
<tr>
<td>Rate: Fall - Spring 7th, cohort 1</td>
<td>1.05</td>
<td>0.27</td>
</tr>
<tr>
<td>Rate: Fall - Spring 6th, cohort 2</td>
<td>1.62</td>
<td>0.35</td>
</tr>
<tr>
<td>Rate: Spring 6th - Fall 7th, cohort 2</td>
<td>1.09</td>
<td>0.22</td>
</tr>
<tr>
<td>Rate: Fall - Spring 7th, cohort 2</td>
<td>0.88</td>
<td>0.17</td>
</tr>
<tr>
<td><strong>Network Dynamics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outdegree</td>
<td>-2.03***</td>
<td>0.11</td>
</tr>
<tr>
<td><strong>Network Closure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reciprocity</td>
<td>1.37***</td>
<td>0.04</td>
</tr>
<tr>
<td>Transitive triplets</td>
<td>0.17***</td>
<td>0.03</td>
</tr>
<tr>
<td>Three-cycles (anti-hierarchy)</td>
<td>-0.17***</td>
<td>0.03</td>
</tr>
<tr>
<td>Balance</td>
<td>0.05***</td>
<td>0.01</td>
</tr>
<tr>
<td><strong>Child Characteristics Affecting Out-Degree</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School Transition Ego (6 ( \beta_6 ))</td>
<td>0.047</td>
<td>0.04</td>
</tr>
<tr>
<td><strong>Child Characteristics Affecting In-Degree</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-degree Popularity</td>
<td>0.095†</td>
<td>0.06</td>
</tr>
<tr>
<td><strong>Homophilic Selection Effects</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender (Girl = 0)</td>
<td>0.39***</td>
<td>0.05</td>
</tr>
<tr>
<td><strong>Victimization</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Shape</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linear Tendency</td>
<td>-1.61***</td>
<td>0.19</td>
</tr>
<tr>
<td><strong>Social Self Concept</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Shape</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linear Tendency</td>
<td>0.59***</td>
<td>0.08</td>
</tr>
<tr>
<td>Quadratic Tendency</td>
<td>-0.08</td>
<td>0.08</td>
</tr>
</tbody>
</table>

\( ^* p < .1, ^* * p < .05, ^* * * p < .01, ^* * * * p < .001 \)
### Table 4

Testing Three Hypotheses of Friendship-Victimization Dynamics using SIENA

<table>
<thead>
<tr>
<th>Model Parameter</th>
<th>Associated Hypothesis</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Network Dynamics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child Characteristics Affecting Out-Degree</td>
<td>oncé</td>
<td>0.11†</td>
<td>0.06</td>
<td>0.09</td>
<td>0.07</td>
</tr>
<tr>
<td>Social Self Concept</td>
<td>Common Predictor, part a</td>
<td>-0.03</td>
<td>0.03</td>
<td>-0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>Child Characteristics Affecting In-Degree</td>
<td>víctimisation</td>
<td>-0.13**</td>
<td>0.05</td>
<td>-0.15**</td>
<td>0.05</td>
</tr>
<tr>
<td>Social Self Concept</td>
<td>Self Preservation, part a</td>
<td>-0.02</td>
<td>0.02</td>
<td>-0.03</td>
<td>0.03</td>
</tr>
<tr>
<td><strong>Homophilic Selection Effects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Self Concept</td>
<td>0.19***</td>
<td>0.05</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Victimization</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Behavior Covariates</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effect of Number of Victimized Reciprocated Friends</td>
<td>0.65**</td>
<td>0.24</td>
<td>0.66**</td>
<td>0.24</td>
<td></td>
</tr>
<tr>
<td>Effect of Number of Non-Victimized Reciprocated Friends</td>
<td>Friendship Protection</td>
<td>-0.48***</td>
<td>0.09</td>
<td>-0.40**</td>
<td>0.13</td>
</tr>
<tr>
<td>Effect of Social Self Concept</td>
<td>Common Predictor, part b</td>
<td>-1.01**</td>
<td>0.3528</td>
<td>-0.64†</td>
<td>0.33</td>
</tr>
<tr>
<td><strong>Social Self Concept</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Behavior Covariates</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effect of Victimization</td>
<td>-0.71**</td>
<td>0.26</td>
<td>-0.71**</td>
<td>0.26</td>
<td></td>
</tr>
</tbody>
</table>

†p < .1, *p < .05, ** p < .01, *** p < .001

Note. The current models include all of the terms from Table 3. The parameters that are not shown here were generally consistent with the Table 3 parameter estimates.
Chapter 4: DISCUSSION, IMPLICATIONS, AND FUTURE DIRECTIONS

The goal of this thesis was to test three hypotheses concerning the nature of friendship and victimization dynamics: the Friendship Protection Hypothesis, the Self Preservation Hypothesis, and the Common Predictor Hypothesis. Findings from both the general linear model approaches as well as the SIENA actor-oriented networking models indicate some support for components of all three hypotheses surrounding victimization and friendship dynamics. The Friendship Protection Hypothesis emerged as significant across all regression and SIENA models, even after controlling for the other hypotheses as well as other covariates of friendship dynamics. Both components of the Self Preservation Hypothesis also remained significant in the SIENA models when modeled in conjunction with the other hypotheses, but support for the Self Preservation Hypothesis was more mixed in the general linear models. The Common Predictor Hypothesis received some support in the regression models, but it received much less support in the SIENA models that controlled for other friendship network dynamics. Overall, these results suggest that friendship and victimization experiences are related in multiple and complex ways.

Findings from this study replicate and extend previous findings surrounding the Friendship Protection Hypothesis. In both the general linear models and SIENA models, number of non-victimized reciprocated friends was negatively related to victimization, even after other predictors—including those modeling the other two hypotheses and those controlling for network dynamics—were entered into the model. These findings replicate those by Boulton and colleagues (1999) as well as Hodges, Malone and Perry (1997), and
additionally extend these findings by utilizing less-restrictive friendship nomination procedures. Even though my methodology allowed for both a relatively unrestricted number of friendship nominations in addition to mixed-sex ties, evidence for a linear relationship between friendships and victimization remained. It may be the case, however, that different friends can provide differing levels of protection and further exploration is needed to understand whether friend characteristics such as gender and social network centrality contribute to the protection they provide.

The Self Preservation Hypothesis had, before this study, perhaps the least amount of empirical basis as compared to the other two hypotheses tested, but had strong theoretical backing from sociological theory (Bukowski & Sippola, 2001; Simmel, 1904). This hypothesis asserts that non-victimized youth will eliminate their ties to victimized youth in order to not become victimized themselves. This study found at least modest support for both components of this hypothesis: (1) victimization status significantly reduced the number of friendship nominations received; and (2) being friends with victimized youth significantly increased risk for own victimization. These models cannot detect motivation for not selecting victimized youth as friends--for instance if this occurred because youth fear their own victimization--however these models provide at least initial support for the underlying components of this hypothesis. Qualitative work exploring non-victimized youth’s motivations for severing relationship ties with victimized youth would help explore this hypothesis further.

Although not a component of our substantive hypotheses, homophily based on victimization also emerged as a strong parameter in our SIENA model. This finding indicates that non-victims tend to be friends with non-victims, and victimized youth will
tend to be friends with other victimized youth, replicating similar findings by Ellis and Zabartany (2007) and Pelligrini, Bartini, and Brooks (2007). Homophily among non-victims gives further support to the Self Preservation Hypothesis, indicating that non-victims will seek other non-victims as friends. Homophily among victimized youth has several possible explanations. Victimized youth, because they are less likely to be selected as friends in general, as demonstrated by our SIENA models, might seek each other out based on the underlying human drive for friendship and companionship (Bukowski, 2001). This has some support in our model, where being victimized does not systematically affect the number of friendship nominations made. Pelligrini, Bartini and Brooks suggest, on the other hand, that perhaps victimized youth seek each other out rather than simply settling for each other, since they may be better at supporting each other in their social experiences. Still, friendships with other victimized youth do not provide a protective function (Pelligrini, Bartini, & Brooks, 2007), and could, as suggested by our finding of the influence of reciprocated victimized friends on victimization, exacerbate victimization.

The models found little support for the Common Predictor Hypothesis. Social self-concept did not appear to affect individuals’ friendship nominations after other network forces were modeled with SIENA, indicating that youth with low social self-concept were not self-isolating, contrary to this hypothesis. Increases in victimization did appear to be somewhat related to lowered social self-concept, but this parameter became non-significant when parameters from the other hypotheses were entered into the SIENA model; this term the had a p of .07. Increases in victimization did significantly predict decreases in social-self concept, however, giving support for the “vicious cycle”
proposition that those with lowered social self-concept are more likely to be victimized, which in turn lowers their social self-concept, and invites more victimization (Hodges & Perry, 1997).

There are several potential reasons why self-isolation did not emerge in these models. Although we used the same measure of social self-concept as both Egan and Perry (1993) and Browning, Cohen and Warman (2003), base rates of SSC in this sample, even among victimized youth, were quite high and a ceiling effect for non-victimized youth likely restricted variance (M~3.5 out of 4). Second, social self-concept may not be the best measure of passively withdrawn behaviors as described by Bukowski & Sippola (2001). This result may be different using a different operationalization of social withdrawal. Third, it may be the case that few kids want to appear as isolated in sociometric measures, and name friends even if those ties are not reciprocated. In fact, very few (n=4) students in this sample were “true” isolates, as defined as no nominations given, even when given the possibility, and no nominations received. For this to be true, however, SSC should have emerged as a child characteristic affecting in-degree, which also emerges as non-significant in the SIENA based models.

Another potential confounding factor limiting our ability to detect the common predictor hypothesis in these analyses may also be our inability to distinguish between passive and reactive victims. Reactive victims tend to engage in acts of aggression and retaliation following victimization, whereas passive victims tend to retreat and internalize their victimization (Hanish and Guerra, 2004). Hanish and Guerra suggest that these two types of victims have different developmental trajectories, and, it may be the case that the
common predictor hypothesis is only relevant for passive victims rather than reactive victims.

Though there were slight differences between findings from the general linear model approaches and SIENA models, both models find similar support for the three hypotheses. The SIENA models provide slightly stronger evidence for the Self Preservation Hypothesis than the general linear models and somewhat weaker evidence for the Common Predictor Hypothesis. Differences between the models may be a result of SIENA’s ability to combine both the sixth and seventh grade data points into a single model, utilizing greater power to detect additional effects and/or from SIENA’s inherent control for systematic network effects. Additional empirical work is needed to gain a clearer understanding of the differences between SIENA and the general linear models.

The overall picture of the relation between friendship and victimization dynamics that emerges from this study is that though friendship might be protective for victimized youth, non-victimized youth may be at risk by being friends with victims. In addition, victimized youth seem to have the same desire for friendship—having no significant differences in their nomination patterns based on their victimization status—but may lack the opportunity to make friendships based on the self-preservation activities of their peers. This suggests that victimization may need to be reduced before victimized youth can successfully make friends and utilize their protective nature.

Many questions are left unanswered by this research, however. Although it is clear that some friendship ties to victimized youth are severed by non-victimized youth, it is likely not the case that all friendship ties between victimized and non-victimized youth are dissolved. In addition, not all non-victimized youth friends with victimized youth will
become victimized, and not all youth with few friends will become victimized. Further exploration is needed to determine what moderating factors might contribute these relations—what about individuals influences whether they receive protection from friendships or are influenced by friends’ victimization.

In general, it can be concluded from this study that friendship and victimization dynamics are complicated and interdependent. There is no clear directionality between the two. Neither fully protects nor fully puts at risk the other. Although friends may protect victimized youth, victimized youth might make their friends vulnerable. It is therefore important to address bi-directionality and interdependence in future studies and in prevention programs surrounding friendship and victimization dynamics.

Many victimization prevention programs utilize the protective nature of friendship for victimized youth by identifying peer mentors with whom victimized youth may connect and form relationships (Cowie et al., 2002; Dellasega & Adamschick, 2005). In evaluations, these “befriending” programs have not demonstrated effectiveness. For instance, in one befriending program in England, only 18% of self-reported victims reported utilizing the peer-friend system (Naylor and Cowie, 1999). In follow-up interviews with students, Naylor and Cowie discovered that many viewed the system as unhelpful and, generally, the broader school community did not support it. Victimized youth, generally, did not feel like the peer-mentors provided adequate support. It may be the case that those peer-mentors restricted their support in an effort to maintain distance. As suggested by the self-preservation hypothesis, peer-mentors’ associations with victimized youth may have the unintended effect of increasing risk for victimization for those mentors. Though no program can force two students to become true friends, it is
still important to consider how peer-supporters tagged by these programs are
subsequently viewed by their peer networks, and whether they have any negative
outcomes as a result of participating in the program.

There are several limitations to the current study. First, peer victimization here
was operationalized as a combination of both verbally and physically victimized youth.
There was not sufficient power to determine whether victimization and friendship
dynamics operate differently for different forms of victimization. Additionally, the
current study did not include relational victims, who may also have very different
interactions with friends. The population sampled for this study was additionally limited
to sixth and seventh graders in a predominately Caucasian rural community, preventing
exploration of differences in friendship and victimization dynamics by age and ethnicity.
Our modest sample size also limited our power to detect gender differences and other
potential moderating factors.

Still, this study provides an important stepping-stone from which to better study
victimization and design programs for its prevention. Future studies into friendship and
victimization should further explore consequences for non-victimized youth having
victimized friends, and should distinguish whether gender or aggression-type moderate
these outcomes. Additionally, data including the identities of individual victims’
aggressors could allow us to understand if, perhaps, victimization emerges from within
friendship dyads—a hypothesis beyond the scope of the three presented here, but
plausible and suggested by recent preliminary analyses (Temkin & Gest, 2010). In full,
more research is necessary to create a full picture of friendship and victimization
dynamics, however this thesis plays an important first step towards that direction.
References


