

## Friendship Dynamics of Prosocial and Aggressive Behaviors in the Classroom: Examining the Role of Gender and the Relationship with the Teacher

Huiyoung Shin<sup>†</sup>

Chonbuk National University Department of Psychology

The current study examined the development of prosocial and aggressive behaviors in youth as related to the selection and influence of friends, and the potential moderating role of gender and relationship with their teacher in these processes. Participants were fifth and sixth graders from 48 classrooms and were followed from the start to the end of the semester in the Mid-West of the U.S. Across the school year, there was a tendency for youth to select peers who were similar to themselves as friends and to be influenced by their friends in regard to both aggressive and prosocial behaviors. However, friend selection and influence processes were moderated by youth's gender and relationship with their teacher. Boys were more attracted to aggressive peers and less attracted to prosocial peers as friends, and were more influenced than girls by their friends' aggressive behavior over time. Further, when youth had a more positive relationship with their teacher, they were more likely to select peers who were highly prosocial and less aggressive as friends. Overall, results indicate that youth's gender and relationship with their teacher play an important role in friendship dynamics and social behavior development.

*Key words* : *friendship, prosocial behavior, aggressive behavior, gender, relationship with the teacher*

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<sup>†</sup> 교신저자 : 신희영, 전북대학교 심리학과, 전주시 덕진구 백제대로 567, 인문사회관 610호  
E-mail: shinhy@jbnu.ac.kr

Peer relations and friendships are important for the development of social behaviors during adolescence (Dishion, Piehers, & Myers, 2008). Due to the severe consequences that can affect the physical and psycho-social health of youth, the influence of peers on aggressive behavior has received much attention (곽금주, 2000; 박중효, 2005; 송경희 & 이승연, 2010; Cohen & Prinstein, 2006; Espelage, Holt, & Henkel, 2003; Rose, Swenson & Waller, 2004). Much research has documented that the similarity between friends' aggressive behavior is quite high and can be attributed to two mechanisms: peer selection and socialization (Dijkstra, Berger, & Lindenberg, 2011; Dishion, Patterson, & Griesler, 1994; Sijtsema et al., 2010b). Youth tend to form friendships among youth with similar levels of aggression (peer selection), and hanging out with aggressive friends increase youth's own aggressive behavior over time (peer influence; peer socialization). However, comparatively less research has examined peer influence processes on adaptive behaviors, such as prosocial behavior despite their importance for healthy adolescent development. Peers socialize positive behaviors as well as risky behaviors (Allen & Antonishak, 2008; Choukas-Bradley, Giletta, Cohen, & Prinstein, 2015). Given prosocial behavior is a critical ingredient of adjustment at school as well as overall healthy development, the lack of attention to prosocial behavior leaves our understanding of peer processes incomplete.

Further, less is known about potential contextual moderators that could affect these general processes of peer selection and influence. Under certain circumstances, some youth may show different friend selection tendencies and/or be more susceptible to peer influence. Given youth's social interactions with peers take place within classrooms at school, and teachers play an important role in classroom social dynamics (Farmer, Lines, & Hamm, 2011; Shin, 2015a; Shin & Ryan, 2017), one of the possible moderators of peer selection and influence on youth's social behaviors would be their relationship with the teacher. In addition, considering the salient gender differences in the nature of youth's friendships (Rose & Rudolph, 2006) and segregation of friend networks by gender (Bukowski & Cillessen, 1998; Maccoby, 1998) during adolescence, youth's gender is likely to moderate the peer selection and influence processes of social behaviors. Thus, in the present study, we take advantage of recent advances in longitudinal social network analysis and examine friend selection and influence processes around prosocial and aggressive behaviors and the potential moderating role of youth's gender and relationship with their teacher in these processes in a sample of adolescents across the school year.

Youth's friend selection and influence on prosocial and aggressive behaviors

During adolescence, interpersonal tasks such as being accepted and liked by many peers and forming friendships become increasingly important for their positive social development (Ladd, 2003). The extent to which youth are able to adequately achieve these tasks depend on many factors, including their behaviors and the nature of their social interactions. Researchers have generally found that aggressive youth have troubles and problems with friends and rejected by many peers, and prosocial youth are more accepted and liked by most peers (Card, Stucky, Sawalani & Little, 2008). However, in certain contexts, aggressive youth are perceived to be cool and popular among peers and even liked by certain friends, and have salient influence on classmates (Gillessen & Mayeux, 2004; Hawley, Little, & Rodkin, 2007; Shin, 2017b). Aggressive youth may be appealing as friends to certain peers because they use aggressive behavior to assert their dominance and to attain higher status among peers (Hawley et al., 2007). Aggressive behavior may allow youth to maintain or increase their social standing among peers (Dijkstra, Cillessen, Lindenberg, & Veenstra, 2010; Shin, 2017a), and thus youth have little reason to cease negative actions when aggressive behavior brings social rewards (Sijtsema, Veenstra, Lindenberg, & Salmivalli, 2009). Observing peers being rewarded for their aggressive behavior encourages youth to emulate friends' aggressive behavior (Bandura, 1977; Cohen & Prinstein, 2006). Furthermore,

associated with sensation-seeking proclivities, interactions with aggressive peers may be attractive and exciting and provide an additional source of positive reinforcement (Hanish et al., 2005). Not surprisingly, numerous studies found support for adolescents' increased level of aggressive behavior and have explained it with processes of friend selection (i.e., aggressive youth are drawn together as friends) and friend influence (i.e., over time friends become more similar in aggressive behavior; Dijkstra, Berger, & Lindenberg, 2011; Fortuin, Geel, & Vedder, 2014; Rulison, Gest, & Loken, 2013; Sijtsema et al., 2010b).

In contrast to aggressive behavior, prosocial behavior has consistently positively evaluated and associated with peer acceptance and peer preference regardless of contextual features of the peer group and the classroom. Adolescents describe good friends as spending time together and being prosocial, loyal, and trustworthy (Berndt, 1982). In line with this view, much research has shown that prosocial behavior is positively associated with friend nominations in the classroom (Newcomb & Bagwell, 1995). However, fewer studies have examined the processes of friendship selection and influence related with prosocial behavior compared to aggressive behavior. Peer processes and friendship context around prosocial behavior have been mostly overlooked and only a couple of studies have examined youth's social interaction with peers around prosocial behavior. Preliminary

evidence suggests that youth are more likely to engage in prosocial behavior if they have friends who value or demonstrate these behaviors (Barry & Wentzel, 2006; Logis et al., 2013; Shin, 2015b). Prosocial youth are likely to affiliate with peers who are similarly prosocial since they may perceive friendships with aggressive classmates as involving undesirable risks of conflict. Similarity in prosocial behavior may enable youth to communicate with less effort and more shared feelings of understanding and belongingness, making these relationships more rewarding and stable (i.e., interpersonal attraction theory; Byrne & Griffitt, 1973). Similar to aggressive behavior, once youth become friends with prosocial peers, they will learn and adopt friends' prosocial behavior through modeling and positive reinforcement (i.e., social learning theory; Bandura, 1977). Frequent interactions and intimate relationships would provide youth affection and behavioral confirmation, and thus become an important context in which peer socialization could take place (Brechwald & Prinstein, 2011).

Thus, based on existing theory and empirical findings, we expect that youth would consider prosocial and aggressive behaviors of their peers as an important criterion on which to select their friends, and then they modify their own prosocial and aggressive behaviors in line with those of their friends. Specifically, we hypothesize that youth would be more attracted to peers who are similar to themselves in behaviors as

friends, and be influenced by friends' behaviors over time for prosocial and aggressive behaviors.

#### Moderating role of gender in friend selection and influence

Much theory and research emphasize the significant role of gender in the socialization of behaviors among youth (see Leaper, 2013 for a review). Although gender boundaries are gradually crossed in adolescence, same-gender peer preference remains strong and persists into adolescence strengthening gender segregation and the promotion of gender-typed behaviors (Mehta & Strough, 2009; Poulin & Pedersen, 2007). Same gender peers play a salient role in shaping adolescents' conformity to gender-typed norms (Bukowski & Cilllessen, 1998; Lamb et al., 2009). Youth tend to model and reinforce peers' gender-typed beliefs and behaviors. Over time, adolescents tend to adopt the norms of their same-gender friends as their personal beliefs, values, and behaviors (Bussey & Bandura, 1999; Leaper, 2000).

Research has evidenced consistent gender differences in terms of expectations in social interactions and features of behaviors. Boys are more likely to communicate assertiveness with their peers and emphasize dominance while girls are more likely to emphasize affection and intimate relationships (Caravita & Cilllessen, 2011; Rose & Rudolph, 2006). The emphasis on dominance that is inherent in peer interactions

among boys often promotes aggression (Dawes & Xie, 2014; Li & Wright, 2014). Since boys' interactions are often part of dominance hierarchies where aggression plays an important role (Geary et al. 2003), aggressive behavior is often found to be more prominent for boys compared to girls (e.g., Dijkstra et al., 2009; Pellegrini & Archer, 2005; Shin, 2017a). In contrast, focus on developing intimate connections and close relationships among girls promotes self-disclosure and caring in peer relationships. Girls seek support from friends more often and provide help when needed, and respond more prosocially to conflict situation with peers than do boys (Rose & Asher, 1999). Given differences in the characteristics that are found in friendships of boys and girls, highly aggressive and less prosocial peers may be considered more attractive as friends and influential among boys compared to girls. Thus, we hypothesize that boys would be more likely to select aggressive peers as friends and be more influenced by aggressive friends compared to girls.

#### Moderating role of youth's relationship with the teacher in friend selection and influence

Youth vary in the extent to which they form a positive relationship and feel a sense of relatedness with their teacher in the classroom (Furrer & Skinner, 2003; Hughes, Im, &

Wehrly, 2014; Skinner et al., 2008). According to Self-Determination Theory (SDT), the need for relatedness is a basic psychological need. When the teacher supports youth's need for relatedness, it sets in motion self-system processes that facilitate positive adjustment in the classroom (Connell & Wellborn, 1991; Skinner & Belmont, 1993). Within SDT, Deci and Ryan (1985) introduced a sub-theory called organismic integration theory (OIT) that described the social conditions that promote or hinder internalization and integration of behaviors. A primary reason people engage in behaviors for others is when "the behaviors are prompted, modeled, or valued by significant others to whom they feel attached and related" (Ryan & Deci, 2000, p. 73). Thus, when the teacher supports youth's need for relatedness, youth would be motivated to act in ways that are valued by their teacher.

Previous research has evidenced that when youth perceive their teacher as supportive and caring, they are more likely to behave in positive ways in the classroom, including trying hard at work, asking peers for help, cooperating with peers, and having positive interactions with peers (Luckner & Pianta, 2011; Marchand & Skinner, 2007) and less likely to engage in negative behaviors, such as disruptive behavior (Ryan & Patrick, 2001). More directly related to peer interaction, Birch and Ladd (1997) found that when youth feel supported by their teacher they are more likely to comply with the

teacher's expectations and wishes, which in turn reduced their involvement with deviant peers. Therefore, based on theoretical and empirical evidences, we hypothesize that youth who have more positive relationship with their teacher would be more attracted to prosocial and less attracted to aggressive peers as friends.

Extending this logic, youth's relationship with their teacher would set youth up to be differentially susceptible to friend influence. Specifically, when youth have more positive relationship with their teacher, negative friend influence will be diminished and positive friend influence will be enhanced in the classroom. If youth form warm and respectful connections with their teacher, they would be less likely to take negative cues from their friends about how to act in regard to aggressive behavior, and more likely to focus on positive behaviors of their friends. In contrast, when youth are less bonded with their teacher, they would be less concerned with teacher approval, which creates the conditions for friends to be more influential on negative behaviors, such as aggression. Thus, we hypothesize that youth who have more positive relationship with their teacher would be less influenced by friends' aggressive behavior and be more influenced by friends' prosocial behavior.

#### Overview of the current study

The central goal of the current research is to

examine the processes of youth's friend selection and influence around prosocial and aggressive behaviors and the moderating role of youth's gender and relationship with the teacher in these processes. To examine our research questions, we used stochastic actor-based modeling of social networks (SIENA). Such an approach incorporates information about friend social networks and individual characteristics at multiple time points and simultaneously estimates structural network features (e.g., density, reciprocity and transitivity), selection and influence of friends. As both friend selection and influence can contribute to similarity among friends, it is necessary to consider both simultaneously to distinguish unique effects (Veenstra & Steglish, 2012). Structural network features can contribute to the development of student behaviors over time and need to be incorporated into models for accurate estimates (Huitsing, Veenstra, Sainio & Salmivalli, 2012). Further, this approach is also opening the door for more sophisticated and complex analyses of change over extended time frames and across contexts as well as the incorporation of moderators to better understand what individual and contextual features might contribute to minimizing or exacerbating friend influence (Ryan & Shin, 2018; Shin, 2018). Using this approach, we focus on students' perceived relationship with the teacher as a potential moderator of friendship processes on prosocial and aggressive behavior. Further, we controlled for possible confounding factors, such as direct effects of youth's gender

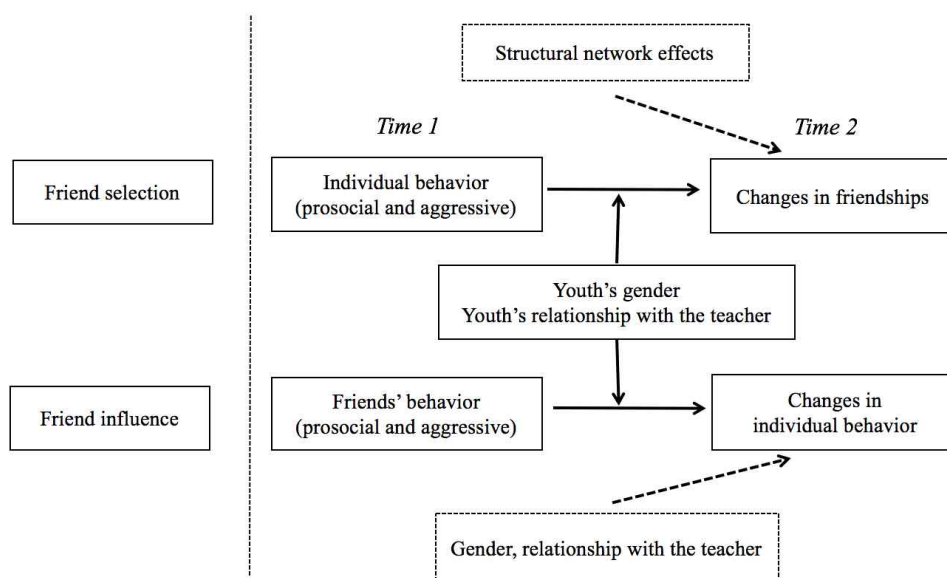


Figure 1. Graphical presentation of the selection and influence of friends.

*Note.* The solid lines in Figure 1 represent that youth can change their friendship network (friend selection) and behavior (friend influence) between two time points. The dashed lines represent that friend selection and influence effects are examined controlling for the structural network effects (e.g., density, reciprocity, transitivity), the effects of youth's gender and relationship with the teacher.

and relationship with their teacher on prosocial and aggressive behaviors (see Figure 1 for the graphical presentation).

Regarding processes of friend selection and influence, we make the following hypotheses: both friend selection and influence processes will contribute to similarity seen across time in friends' prosocial and aggressive behavior. Regarding the potential moderating role of youth's gender in friend selection and influence, we make the following hypotheses: boys will be more attracted to aggressive peers and will be more influenced by friends' aggressive behavior,

and girls will be more attracted to prosocial peers and will be more influenced by friends' prosocial behavior. Regarding the potential moderating role of youth's relationship with their teacher in friend selection and influence, we make the following hypotheses: youth who have more positive relationship with their teacher will be more attracted to prosocial and less attracted to aggressive peers as friends, and youth who have more positive relationship with their teacher will be less influenced by friends' aggressive behavior and more influenced by friends' prosocial behavior.

## Methods

### Participants and procedures

Youth participated in the research as they began a new semester (Wave 1) and then at the end of the semester (Wave 2) in 2011 year, approximately six months apart. Participants attended one of 48 classrooms in 4 elementary schools in fifth and sixth grade with different teachers. These classrooms were from public schools located in the Mid-west of the U.S. The schools serve non-metropolitan small urban communities and reported 66% of their students were eligible for free or reduced-free lunch. Youth stayed all day long with the same peers and a teacher in self-contained classrooms during regular school days. Youth were informed that their participation was optional and that their responses would be kept confidential. Youth signed an assent form indicating that they understood the conditions and wanted to participate prior to starting the survey. Surveys were administered to youth in their classrooms. The total sample size was 879 at wave 1 and 859 at wave 2, and 51% female at wave 1 and 52% female at wave 2. There was some turn-over in participants from time 1 to time 2. Specifically, at time 2 we lost 79 of adolescents who participated at time 1 (8.9%) and gained 59 adolescents who had not participated at time 1 (6.8%). There was no significant difference in demographics or study variables between youth

who had data at both times compared to youth who had data at only time 1 or 2. Teachers were asked to complete a brief survey about youth's behaviors at both times 1 and 2. Teachers were told the purpose of the survey was to better understand youth's adjustment at school.

### Measures

Friend networks. Adolescents' friends within classrooms were measured by asking youth to nominate their closest friends, further described to youth as "the friends you hang around with and talk to the most in this class." Embedded in each adolescent's survey was a class list and youth were told they could nominate as many or as few friends as they wanted by putting a check next to names of their friends. On average, youth nominated 5.63 friends at time 1, and 5.43 friends at time 2. Friendship networks were calculated for each classroom.

Prosocial behavior. Teachers reported on youth's prosocial behavior (i.e., voluntary behavior intended to benefit others) in their class with a measure adapted from Cassidy and Asher (1992) and Crick (1996). Teachers rated each student on the extent to which they exhibit the following behaviors: "friendly", "helpful", "cooperative", "kind", and "considerate" on a scale that ranged from 1 (never) to 5 (always). The scale was reliable in our sample (Cronbach's alpha for prosocial behavior = .93 for both

times 1 and 2). All items for prosocial behavior were averaged, and then rounded up to the nearest integer to retain the original scale with 5 categories (1 = never, 5 = always), because our estimation method (RSiena) requires that variables have whole-positive values.

**Aggressive behavior.** Teachers reported on youth's physical aggressive behavior in their class using the Aggression subscale of the Interpersonal Competence Scale (i.e., behavior causing or threatening physical harm toward others; Cairns, Leung, Gest, & Cairns, 1995). Teachers rated each student on the extent to which they exhibit the following behaviors: "fights with others", "argues with others" and "gets in trouble" on a scale that ranged from 1 (never) to 5 (always). The scale had 3 items and was found to be reliable in our sample (Cronbach's alpha for aggressive behavior = .88 and .87 for times 1 and 2, respectively). All items for aggressive behavior were averaged, and then rounded up to the nearest integer to retain the original scale with 5 categories (1 = never, 5 = always), because our estimation method (RSiena) requires that variables have whole-positive values.

**Relationship with the teacher.** Students reported on their perceived relationship with the teacher using a measure developed by Skinner and Belmont (1993). Sample items are "My teacher really cares about me", "My teacher spends time with me", and "I can't depend on my teacher when I need him/her" (reverse

coded). All items were rated on a 5-point scale (1 = not at all true of me, 3 = somewhat true and 5 = very true of me). The scale had 8 items and was reliable in our sample (Cronbach's alpha for relationship with the teacher = .78 and .83 for times 1 and 2, respectively). All items for relationship with the teacher were averaged, and then rounded up to the nearest integer to retain the original scale with 5 categories (1 = not at all true, 5 = very true), because our estimation method (RSiena) requires that variables have whole-positive values.

#### Analytic strategy

Analyses were conducted using longitudinal social network analyses implemented using the RSiena software program (RSiena version 1.1-289 in R 3.2.2). This approach builds social networks based on individual youth's nominations of their friends, while integrating information about their behaviors (e.g., prosocial and aggressive behaviors) at multiple time points. By means of simulation, the likelihood of changes in the friendship network as well as changes in behavior are determined. Estimates are derived from iterative simulations within RSiena using a stochastic approximation (MCMC; Markov Chain Monte Carlo) algorithm. Reliable estimates are assessed with good convergence statistics of the estimation algorithm as indicated by near-zero convergence t statistics (for more

details on RSiena estimation, see Snijders, van de Bunt, & Steglich, 2010).

Missing data were handled in the RSiena program, which allows for some missing data on network variables, covariates and dependent action variables. In a simulation study, less than 10% missing data did not provide estimation problems or bias (Huisman & Steglich, 2008). In RSiena, when data were missing, it is imputed with the value from the previous wave. If such information is not available (always the case at wave 1) then the value 0 (no friendship tie) is imputed for friendship ties and the modal value is imputed for other variables. Note that these imputed values did not contribute to the computation of any statistics in SIENA. Only individuals with valid data at the beginning and at the end of a period were considered in the estimation process (Ripley et al., 2017).

In the current study, we estimated the relative contributions of network-behavior dynamics (i.e., friend selection and influence effects) for prosocial and aggressive behaviors, while controlling for various structural network features (i.e., density, reciprocity and transitivity) and covariate effects (i.e., gender and relationship with the teacher). The size of classroom networks is small (compared to schools or other organizations). Thus, to obtain well-converged estimates, classrooms were combined and analyzed simultaneously using the multi-group option (Ripley et al., 2017). Analysis in RSiena yields parameters related to network dynamics

(structural network and friend selection effects) and behavior dynamics (friend influence effects and behavioral tendencies and covariate effects). We describe in greater detail below the key aspects of what the models specified and estimated.

Friend structural network effects. To examine the structural network features, we included three network effects: density, reciprocity, and transitive triplets. Density describes the overall tendency of youth to nominate classmates as friend. Reciprocity describes the tendency for youth to reciprocate a relationship. Transitive triplets describe the tendency for dyadic friendships to be embedded within triadic patterns of relations (e.g., my friend's friend is my friend). Ripley et al., 2017 recommend to include these basic network structural features to accurately examine the friend selection and influence.

Friend selection effects. To examine the friendship selection based on prosocial and aggressive behaviors, we included the effects of prosocial and aggressive behaviors on friendship nominations given (behavior ego effects), received (behavior alter effects), and selecting similar peers on the level of behavior (behavior similar). Since adolescents' gender is highly relevant to friendship selection (Bukowski & Cillessen, 1998; Maccoby, 1998), we included the effects of gender on friendship nominations given (gender ego effects), received (gender alter effects), and selecting same gender peers (gender same).

Friend influence effects. To examine the friend influence processes, we included behavior similarity along with behavioral tendency parameters. The behavioral similarity parameter represents tendencies for youth to adopt the behaviors of their friends. A positive behavioral similarity effect represents a tendency for youth to adopt friends' behavior and become similar over time (i.e., friend influence). The behavioral tendency parameters indicate the overall tendency toward higher or lower values (linear shape effect) and behavior changes as a function of initial levels of behavior (quadratic shape effect). A positive linear shape effect indicates that the majority of youth had higher levels of behavior (i.e., above the mean) in the classroom. A positive quadratic shape effect indicates that youth with higher levels of behavior further increase their behavior, whereas youth with lower levels of behavior further decrease their behavior over time. A negative quadratic shape effect represents changes in behaviors where most youth are moving towards the mean (Snijders et al., 2010).

Moderating effect of gender on friend selection and influence. To examine the moderating role of youth's gender on friend selection and influence, we included two interactions combining male with friendship nominations received (i.e., behavior alter) and friend influence (i.e., average similarity) for each behavior. Using prosocial behavior as an example, the first interaction (i.e., male ego X prosocial behavior

alter) examines whether boys are more likely to select highly prosocial peers than less prosocial peers as friends, and the second interaction (i.e., prosocial average similarity X male) examines whether boys are more influenced by prosocial friends. Interactions could be interpreted in a similar manner for aggressive behavior.

Moderating effect of relationship with the teacher on friend selection and influence. To examine the moderating role of youth's relationship with the teacher on friend selection and influence, we included two interactions combining relationship with the teacher with friendship nominations received (i.e., behavior alter) and friend influence (i.e., average similarity) for each behavior. Using aggressive behavior as an example, the first interaction (i.e., relationship with the teacher ego X aggressive behavior alter) examines whether youth who have more positive relationship with their teacher are more likely to select highly aggressive peers than less aggressive peers as friends, and the second interaction (i.e., aggressive average similarity X relationship with the teacher) examines whether youth who have more positive relationship with their teacher are more influenced by aggressive friends. Interactions could be interpreted in a similar manner for prosocial behavior.

## Results

Descriptive statistics

Descriptive information about the sample and network characteristics is presented in Table 1. The average out-degree (average number of friend nominations) indicates that youth

nominated an average of five friends at waves 1 and 2. The density indicates that youth nominated around 42-48% of their classmates as friends over the two waves. The networks were characterized by high reciprocity and transitivity, indicating that over 69% of the friendship

Table 1. Description of the sample and changes in friend networks, prosocial and aggressive behaviors, and relationship with the teacher from W1 to W2.

	W1	W2
Sample		
Cohort size	879	859
Fraction females	51%	52%
Friendship		
Average outdegree	5.63	5.43
Density	42%	48%
Reciprocity	69%	75%
Transitivity	60%	64%
Prosocial behavior mean (SD)	4.02 (.85)	3.99 (.86)
Aggressive behavior mean (SD)	1.73 (.89)	1.78 (.87)
Relationship with the teacher mean (SD)	3.74 (.80)	3.58 (.88)
Friendship tie changes		
Average number of ties dissolved		47.58
Average number of ties emerged		40.33
Average number of ties maintained		66.84
Network changes		
Hamming distance (change)		87.91
Jaccard index (stability)		40%

*Note.* Density is the proportion of given ties relative to the total amount of possible ties; Reciprocity is the proportion of mutual ties; Transitivity is the proportion of tie configurations that could become cohesive peer groups; Hamming distance is the amount of tie changes from the beginning to the end of the time point; Jaccard index is the fraction of stable ties relative to all new, lost, and stable ties; For more information regarding these network indices and the other statistics in this table as well as their calculations, we refer to Veenstra and Steglich (2012)

nominations were reciprocated and over 60% were part of a transitive triplets. The Jaccard index (fraction of stable friendship nominations among the new, lost, and stable ties between observed data points) indicates the amount of stability and should be more than 30% to permit complex selection dynamic modeling in RSiena with adequate statistical power (see Veenstra & Steglich, 2012). The Jaccard index in our networks was 42% so there was sufficient stability and change. Table 1 presents the means and standard deviations of youth's prosocial and aggressive behaviors as well as youth's relationship with the teacher at waves 1 and 2; trends which were accounted for in the behavioral dynamics in the SIENA models.

### SIENA results

Table 2 presents the findings with regard to the estimation of network-behavior dynamics for prosocial and aggressive behaviors, the effects of covariates (i.e., gender and relationship with the teacher), and the interaction effects with gender and relationship with the teacher. All of the models satisfied the model convergence requirements, which recommend the convergence  $t$  statistics less than 0.25 in the overall maximum convergence and less than 0.1 for all the individual parameters (see Ripley et al., 2017). Significance tests were performed for all of the models by dividing the estimates with its standard error resulting in  $t$ -values which under

the null hypothesis are approximately normally distributed (Ripley et al., 2017). We discuss only the main findings, starting with friend selection and influence effects on prosocial and aggressive behaviors, following with the effects of covariates, and the moderating effects of gender and relationship with the teacher.

Friend structural network features. All structural network effects were statistically significant and similar across all models (see the first portion of Table 2). Youth were selective in their friendships (i.e., negative density) and reciprocated friendships (i.e., positive reciprocity). Further, youth tended to nominate friends of friends as friends (i.e., positive transitive triplets). Youth preferred same gender friends (i.e., positive same gender).

Friend selection on prosocial and aggressive behaviors. The prosocial behavior alter effect was statistically significant and positive (Est. = 0.06,  $p < .05$ ), indicating that prosocial youth are attractive as friends and receive more friendship nominations from peers than less prosocial youth. The aggressive behavior ego effect was statistically significant and positive (Est. = 0.12,  $p < .001$ ), indicating that aggressive youth are active in forming friendships and nominate many peers as friends. The similar prosocial behavior effect and the similar aggressive behavior effect was statistically significant and positive (Est. = 0.33,  $p < .01$ , Est. = 0.42,  $p < .001$ , respectively), indicating that prosocial youth tend to form friendships with other prosocial peers

Table 2. RSiena estimates for friend selection and influence effects for prosocial and aggressive behaviors

	Prosocial Behavior		Aggressive Behavior	
	Est.	SE	Est.	SE
<i>Network Effects</i>				
Density	-1.75***	0.07	-1.06***	0.05
Reciprocity	0.86***	0.03	0.76***	0.04
Transitive triplets	0.90***	0.07	0.27***	0.05
<i>Behavior Selection Dynamics</i>				
Gender				
Gender alter (male=1)	-0.08**	0.03	-0.10***	0.03
Gender ego	0.12**	0.04	0.11**	0.04
Same gender	0.53***	0.04	0.56***	0.04
Behavior				
Behavior alter	0.06*	0.03	-0.01	0.03
Behavior ego	-0.05	0.03	0.12***	0.03
Similar Behavior	0.33**	0.12	0.42***	0.12
Male ego x behavior alter	-0.12*	0.06	0.12*	0.06
Relationship ego x behavior alter	0.12*	0.05	-0.10*	0.05
<i>Behavior Influence Dynamics</i>				
Behavior				
Linear shape	0.16*	0.08	-0.22*	0.10
Quadratic shape	0.06	0.09	0.08	0.07
Average similarity (influence)	2.48**	0.92	2.55**	0.78
Effect from male	-0.27	0.17	0.42	0.23
Effect from Relationship	-0.01	0.20	-0.51	0.30
Behavior average similarity x Male	1.08	1.28	2.67*	1.30
Behavior average similarity x Relationship	1.70	1.92	-1.77	1.81

Note. \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ ; two-tailed tests.

For gender, boys were coded as 1 and girls were coded as 0. Relationship indicates relationship with the teacher.

and aggressive youth tend to form friendships with other aggressive peers in the classroom (see the second portion of Table 2).

Friend influence on prosocial and aggressive behaviors. As indicated by the statistically significant and positive average similarity effect for prosocial and aggressive behaviors (Est. = 2.48,  $p < .01$ , Est. = 2.55,  $p < .01$ , respectively), youth are influenced by friends' behaviors and tend to become more similar to their friends in prosocial and aggressive behaviors over time (see the third portion of Table 2).

Behavioral tendencies and covariate effects. The linear shape effect for prosocial behavior was statistically significant and positive (Est. = 0.16,  $p < .05$ ), indicating that the majority of youth scored above the mean of prosocial behavior. The linear shape effect for aggressive behavior was statistically significant and negative (Est. = -0.22,  $p < .05$ ), indicating that the majority of youth scored below the mean of aggressive behavior. Direct effects of youth's gender and relationship with the teacher (i.e., effect from male, effect from relationship) were not statistically significant.

Moderating effects of youth's gender and relationship with the teacher. Youth's gender moderated selection and influence of friends on prosocial and aggressive behaviors (see the last row of the second and third portion in Table 2). Boys were less attracted to prosocial peers (i.e., male ego X prosocial behavior alter; Est. = -0.12,  $p < .05$ ) and more attracted to

aggressive peers as friends compared to girls (i.e., male ego X aggressive behavior alter; Est. = 0.12,  $p < .05$ ). Further, boys were more influenced by aggressive friends over time (i.e., aggressive behavior average similarity X male; Est. = 2.67,  $p < .05$ ) compared to girls. Youth's relationship with the teacher moderated selection of friends on prosocial and aggressive behaviors (see the last row of the second portion in Table 2). When youth have more positive relationship with their teacher, they are more likely to select friends high in prosocial behavior (i.e., relationship ego X prosocial behavior alter; Est. = 0.12,  $p < .05$ ) and low in aggressive behavior (i.e., relationship ego X aggressive behavior alter; Est. = -0.10,  $p < .05$ ). Moderating effects of youth's relationship with the teacher on friend influence were not statistically significant for prosocial (i.e., Behavior average similarity X relationship; Est. = 1.70,  $p = .20$ ) and aggressive behavior (i.e., Behavior average similarity X relationship; Est. = -1.77,  $p = .22$ )

## Discussion

Adolescence is often characterized as a period of challenges with increased proclivity to problem behaviors (Arnett, 1999) and susceptibility to negative peer influence (de Cuyper, Weerman, & Ruiter, 2009; Mercken, Snijders, Steglich, & Vries, 2009). The results of the present study

indicate that youth's social interactions with peers not just promote negative behaviors, but also facilitate adaptive behaviors. Youth's selection and influence of friends were critically related with their prosocial and aggressive behavior development. This is in line with other scholars' assertions that emphasize the significant role of peers in positive as well as negative behaviors (Allen & Antonishak, 2008; Choukas-Bradley et al., 2015; Shin & Ryan, 2014a). Further, current findings underscore that friend selection and influence processes vary by aspects of an individual's relationships and the social context. Individual differences in youth's relationship with the teacher as well as youth's gender moderated friendship processes around prosocial and aggressive behaviors.

We found that youth's selection and influence of friends played an important role in the development of social behaviors in the classroom. Similarity in prosocial and aggressive behaviors served to bring youth together as friends in the classroom, and youth became more similar to their friends indicating that peer socialization processes were operating for both types of behavior. Our findings are in line with many other studies on friendship processes of aggressive behavior (e.g., Dijkstra, Berger, & Lindenberg, 2011; Rulison, Gest, & Loken, 2013; Shin, 2017a; Sijtsema et al., 2010b) and lend further support to theoretical and empirical work on the importance of friends in youth's behavior development (Dishion, Patterson, & Griesler,

1994). Further, by using longitudinal network analysis, the current study provides more rigorous evidence of selection and influence effects of friends over time, while controlling for structural network tendencies as well as possible confounding factors (Veenstra & Dijkstra, 2011). This evidence was especially needed in regard to prosocial behavior, given scant attention to positive behaviors in recent research focusing on friend dynamics. Our findings underscore that friends have the potential to be a positive influence on youth's behavior development.

We found that youth's selection and influence of friends on prosocial and aggressive behaviors vary by gender. Boys were more attracted to and formed friendships with highly aggressive and less prosocial peers as friends compared to girls. And, friend influence for aggressive behavior was stronger for boys compared to girls. This needs to be appreciated in light of the findings that, overall, boys are more likely to endorse dominance than girls (Caravita & Cillessen, 2011; Rose & Rudolph, 2006), and aggression is more prevalent among boys compared to girls (Pellegrini & Archer, 2005). Given that promotion of dominance and aggression is a salient part of boys' friendships and peer interactions (Benenson et al., 2002; Shin, 2017b; Zbaratany et al., 2000), aggressive behavior may be an important criterion on which to select their friends for boys, and boys are more susceptible to influence from friends' aggressive behavior (Shin, 2017a).

Youth's relationship with their teacher moderated friend selection based on prosocial and aggressive behaviors. Youth who had more positive relationship with their teacher were more attracted to highly prosocial and less aggressive peers as friends compared to youth who had less positive relationship with their teacher. Our results indicate that youth's friendship choices are affected by their relationship with the teacher. A warm and supportive relationship with the teacher can help youth to make more positive friendship choices in that classroom. Given adolescent period of life is characterized as a vulnerable time for negative peer influence and increasing social problems (de Cuyper, Weerman, & Ruiter, 2009; Mercken, Snijders, Steglich, & de Vries, 2009), the current findings indicate that emotional bond with the teacher can function as a social buffer and shape youth's peer interactions toward more positive direction.

Contrary to our expectations, youth's relationship with the teacher did not moderate friend influence on prosocial or aggressive behaviors in the classroom. However, given that we found evidence for the moderating role of youth's relationship with the teacher on friend selection, and strong friend influence for both behaviors over time, findings underscore the intertwined nature of youth's relationship with the teacher and peers in the classroom at school. Based on youth's relationship with their teacher, youth may make different friendship choices, and in turn those friendships do influence youth's

prosocial and aggressive behaviors over time. These findings add to the growing empirical support for the phenomenon of "teacher's invisible hand", which refers to the role that teachers play in youth's friend dynamics and peer social interactions (Farmer et al., 2011; Shin & Ryan, 2017; Shin, 2018a).

The current study has both strengths and limitations. We used both student reports (i.e., friendship nominations and relationship with the teacher) and teacher reports (i.e., youth's prosocial and aggressive behaviors) to examine the moderating role of youth's relationship with the teacher in friendship processes around social behaviors. Drawing on reports from multiple sources minimizes concerns that shared-methods biased the results. Our use of Stochastic Actor-Based Modeling takes advantage of recent developments in longitudinal social network analysis and allowed the simultaneous estimation of friend selection and influence over time, while controlling for structural network tendencies as well as possible confounding factors that could play a role. These features give us greater confidence that the effects of selection and influence of friends on prosocial and aggressive behaviors are accurate and not conflated with structural features of youth's friendships, effects of youth's gender and relationship with the teacher.

Although the current study provides many insights, there are limitations that need to be noted and possibly addressed in future work.

First, the fact that our study was classroom based yielded friend networks that were too small in size to analyze our SIENA results with meta-analysis, which would have allowed us to examine whether friendship processes vary by classroom. Future studies with larger class sizes may attempt to replicate our study with meta-analyses, so that class-level variation can be taken into account. Further, future studies could also include other group-level variables other than gender and teacher-student relationship, such as the socio-economic status (S.E.S.) or achievement level of the students. Second, the current study focused on physical aggression, and relational aggression was not included in the current study. It would be important in future studies to specifically examine relational aggression in relation to girls' friendship dynamics given that a number of researchers have found that relational aggression is more common among girls during adolescence (Cillessen & Rose 2005; Rose et al. 2004). Third, we only examined change across one school year. Future work that follows the same cohort of youth across multiple years could be informative of how youth's relationship with the teacher change from early adolescence through late adolescence against the backdrop of changing school contexts.

Despite the limitations in the current study, our findings make several contributions to the literature. Friends play an important role in the development of youth's prosocial and aggressive

behaviors in the classroom. Similarity between friends in regards to prosocial and aggressive behaviors is an important drive for youth's selection of friends, and friend influence plays an expansive role in youth's behavior development over time. Further, rather than being static across contexts, peer processes are affected by features of an individual's relationship and the social context. Individual differences in youth's relationship with the teacher and youth's gender play a critical role in youth's friendship choices and the magnitude of friend influence. Overall, our findings contribute to a more complete understanding of individual development of prosocial and aggressive behaviors and emphasize the need to take into account contextual factors to fully understand adolescents' peer processes in relation to their social development.

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## 청소년의 또래 상호 작용과 공격 및 이타적 행동 발달의 관계 연구: 성별과 교사와의 관계가 미치는 영향을 중심으로

신 희 영

전북대학교 심리학과

본 연구는 청소년의 또래 상호 작용이 공격 및 이타적 행동 발달에 미치는 영향을 탐색하고, 이러한 과정에서 청소년의 성과 교사와의 관계가 어떠한 조절 역할을 하는지 살펴보았다. 이를 위해 미국 중부지역 초등학교 5-6학년, 48 학급의 학생을 대상으로, 교사 보고를 통해 청소년의 공격 및 이타적 행동을, 또래 보고를 통해 청소년의 친구 관계 네트워크를, 자기 보고를 통해 청소년의 교사와의 관계를, 학기 초와 학기 말에 걸쳐 측정하였다. 종단적 사회연결망 분석을 통해 살펴본 결과, 청소년은 이타적 행동과 공격 행동의 정도가 비슷한 또래를 친구로 선택하고, 지속적인 관계를 통해 친구의 이타적 행동과 공격 행동을 적극적으로 사회화하는 것으로 나타났다. 또한, 이러한 친구 선택 및 친구 사회화 과정에 청소년의 성과 교사와의 관계는 중요한 영향을 미치는 것으로 나타났다. 남자의 경우 이타적 행동이 낮고 공격성이 높은 또래를 친구로 선호하고, 학기가 진행됨에 따라 친구의 공격성을 적극적으로 사회화하는 것으로 나타났으며, 교사와 긍정적인 관계를 형성하는 청소년일수록 공격성이 낮고 이타적 행동이 높은 또래를 친구로 선호하는 것으로 나타났다. 이러한 결과는 청소년의 공격 행동과 이타적 행동 발달을 살펴보는데 있어 청소년의 개인 및 사회적 변인이 미치는 영향을 종합적으로 고려해야 할 필요성을 시사한다.

주요어 : 친구 관계, 이타적 행동, 공격 행동, 성, 교사와의 관계