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Executive Functioning and Bullying Participant Roles: Differences for Boys and Girls

Abstract

Bullying is a process of direct (i.e., youth who bully and are victimized) and indirect (i.e., bystanders) social exchanges. Though researchers often examine social and emotional correlates of bullying role behaviors, it is important to also consider the underlying cognitive processes associated with different bullying roles, such as socially-oriented cognitive processes associated with executive functions. The goal of the current study was to examine executive functions associated with types of bullying role behavior (aggression, victimization, defending, assisting, and outsider behavior) and differences between boys and girls within a sample of 689 third-eighth grade students (51% male, 49% female). Victimization was significantly and negatively associated with each executive function. Defending was positively associated with Emotion Regulation for upper elementary school students, but not for middle school students. Outsider Behavior was significantly and negatively associated with Self-Monitoring, Flexibility, and Initiation.

Keywords: executive functions, bullying roles, emotion regulation, bully, victim, bystander

Executive Functions and Bullying Participant Roles: Differences for Boys and Girls

Bullying is a social process of exchanges between individuals directly and indirectly involved in bullying events. Though direct bullying participants (i.e., youth who bully and/or are victimized) have received the greatest amount of attention in the literature, there is growing interest in understanding the role of indirect participants, or bystanders, such as those that support aggressors (i.e., assistants), ignore bullying (i.e., outsiders) or, those that attempt to thwart aggressive actions by reporting incidents to adults or being kind to victims (i.e., defenders; Salmivalli Lagerspetz, Björkqvist, Österman, & Kaukiainen, 1996; Swearer & Espelage, 2011).

Researchers have examined many underlying causes and correlates of bullying role behavior including social, emotional, or cognitive variables. Though social and emotional characteristics (e.g., anxiousness, depressive symptoms, social skills) may be more observable, they are influenced by underlying cognitive processes such as planning and self-monitoring (Camodeca & Goossens, 2005; Crick & Dodge, 1994; Riggs, Jarhomi, Razza, Dillworth-Bart, & Mueller, 2006). Thus, it is important to consider both the more observable behavior and the less observable, underlying cognitive processes to more fully understand bullying role behavior.

One cognitive process relevant to social interactions is executive functioning, which refers to a set of self-regulatory processes responsible for problem-solving and management of goal-oriented behavior (Séguin & Zalazo, 2005), including skills such as emotion regulation, initiation, self-monitoring, inhibitory control, and flexibility in thinking. According to Nageleri and Goldstein (2013), emotion regulation is the ability to control and manage thoughts, feelings, and reactions to emotional events, and self-monitoring refers to the ability to evaluate one's own performance or behavior. Initiation describes the ability to engage in activities without being

prompted while inhibitory control is the capacity to control behavior and impulses. Flexibility refers to how well a person can adapt to circumstances, and includes problem-solving abilities.

Though executive function skills are commonly associated with academic achievement, bullying researchers have also examined executive function skills of youth who engage in bullying or are victimized (Camodeca & Goossens, 2005; Verlinden et al., 2014). Some domains of executive function, such as inhibition and emotion regulation, have been associated with processes related to aggressive behavior and victimization (Mahady Wilton, Craig, & Pepler, 2000; Toblin, Schwartz, Gorman, & Abou-Ezzeddine, 2005; Verlinden et al., 2014). This work also suggests that victimized students and youth who bully tend to lack cognitive skills related to social competence; though other work suggests that some youth who bully actually have average to above average social-cognitive skills and use their skills in an inappropriate, but adaptive way by manipulating their peers via victimization (e.g., Hawley, 2007; Hawley, Little, & Pasupathi, 2002). On the other hand, prosocial youth (e.g., defenders) have similar (high) levels of social competence compared to youth who bully, but apply their skills in more prosocial and appropriate ways (Hawley, 2007; Hawley et al., 2002). Limited empirical work has examined social-cognitive skills associated with assisting or outsider behavior, but on "uninvolved" students more generally, not assistants or outsiders specifically. For example, Medeiros, Torro-Alves, Malloy-Diniz, and Minervino (2016) compared performance on executive functioning tasks among students classified as bullies, victims, bully-victims, and a control group. Those there was not an explicit "assistant" or "outsider" group, but students engaging in these behaviors could be in the control group. The researchers found few differences between the control group and other groups in terms of performance on executive functioning tasks.

Theoretical Underpinnings of Executive Functions

Social information processing (SIP) theory (Camodeca & Goossens, 2005; Crick & Dodge, 1994) links executive functions to social behavior. SIP theory describes the process by which individuals perceive and react to social stimuli: encoding and interpreting social cues (steps 1 and 2), clarifying goals (step 3), searching for response options (step 4), and selecting a response (step 5). Executive function skills are used throughout this model. For example, individuals who are low in emotion regulation and are easily emotionally aroused may have their executive function resources flooded during stressful social interactions, which leads to difficulties coping and maladaptive social information processing (Ferrier, Bassatt, & Denham, 2014). Noticing, encoding, and interpreting social cues relies heavily on selective attention, while clarifying social goals and choosing from alternate response options requires cognitive flexibility, emotion regulation, inhibition, and task initiation (Zelazo, Carter, Resnick, & Frye, 1997). Self-monitoring is used throughout all stages of this process as attentional control and regulation are governed by the ability to monitor one's thoughts and actions. Errors at any SIP step can lead to inappropriate or unsuccessful social interactions.

Executive Functions, Aggression, and Victimization

In the empirical literature, executive function skills have been broadly linked to peer relationship problems. For example, research conducted on a large national sample (Holmes, Kim-Spoon, & Deater-Deckard, 2016) found that peer problems contributed to lower executive functioning over time, and that lower executive functioning was associated with more peer problems, although this association weakened over time. Research also indicates that deficits in executive functions underlie maladaptive social information processing and subsequent aggressive behavior, particularly physical aggression (O'Toole, Monks, & Tsermentseli, 2017). This supports the idea that youth who bully through proactive aggression can be socially skilled

enough to successfully plan and enact responses that will benefit them. However, because their responses are antisocial, the actions of proactive aggressors (bullies) may not align with established moral codes and social norms (Aresenio & Lemerise, 2001).

Verlinden et al. (2014) reported that domains of executive functions were predictors of bullying and victimization among elementary children. Bullying behavior was predicted by difficulties with inhibition and global executive function deficits, while victimization was associated with inhibition as well as lower intelligence. A recent study of 10- and 11- year-olds found that youth who bully had more difficulties in the decision-making process while victims of bullying had lower cognitive flexibility (Medeiros, Torro-Alves, Malloy-Diniz, & Minervino, 2016). Other studies have also found that victims and aggressors have difficulty with executive function tasks (Fox & Boulton, 2005; Mahady Wilton et al., 2000; Monks, Smith, & Swettenham, 2005; Toblin et al., 2005).

Executive Functions and Bystander Behavior

Though researchers know the importance of bystanders, research is just emerging to help us better understand them. There is limited research on the association between defending and executive functions, but from the work that has been done, it seems that defenders (i.e., prosocial youth that help victims) do not have deficits in these skills. For example, Camodeca and Goossens (2005) found that defenders displayed adaptive social information processing and were less likely than bullies to make a hostile interpretation of social situations. Monks and colleagues (2005) reported that defenders perform better on theory of mind, deception, planning, and inhibition tasks compared to aggressors. Other studies have found that prosocial behavior is associated with strong emotional and behavioral regulation ability and constructive problem solving (Eisenberg, Fabes, Murphy, Carlo, & Karbon, 1995). A recent study by Erreygers,

Pabian, Vandebosch, and Baillien (2016) found that higher levels of impulsivity in youth ages 9 to 17 was associated with less defending behavior when witnessing cyberbullying. Lastly, Jenkins, Demaray, and Tennant (2017) found, in a sample of sixth through eighth grade youth, that executive functioning was significantly and negatively associated with defending behavior for boys, but not girls.

Very little is known about the social, emotional, and cognitive characteristics of assistants and outsiders, but they are a vital piece to the puzzle. If youth who assist would no longer encourage aggression and the outsider's inaction could be turned into something productive and prosocial, their social power could be harnessed and used to reduce or prevent bullying. We do not understand the types of cognitive skills associated with assisting and outsider behavior, but this is critical information to have. For example, if youth have difficulty regulating emotions or initiating actions without being prompted, then we can provide explicit instruction in these areas. Alternately, if assistants support youth who bully because they lack self-monitoring skills and become wrapped up in social situations without thinking, then interventions can focus on teaching self-monitoring in unstructured and/or unsupervised social situations.

Interactions among Gender, Age, Executive Functions, and Bullying Role Behavior

There are notable gender differences in many of the variables in this study, so relations among executive functions and bullying role behavior were explored separately for boys and girls. Boys are more likely to engage in direct aggression as early as preschool (Bistrong, Bradshaw, & Morin, 2016; Card, Stucky, Sawalani, & Little, 2008). Although girls in preschool may experience more indirect aggression (Bistrong et al., 2016), they experience similar levels as boys by adolescence (Card et al., 2008). Girls are more likely to defend or ignore bullying, but boys are more likely to assist peers who bully (Salmivalli et al., 1996). Boys are also more likely

to be bullies, victims, and bully-victims (Espelage & Holt, 2007). There may also be differences in executive function skills between boys and girls, but the findings are inconsistent. Some studies show that girls outperform boys on executive function measures of verbal skills and inhibitory control (Berlin & Bohlin, 2002; Carlson & Moses, 2001; Reader, Harris, Schuerholz, & Denckla, 2004), but others have not found gender effects in these areas (Welsh, Pennington, & Groisser, 1991).

In addition to gender differences, we see developmental changes in both executive functioning and bullying role behavior. There are documented differences in executive functions during childhood and adolescence, and even from adolescence into early adulthood (Lee, Bull, & Ho, 2013; Taylor, Barker, Heavey, & McHale, 2015). Many of these changes are related to maturation of the prefrontal cortex (Zelazo, Carlston, & Kesek, 2008) which is the primary cognitive controller of executive functions such as planning, problem-solving, abstract thinking, and self-control. As the prefrontal cortex develops, it allows youth to engage in increasingly complex tasks, including social tasks. We also see changes in how youth interact with one another from late elementary through middle school. There tends to an increase in bullying and victimization starting in elementary and increasing through middle school (Wang, Iannotti, & Nansel, 2009), which corresponds to a decrease in prosocial behavior middle school (Batanova, Espelage, & Rao, 2014). Taken together, for the current study it was important to consider these gender and age differences in executive functions and bullying role behavior.

The Current Study

The goal of the current study was to examine the association among different types of executive function skills (i.e., emotion regulation, initiation, self-monitoring, cognitive flexibility, and inhibition) and bullying role behavior (i.e., bullying, assisting, victimization,

defending, and outsider behavior), as well as examine differences in these relations between boys and girls. We hypothesized that bullying behavior would be negatively associated with executive function skills, aside from initiation, and that victimization would be negatively associated with executive function skills (Mahady Wilton et al., 2000; Toblin et al., 2005; Verlinden et al., 2014). Overall, previous studies suggested that executive functions support prosocial behavior, thus we expected to find positive associations between executive functions and defending in the current study (Camodeca & Goossens, 2005; Eisenberg et al., 1995; Monks et al., 2005). We further hypothesized that assisting and outsider behavior would be negatively associated with executive functions because these types of bystander actions may be the result of difficulty with perspective taking, flexible thinking, self-monitoring, and misinterpretation of social situations that impairs the ability to realize that prosocial actions are necessary. As described above, there seems to be gender differences in mean levels of engagement in the different bullying roles, but gender differences in executive function skills are not as clear. Gender differences in the main study variables were explored, but also gender differences in the relation between executive function skills and bullying role behavior.

Method

Participants

Participants included 689 students in grades third through eighth from two rural schools in the Midwestern United States. Slightly more than half of the students were male (51%) and slightly less than half were female (49%). There were 140 third graders (20.3%), 120 fourth graders (17.4%), 142 fifth graders (20.6%), 101 sixth graders (14.7%), 93 seventh graders (13.5%), and 85 eighth graders (12.3%). Eight students did not report their grade level. Seventy students received special education services (10.2%) and 50 students (7.3%) received Title 1

services. Approximately 92% of the students in these two schools completed the survey. According to Illinois Interactive Report Card, 51% of the student body are low-income (i.e., qualify for free or reduced lunch) and 95% of the students are White. Twenty-six teachers provided ratings for students (ranged from 8-30 students).

Measures

Bullying Participant Behavior Questionnaire (BPBQ; Summers & Demaray, 2008).

The BPBQ is a student self-report measure of bullying role participant behavior across five roles: Bully, Assistant, Victim, Defender, and Outsider. The Bully subscale measures an individual's frequency of engagement in aggressive acts directed toward peers (e.g., "I have pushed, punched, or slapped another student"). The Assistant subscale reflects how often the respondent encourages, joins in with, or aids bullying (e.g., "When someone else tripped another student on purpose, I laughed"). The Victim subscale measures the frequency with which the respondent experiences acts of targeted aggression from a peer (e.g., "People have tried to make others dislike me"). The Defender subscale is a measure of the respondent's frequency of engagement in behavior that support victims of bullying (e.g., "I defended someone by telling people that a rumor is not true"). Finally, the Outsider subscale represents how often the respondent ignored or chose not to get involved with bullying situations (e.g., "I ignored it when someone was calling another student bad names"). Students respond to 50 items using a 5-point Likert scale ranging from 1 = *Never* to 5 = *7 or More Times.* Higher scores on each BPBQ subscale indicate more frequent engagement in behavior or experiences related to that role. Low scores on a subscale indicate that the respondent has not engaged in the role's associated behavior or experiences.

Psychometric support for the BPBQ is strong. The measure has demonstrated acceptable to high levels of internal consistency, subscale-to-total correlations, and item-subscale

correlations (Demaray, Summers, Jenkins, & Becker, 2014). As also evidenced in the Demaray et al. article, the factor structure was supported via exploratory and confirmatory factor analysis, and preliminary evidence of validity was established through comparisons with subscales of the Behavior Assessment System for Children (BASC-2) and the Social Skills Rating System (SSRS). See Demaray et al. (2014) for additional evidence of reliability and validity. In the current study, alpha coefficients were .84, .74, .94, .93, .94, and .87 for the Bully, Assistant, Victim, Defender, and Outsider subscales, respectively.

Comprehensive Executive Function Index (CEFI; Naglieri & Goldstein, 2012). Executive Functions were measured via select subscales (Emotional Regulation, Inhibitory Control, Self-Monitoring, Initiation, and Flexibility) of the Comprehensive Executive Function Index (CEFI; Naglieri & Goldstein, 2012). The CEFI Teacher Report Form uses 90 items to assess executive functions of students ages five to eighteen. Teachers report how often specific behavior has been observed during the past four weeks using scale ranging from 0=*Never* to 5=*Always*. To reduce teacher fatigue, only five subscales were collected. The Emotion Regulation assesses the student's ability to control and manage his/her emotions (e.g., "During the past 4 weeks, how often did the child wait patiently?") The Inhibitory Control subscale consists of questions that assess a student's ability to control his/her behavior and impulses (e.g., "During the past 4 weeks, how often did the child have trouble waiting his/her turn?"). The Self-Monitoring subscale consists of items that reflect how a student evaluates his/her own behavior and performance (e.g., "During the past 4 weeks, how often did the child make careless errors?"). The Initiation subscale provides an assessment of a student's ability to motivate him/herself and start task (e.g., "During the past 4 weeks, how often did the child start something without being asked?"). Finally, the Flexibility subscale reflects a student's ability to adapt to

new situations and problem solve ("During the past 4 weeks, how often did the child solve a problem in different ways?").

Psychometric evidence for the CEFI Teacher Form version is excellent. According to the manual, acceptable to high levels of internal consistency, test-retest reliability, and interrater reliability have all been established. For more detailed information on scoring and the psychometric support for the CEFI, see the manual (Naglieri & Goldstein, 2012). In the current study, alpha coefficients were .76, .94, .92, .95, and .94 for the Self-Monitoring, Inhibitory Control, Flexibility, Initiation, and Emotional Regulation subscales, respectively.

Procedure

All students completed the Bullying Participant Behavior Questionnaire as part of a school-wide universal screening evaluation. Teachers checked for skipped items as students turned in rating scales to reduce the chance of missing data and they read items aloud to students receiving special education services for reading. Active consent from teacher participants was collected. Teachers completed the CEFI ratings within one month of the student ratings. Teacher participants had to have the student in at least one academic class and have known the student for at least six weeks. Students and teachers used school-issued student identification numbers so that data would remain anonymous to researchers, but the two rating scales could be connected later for research purposes. Later, IRB approval was given for access to the extant BPBQ data, and the two datasets were combined using identification numbers.

Data Analysis

Regression analyses were completed using MPlus to determine the associations among bullying roles and executive function skills. The five BPBQ subscales (Bully, Victim, Assistant, Defender, and Outsider) were mean-centered then entered as independent variables along with

gender interaction terms, and each of the five CEFI subscales (Emotion Regulation, Inhibitory Control, Self-Monitoring, Initiation, and Flexibility) were entered as dependent variables. Gender was dummy coded as follows: male = 0 and female = 1. Model fit was also compared for elementary school and middle school students. The fit only differed by grade when Emotion Regulation was the outcome. Therefore, all regression results are presented for the total sample except for the regressions predicting Emotion Regulation were conducting separately for elementary school and middle school students.

Results

Missing Data

The current sample had only a small portion of missing data. Approximately 7% of participants were missing one or more subscale scores across the five BPBQ subscales and five executive function subscales. All analyses were completed using the Mplus statistical software, 5th version (Muthén & Muthén, 1998-2009), which utilizes a robust method, maximum likelihood estimation, to replace missing data before running analyses.

Preliminary Analyses

Means and standard deviations for all study variables along with, and MANOVA *F* and *p* values comparing mean scores for boys and girls are presented in Table 1. Table 2 displays the intercorrelations among study variables by gender. Most variables, aside from Defending, were significantly correlated with the other study variables for both boys and girls. It should be noted that due to restricted range of some variables, correlations among some study variables may be lower.

Gender differences in the main study variables were investigated. The omnibus MANOVAs comparing the five bullying behaviors (i.e., Bullying, Assisting, Victimization, Defending, and Outsider behavior) and the five executive functions (i.e., Self-Monitoring, Inhibitory Control, Initiation, Flexibility, and Emotion Regulation) across gender were significant (F= 4.21, p= .001, Pillai's Trace= 0.03 and F= 5.48, p< .001, Pillai's Trace= 0.04 respectively). Follow-up univariate ANOVAs indicated that girls reported higher Self-Monitoring, Inhibitory Control, Initiation, and Emotion Regulation scores as well as more frequent Defending. Boys reported more frequent Assisting and Outsider behavior.

Primary Analyses

The associations among Gender, bullying participant role behavior, and executive functions were investigated through five moderated multiple regression analyses. The five BPBQ subscales (i.e., Bully, Assistant, Victim, Defender, Outsider) were entered as predictors, Gender was entered as a moderator, and each of the five CEFI subscales (i.e., Emotional Regulation, Inhibitory Control, Self-Monitoring, Initiation, Flexibility) were entered as separate outcome variables for each regression.

Each of the regression models were tested for significant differences between upper elementary students and middle school students. No significant differences were found for four of the outcome variables (i.e., Self-Monitoring, Inhibitory Control, Flexibility, and Initiation). Thus, for these four dependent variables, the regression models were conducted using the full sample. Because of the significant difference in Emotion Regulation between upper elementary school and middle school students (Wald Test of Parameter Constraints= 3.919, p= 0.047), two separate regression models (i.e., one for upper elementary school students and one for middle school students) were run predicting Emotion Regulation from the five bullying roles. See Table

3 for results of the regression analyses. The regressions were significant for all executive function outcomes, and several significant interaction effects were found.

Self-monitoring. The full collection of independent variables explained a moderate proportion of variance in Self-Monitoring (R^2=0.08). Across grade levels, Victimization was negatively and significantly related to Self-Monitoring (β=-0.51, p<.01) and Outsider Behavior (β=-0.31, p=.01). Defending, Bullying, and Assisting Behavior were not significantly associated with Self-Monitoring. The Gender by Victimization interaction was significant (β=0.30, p=.04). Additionally, the Gender by Outsider Behavior interaction was significant (β=0.28, p=.02). Follow-up regression analyses were performed to identify the simple slopes of the associations between Victimization and Outsider Behavior, respectively, and Self-Monitoring for girls by dummy coding gender as 0=girls and 1=boys. For girls, the association between Self-Monitoring and Victimization (β=-0.13, p=.06) and Outsider Behavior (β=-0.12, p=.08) was not significant. For boys, Self-Monitoring was significantly and negatively related to Victimization (β=-0.51, p<.01) and Outsider Behavior (β=-0.31, p=.01). See Figure 1.

Inhibitory control. The full model explained a moderate proportion of variance in Inhibitory Control (R^2=0.12). For both grade levels, Victimization was negatively and significantly related to Inhibitory Control (β=-0.53, p<.001). No other bullying role behavior was significantly associated with Inhibitory Control. The Gender by Victimization interaction was significantly related to Inhibitory Control (β=0.33, p=.04). Therefore, an additional regression analysis was performed to identify the simple slope of the association between Victimization and Inhibitory Control for girls by reversing the dummy coding, as described above. For girls, the association between Inhibitory Control and Victimization was not

significant (β=-0.12, p=.08). For boys, Victimization was negatively and significantly related to Inhibitory Control (β=-0.53, p<.001). See Figure 2.

Flexibility. Collectively, the independent variables explained only a small proportion of the variance in Flexibility (R^2=0.07). Victimization and Outsider Behavior were negatively and significantly related to Flexibility (β=-0.47, p<.01 and β=-0.30, p=.01, respectively) for boys. No other bullying role behavior (i.e., Defending, Bullying, or Assisting) was significantly associated with Inhibitory Control. However, three interaction effects involving Flexibility were significant. First, the Gender by Victimization interaction was significantly related to Flexibility (β=0.29, p=.04). Second, the Gender by Outsider Behavior interaction was significantly related (β=0.25, p=.02). And, third, the Gender by Bullying interaction was significantly related (β=-0.29, p=.03). Thus, three additional regression analyses were performed to identify the simple slopes of the associations between Victimization, Outsider Behavior, and Bullying, separately, and Flexibility for girls using the reversed dummy coding described above (i.e., 0=girls and 1=boys). For girls, the association among Flexibility and Victimization and Flexibility and Outsider Behavior were not significant (β=-0.10, p=.14 and β=0.05, p=.39, respectively). Victimization and Outsider Behavior were negatively and significantly related to Flexibility (β=-0.47, p<.01 and β=-0.30, p=.01, respectively) for boys. Bullying was negatively and significantly associated with Flexibility for girls (β=-0.14, p=.04), but not for boys (β=0.261, p=.06). See Figure 3.

Initiation. The full collection of bullying role behavior explained a moderate proportion of variance in Initiation (R^2=0.08). For both grade levels and genders, Outsider Behavior were negatively and significantly related to Initiation (β=-0.26, p=.04). For both grade levels, Victimization was significantly negatively associated with Initiation (β=-0.56, p<.01).

Furthermore, a significant association between the Gender by Victimization interaction and Initiation (β=0.35, p=.02) was found, necessitating the conduction of an addition regression analysis to determine the simple slope of the association between Victimization and Initiation for girls, coding gender as 0=girls and 1=boys. For girls, the association between Initiation and Victimization was not significant (β=-0.12, p=.08). Conversely, Victimization was significantly negatively associated with Initiation (β=-0.56, p<.01) for boys. See Figure 4.

Emotion regulation. Finally, the five bullying role behaviors collectively explained a moderate proportion of variance in Emotion Regulation for middle school students (R^2=0.16) and upper elementary school students (R^2=0.11). For Emotion Regulation, a significant association was found with Victimization for upper elementary school students (β=-0.60, p<.01). Defending was positively and significantly associated with Emotion Regulation for middle school students (β=0.09, p<.01). Two significant interaction effects emerged, one associated with each grade level. Specifically, the Gender by Victimization interaction was significantly related to Emotion Regulation for middle school students (β=0.52, p=.04) and Emotion Regulation for upper elementary school students (β=0.41, p=.04). As described above, an additional regression analysis was performed to identify the simple slope of the association between Victimization and Emotion Regulation for girls. For girls, Victimization was not significantly associated with Emotion Regulation at either the Upper Elementary (β=-0.02, p=.13) or Middle School level (β=-0.02, p=.91). In contrast, Victimization was significantly and negatively associated with Emotion Regulation for boys in upper elementary school (β=-0.60, p<.01). See Figure 5.

Discussion

The goal of the current study was to examine the association among different types of executive function skills and bullying role behavior for both boys and girls in upper elementary

school and middle school. Preliminary analyses found that girls reported higher levels of executive function skills than boys on four of the five variables included in the study: self-monitoring, inhibitory control, initiation, and emotion regulation. These findings are consistent with prior research that has found girls perform better on some measures of executive function (Berlin & Bohlin, 2002; Carlson & Moses, 2001; Reader et al., 2004). Girls also reported more frequently engaging in defending behavior, which matches prior research (Salmivalli et al., 1996). Lastly, boys reported more frequent bullying, assisting, and outsider behavior. Again, prior research found boys are more likely to assist peers who bully and engage in bullying (Espelage & Holt, 2007; Salmivalli et al., 1996). Although prior research has found boys are more likely to be victims or bully-victims (Espelage & Holt, 2007), the current study did not replicate those findings. Developmentally, we expected to see differences in executive functions (Lee et al., 2013; Taylor et al., 2015; Zelazo et al., 2008), but the only difference was for emotion regulation.

We hypothesized that bullying behavior would be negatively associated with executive function skills, aside from initiation (Mahady Wilton et al., 2005; Toblin et al., 2005; Verlinden et al., 2014). Given the similarity of assisting and bullying, we expected these two behaviors to relate to executive functions in similar ways. Surprisingly, bullying behavior was not significantly related to any of the executive function skills, except for one interaction with gender in relation to flexibility. Similarly, assisting behavior was not significantly related to any of the executive functions. There was not a significant association between bullying and flexibility for boys; however, for girls there was a significant and negative association. Higher levels of bullying behavior for girls were associated with lower levels of flexibility. Flexibility reflects a student's ability to adapt to new situations and problem solve. It could be that girls who

are not able to adapt or problem-solve a situation resort to bullying. The lack of association between executive functions and bullying and assisting behavior differs from prior work that has found associations between bullying behavior and deficits in global executive function deficit (Verlinden et al., 2014). A recent study, however, found that bullies did not have deficits in inhibition or flexibility (Medeiros et al., 2016). It appears that the literature on bullying and executive function deficits is inconclusive and more work is needed.

It was hypothesized that victimization would be negatively associated with executive function skills (Mahady Wilton et al., 2000; Toblin et al., 2005; Verlinden et al., 2014) as several studies have found that victims of bullying have deficits in emotion regulation and social self-efficacy, which is likely associated with initiation and other executive functions that support social problem-solving skills. In the current study, victimization was significantly and negatively associated with every executive function skill, except for emotional regulation skills for middle school students. Notably, there was a gender interaction for all of these associations (including emotional regulation for middle school students). Interestingly, for every one of the executive function skills, the association with victimization was not significant for girls, but was significant and negative for boys. For boys, higher victimization was associated with lower executive function skills, including self-monitoring, inhibition, flexibility, initiation, and emotion regulation. Thus, victimization was negatively associated with executive functions; however, this finding only held true for boys not for girls. This is a surprising finding and has important implications for intervention. Although we do not know the direction of the association, it is important to know that boys lacking executive function skills may be at an increased risk for victimization. The executive functions of victims have been explored in the literature, and victims of peer aggression are generally found to have difficulties with multiple types of

executive functions (Fox & Boulton, 2005; Mahady Wilton et al. 2000; Toblin et al., 2005). The finding that victimization is associated with deficits in executive functions for boys only is new and more work needs to be conducted on gender differences in this area. One reason could be that socially difficult situations can flood the social-cognitive resources (i.e., executive function skills) of youth. Since boys in the current sample had lower levels of executive function skills, they may be at particular risk of reaching their threshold of social-cognitive resources in social situations.

Defending behavior was not uniquely associated with any of the executive function skills, except for a significant and positive association with emotional regulation in middle school students. Thus, for middle school students, more defending behavior were associated with better emotion regulation skills for both boys and girls. The association of emotion regulation and defending is in line with prior research that has found prosocial behavior is positively associated with strong emotional and behavioral regulation skills (Eisenberg et al., 1995) and that emotional regulation improves with age. Interestingly, this association was not found in upper elementary students demonstrating there may be developmental differences in the relations among these variables. The fact that no other executive function skills were related to defending was surprising given prior research has demonstrated that executive function skills (i.e., planning, inhibition, problem-solving) support prosocial behavior such as defending (Camodeca & Goossens, 2005; Eisenberg et al., 1995; Monks et al., 2005). Emotion regulation is the ability to control and manage thoughts, feelings, and reactions to emotional events, so, hypothetically, emotion regulation may be a “prerequisite” executive function skills. If emotion regulation has not developed appropriately, youth may not have the ability to control and then channel their thoughts and behaviors toward the prosocial action of defending peers.

Although we hypothesized outsider behavior would be negatively associated with executive function skills, no research has investigated this association. In the current study, outsider behavior was negatively associated with self-monitoring, flexibility, and initiation skills. However, there was also a gender interaction with outsider behavior for both self-monitoring and flexibility. For both of these interactions, the associations were not significant for girls and significant and negative for boys. For boys, higher outsider behavior was associated with lower the self-monitoring and flexibility behavior. Thus, engaging in outsider behavior (i.e., more ignoring) was associated with less initiation, for both boys and girls; and less self-monitoring and flexibility for boys. Initiation is the ability of the student to motivate himself or herself to start a task, so this fits with the depiction of the outsider as someone who does not engage in the situation. For boys, outsider behavior was also associated with lower self-monitoring, or evaluation of one's own performance. Boys may be less reflective about their behavior even after the event and this might be related to them not intervening in the future. For boys with low flexibility skills, they may be more likely to not engage in the bullying situation when they see it happening – this may be a function of not adapting to the situation or having the ability to problem-solve.

Limitations and Future Research

The current study has several limitations. First, the sample was predominately White, limiting the generalization of results to more diverse groups. In addition, the students were from rural schools. All of the data were collected via rating scales and limits the direct assessment of the variables included in the study. However, an advantage of the current study was the use of multiple informants with teachers reporting on the executive function skills of the students. Unfortunately, not all executive function skills could be investigated due to logistics and time

demands on the teachers, thus, only a subset of executive function skills were assessed. Future research may want to include a broad assessment of various executive function assessments. Future research may also want to include both younger and older aged youth in the study to understand the association between executive functions in relation to bullying behavior at different developmental levels. Furthermore, the role of gender should continue to be investigated as the current study found gender differences in the associations among bullying role behavior and executive functions.

Implications

Though additional research is needed to confirm these findings in other samples, there are some preliminary implications that can be taken from these results. Girls who had difficulty with adaptation and problem solving (i.e., flexibility) were more likely to bully others; therefore, girls, in particular, may need to be explicitly taught alternative behaviors to engage in when in difficult social situations, rather than being aggressive towards their peers. Students with higher emotional regulation were more likely to report defending their peers. Of course, the causal direction of this association cannot be known in the cross-sectional study, but it may be important to teach students who to regulate their emotional reactions, particularly in social settings. Teaching regulation skills (e.g., deep breathing, thinking of alterative behaviors, walking away) may not directly increase defending behavior, but may at least remove a barrier to prosocial helping. Finally, if students lack skills in how to begin social interactions (i.e., initiation) they may benefit from explicit instruction in what to say. Students could be taught what to say to victims or perpetrators if they observe bullying. If removing the question of what to say through training of these skills, a barrier to defending can be removed. Similarly, boys in particular could benefit from training of how monitor their own behavior (i.e., self-monitoring).

Overall, findings from this cross-sectional study do not lead directly to interventions that could be immediately implemented to reduce bullying in schools, but it has identified some potential barriers that could be taken down through explicit training to reduce bullying behavior and increase defending.

A search of the literature did not reveal any studies focused on the implementation of executive function intervention to change or reduce bullying-related or bystander-related behavior; however, there is empirical evidence that executive function interventions can be used to improve social competence more generally. For example, the Social Competence Intervention for Adolescents (SCI-A) is designed to help individuals with more severe social difficulties, such as those with high-functioning Autism Spectrum Disorders, become more aware of social situations and improve social skills (Stichter et al., 2010; Stichter, O'Connor, Herzog, Lierheimer, & McGhee, 2012). This is just one example of how evidence-based interventions of executive functions can improve social competence for youth who struggle in social situation.

Conclusions

The goal of the current study was to examine executive function skills and deficits associated with five different bullying role behaviors with a sample of upper elementary and middle school students. Some bullying role behaviors were found to be related to executive functions and these associations differed by gender. Bullying was negatively associated with flexibility for girls only. Victimization was significantly and negatively associated with each executive function for boys only. Defending was positively associated with emotion regulation for middle school students, but not upper elementary students. Outsider behavior was significantly and negatively associated with self-monitoring and flexibility for boys only and

with Initiation for both boys and girls. These findings highlight the need to help students develop strong executive function skills.

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Table 1

Means and Standard deviations of Main Study Variables and MANOVA Results Testing Gender Differences

		M	*SD*	Minimum	Maximum	*F*	*p*
Self-Monitoring	Boys	26.45	6.98	13.00	41.00	6.68	**.010**
	Girls	27.92	6.43	11.00	46.00		
Inhibitory Control	Boys	33.24	10.36	3.00	50.00	16.15	**<.001**
	Girls	36.44	9.22	4.00	50.00		
Flexibility	Boys	18.86	6.99	3.00	35.00	3.19	.074
	Girls	19.90	6.88	2.00	35.00		
Initiation	Boys	30.35	11.34	3.00	50.00	6.31	**.012**
	Girls	32.21	9.97	3.00	50.00		
Emotional Regulation	Boys	32.00	9.16	3.00	45.00	6.00	**.015**
	Girls	33.74	8.26	3.00	45.00		
Bullying	Boys	2.51	4.00	0.00	28.00	3.98	.061
	Girls	1.99	3.16	0.00	22.00		
Victimization	Boys	8.33	8.93	0.00	40.00	0.14	.460
	Girls	8.80	9.64	0.00	40.00		
Defending	Boys	12.57	10.41	0.00	40.00	6.76	**.001**
	Girls	15.04	11.61	0.00	40.00		
Assisting	Boys	1.49	2.96	0.00	20.00	7.62	**.004**
	Girls	0.93	1.99	0.00	16.00		
Outsider Behavior	Boys	3.10	5.02	0.00	40.00	5.59	**.017**
	Girls	2.25	3.96	0.00	27.00		

Note. Differences between boys and girls on the main study variables were assessed using MANOVAs for executive functioning (top half, $N = 644$) and bullying roles (bottom half, $N = 676$). Corresponding univariate F and p values are listed in the table. Significant analyses are in bold.

Table 2
Intercorrelations among Main Study Variables for boys and girls

	1	2	3	4	5	6	7	8	9	10
1. Self-Monitoring		.81**	.91**	.90**	.70**	-.08	-.30**	-.08	-.11*	-.15**
2. Inhibitory Control	.78**		.78**	.80**	.90**	-.20**	-.32**	-.06	-.15**	-.22**
3. Flexibility	.88**	.75**		.89**	.68**	-.10	-.26**	-.04	-.11*	-.17**
4. Initiation	.88**	.76**	.89**		.68**	-.09	-.30**	-.09	.10	.16**
5. Emotion Regulation	.64**	.88**	.63**	.64**		-.22**	-.31**	-.01	-.12*	-.20**
6. Bullying	-.11*	-.23**	-.17**	-.16**	-.22**		.33**	-.01	.56**	.52**
7. Victimization	-.12*	-.17**	-.11*	-.11**	-.12*	.29**		.38**	.30**	.23**
8. Defending	.04	.03	.06	.09	.06	.-.06	.43**		.02	-.03
9. Assisting	-.06	-.14**	-.12*	-.11**	-.12*	.46**	.31**	.01		.45**
10. Outsider Behavior	.02	-.15**	-.05	-.05	-.17**	.38**	.25**	.04	.41**	

Note. Correlations above the diagonal are for boys, below the diagonal for girls. * $p < .05$, ** $p < .01$.

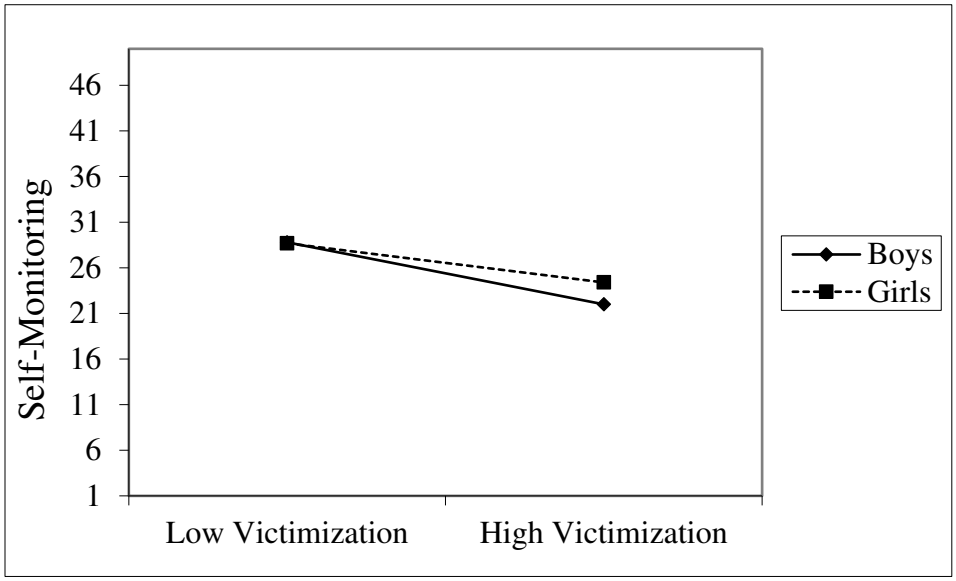
Table 3
Summary of Regression Analyses with Bullying Role Behaviors and Executive Functioning Skills

EF Outcome	School Level	Bullying Role Behavior	*β*	*SE β*	R^2	*Sig.*
Self-Monitoring	Both				0.08	<.001
		Bullying	0.26	0.16		.10
		Assisting	-0.02	0.14		.88
		Victimization**	-0.51	0.14		<.01
		Defending	-0.02	0.13		.90
		Outsider*	-0.31	0.12		.01
		Gender*	0.08	0.04		.02
		Gender X Bullying	-0.26	0.14		.08
		Gender X Assisting	0.01	0.13		.99
		Gender X Victimization*	0.30	0.14		.04
		Gender X Defending	0.09	0.13		.51
		Gender X Outsider*	0.28	0.12		.02
Inhibitory Control	Both				0.12	<.001
		Bullying	0.08	0.16		.58
		Assisting	0.08	0.15		.58
		Victimization**	-0.53	0.15		<.01
		Defending	0.05	0.14		.70
		Outsider	-0.20	0.12		.10
		Gender**	0.13	0.04		<.01
		Gender X Bullying	-0.20	0.14		.19
		Gender X Assisting	-0.06	0.14		.65
		Gender X Victimization*	0.33	0.16		.04
		Gender X Defending	0.01	0.14		.93
		Gender X Outsider	0.11	0.12		.34
Flexibility	Both				0.07	<.001
		Bullying	0.26	0.14		.06
		Assisting	0.06	0.13		.67
		Victimization**	-0.47	0.14		<.01
		Defending	0.05	0.13		.69
		Outsider**	-0.30	0.11		<.01
		Gender	0.03	0.04		.37
		Gender X Bullying*	-0.29	0.14		.03
		Gender X Assisting	-0.08	0.13		.53
		Gender X Victimization*	0.29	0.15		.04
		Gender X Defending	0.04	0.13		.80
		Gender X Outsider*	0.25	0.11		.02
Initiation	Both				0.08	<.001
		Bullying	0.24	0.14		.08
		Assisting	0.06	0.15		.69
		Victimization**	-0.56	0.15		<.01

		Defending	-0.06	0.14		.67
		Outsider*	-0.26	0.13		.04
		Gender*	0.08	0.04		.04
		Gender X Bullying	-0.26	0.14		.06
		Gender X Assisting	-0.08	0.14		.59
		Gender X Victimization*	0.35	0.15		.02
		Gender X Defending	0.15	0.13		.28
		Gender X Outsider	0.22	0.13		.08
Emotion Regulation	Middle School				0.16	<.01
		Bullying	-0.07	0.31		.86
		Assisting	0.01	0.27		.82
		Victimization	-0.70	0.24		.98
		Defending**	0.09	0.20		<.01
		Outsider	-0.01	0.19		.65
		Gender	-0.01	0.06		.86
		Gender X Bullying	-0.06	0.28		.84
		Gender X Assisting	0.01	0.28		.98
		Gender X Victimization*	0.52	0.25		.04
		Gender X Defending	-0.10	0.21		.62
		Gender X Outsider	-0.17	0.17		.32
	Upper Elementary				0.11	<.01
		Bullying	0.03	0.18		.87
		Assisting	0.16	0.19		.40
		Victimization**	-0.60	0.20		<.01
		Defending	0.34	0.18		.05
		Outsider	-0.11	0.20		.59
		Gender**	0.15	0.05		<.01
		Gender X Bullying	-0.16	0.17		.36
		Gender X Assisting	-0.14	0.16		.40
		Gender X Victimization*	0.41	0.20		.04
		Gender X Defending	-0.19	0.18		.30
		Gender X Outsider	0.12	0.18		.53

Note. Gender was dummy coded (0=Male, 1=Female); * $p<.05$; ** $p<.01$, $N = 683$.

Figure 1. The Interaction Effects of Gender and Victimization and Gender and Outsider Behavior on Self-Monitoring



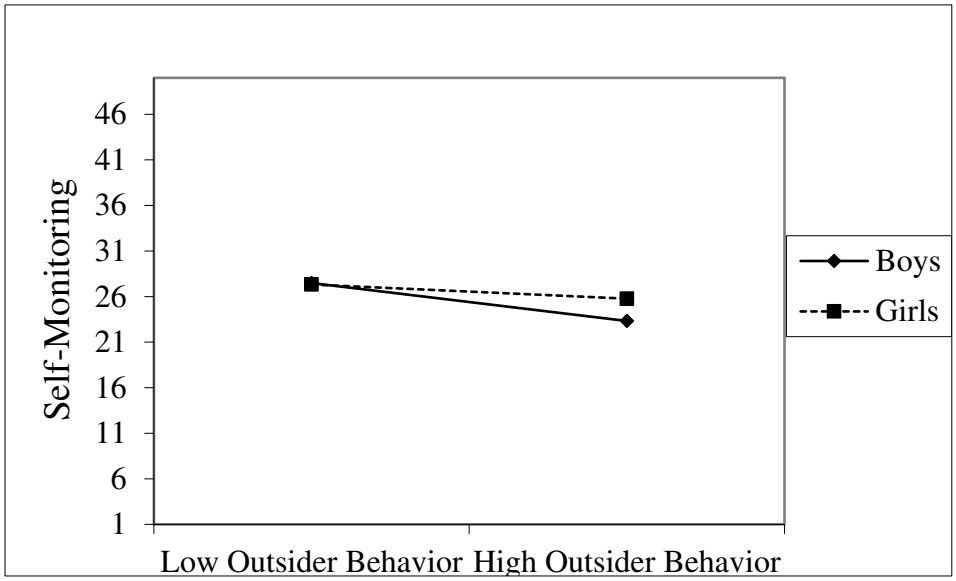


Figure 2. The Interaction Effect of Gender and Victimization on Inhibitory Control

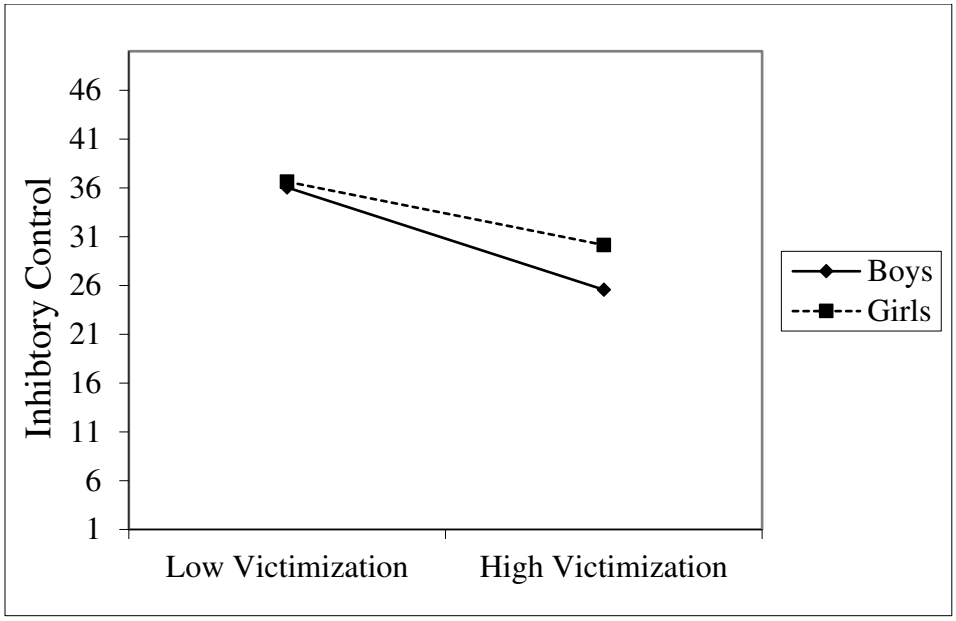


Figure 3. The Interaction Effects of Gender and Bullying, Gender and Victimization, and Gender and Outsider Behavior on Flexibility

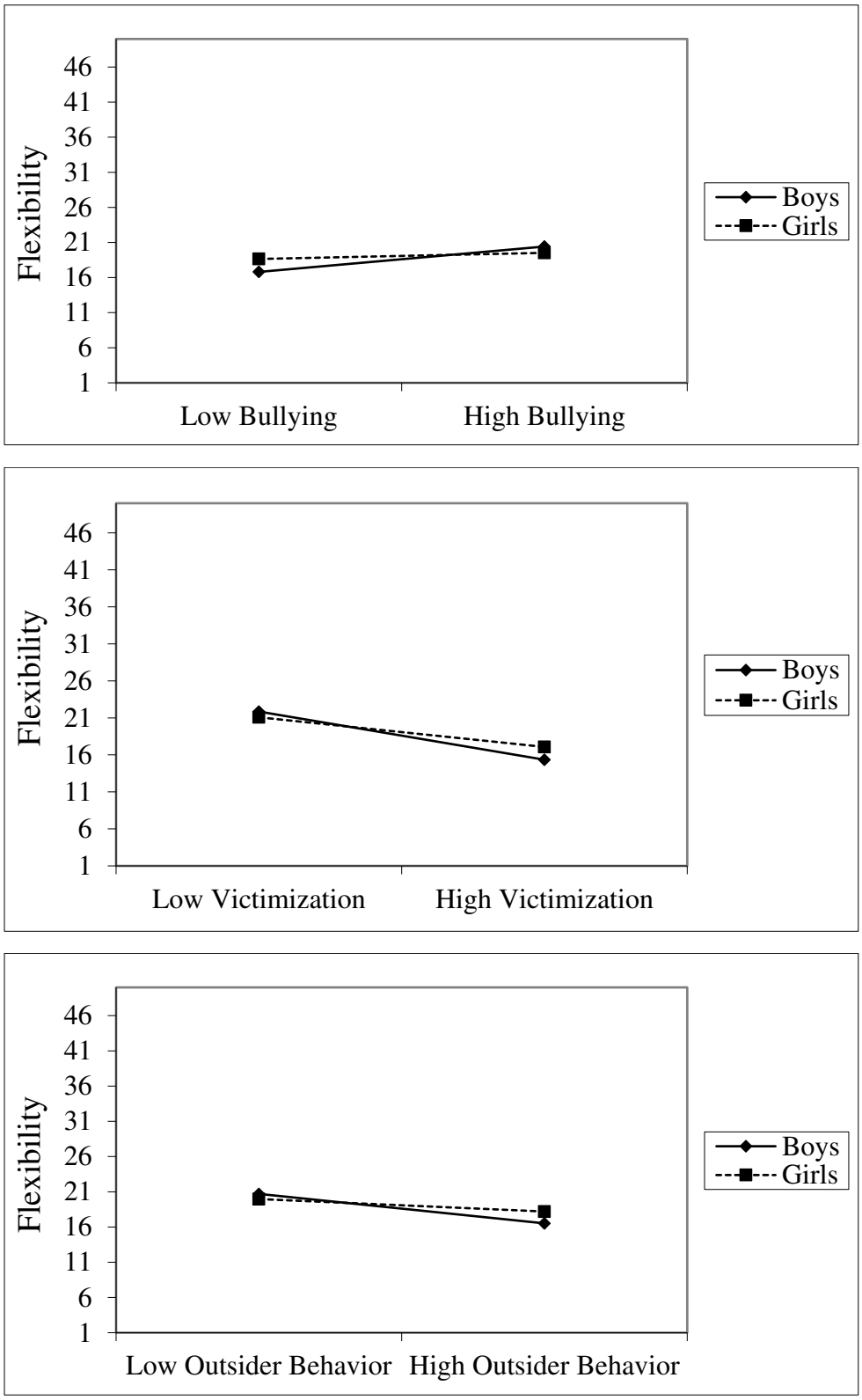


Figure 4. The Interaction Effect of Gender and Victimization on Initiation

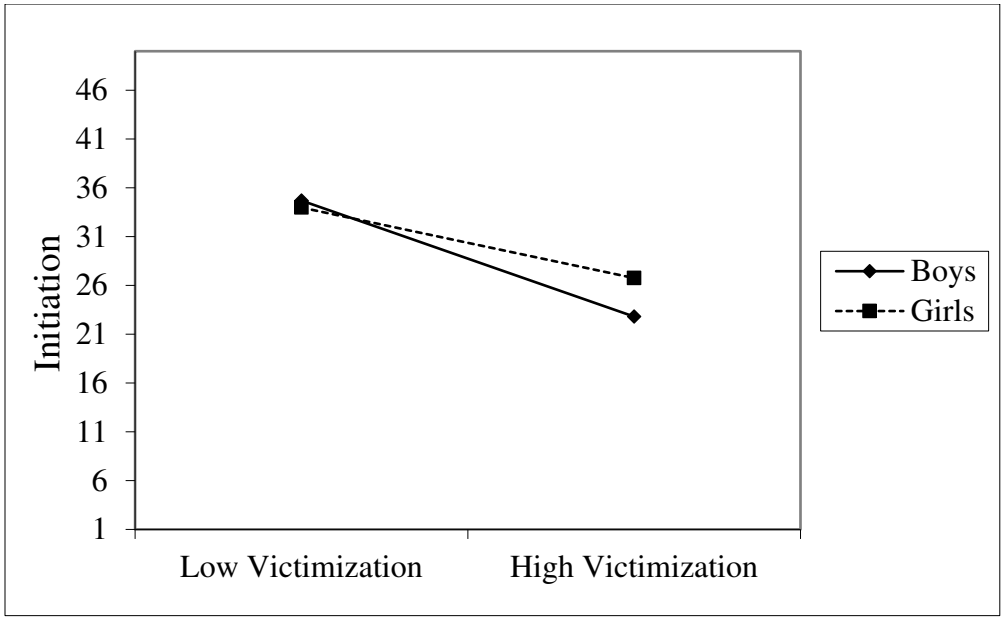


Figure 5. The Interaction Effect of Gender and Victimization on Emotion Regulation for Middle School Students and Upper Elementary Students