



Cumulative Bullying Experiences, Adolescent Behavioral and Mental Health, and Academic Achievement: An Integrative Model of Perpetration, Victimization, and Bystander Behavior

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Abstract

Bullying is often ongoing during middle- and high-school. However, limited research has examined how cumulative experiences of victimization, perpetration, and bystander behavior impact adolescent behavioral and mental health and academic achievement outcomes at the end of high school. The current study used a sample of over 8000 middle- and high-school students (51% female; mean age 12.5 years) from the Rural Adaptation Project in North Carolina to investigate how cumulative experiences as a bullying victim and perpetrator over 5 years, and cumulative experiences of bystander behavior over 2 years impacted students' aggression, internalizing symptoms, academic achievement, self-esteem, and future optimism. Following multiple imputation, analysis included a Structural Equation Model with excellent model fit. Findings indicate that cumulative bullying victimization was positively associated with aggression and internalizing symptoms, and negatively associated with self-esteem and future optimism. Cumulative bullying perpetration was positively associated with aggression and negatively associated with future optimism. Cumulative negative bystander behavior was positively associated with aggression and internalizing symptoms and negatively associated with academic achievement and future optimism. Cumulative prosocial bystander behavior was positively associated with internalizing symptoms, academic achievement, self-esteem, and future optimism. This integrative model brings together bullying dynamics to provide a comprehensive picture of implications for adolescent behavioral and mental health and academic achievement.

KeyWords Bullying · Victimization · Perpetration · Bystander Behavior · Adolescence

Introduction

The National Academies of Sciences, Engineering, and Medicine has deemed bullying a significant public health problem given that between 18–31% of U.S. youth are

involved in bullying (See Rivara and Le Menestral (2016) for a review). Most recently, in 2015, a nationally representative survey estimated that 20% of all U.S. high school students reported being bullied on school property during the prior 12 months (Centers for Disease Control and Prevention (2016)). However, rates of bullying might be even higher in rural areas as small-scale studies of rural elementary- and middle-school youth have found victimization rates ranging from 33 to 82% (Dulmus et al. (2004); Stockdale et al. 2002). Rural living presents a number of unique stressors that impact children and adolescents that might account for these increased bullying rates; geographic isolation, limited public transportation, restricted social networks, minimal community resources in rural areas, limited access to mental health services, and rural youth reporting high rates of boredom and risk taking behavior (i.e., substance use, sexual activity, and bringing weapons to school (Atav and Spencer 2002; Willging et al. 2014; Witherspoon and Ennett 2011)).

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A substantial body of research documents the negative outcomes associated with bullying victimization and perpetration; however, rigorous longitudinal research focused on rural youth is lacking. Victims typically report poor outcomes in the form of increased internalizing symptoms (e.g., depression, anxiety) and reactive aggression, decreased self-esteem and self-image, and poor academic performance (Camodeca and Goossens 2005; Turner et al. 2013). Additionally, youth who bully suffer from negative behavioral health outcomes that endure over time, and often display high rates of proactive and reactive aggression even outside of bullying situations (Camodeca, Gossens, Terwogt & Schuengel, 2002; Olweus 1993). A meta-analysis of six longitudinal studies of the effects of bullying ranging from 9 months to 11 years post-bullying found that, compared to non-bullied youth, those who had been bullied were more than twice as likely to report psychosomatic problems (Gini and Pozzoli (2013)). Two meta-analyses indicated that victimized youth were at increased risk for internalizing and externalizing problems an average of 6.9 years post-victimization. Youth who bullied others displayed increased levels of criminal offending up to 11 years post-bullying (Ttofi et al. 2011a, b).

Such longitudinal studies have contributed to the bullying research base in important ways. However, they did not consider if and how cumulative involvement as a bullying victim or perpetrator impacts later behavioral and mental health and academic outcomes. Researchers often examine reports of bullying at one point in time; whereas cumulative bullying refers to adolescents' report of multiple bullying experiences over the course of middle- and high-school. The aforementioned studies measured bullying and victimization at a single time point and therefore did not capture whether youth engaged in bullying or experienced victimization more than once during childhood. Furthermore, they did not specify whether participants had the same childhood bullying victimization and/or perpetration experiences through middle- to high-school and failed to examine bystander behavior, a critical role played by witnesses of the bullying event who respond by either reinforcing the abuse or helping the victim.

Bullying roles (e.g., victim, perpetrator, and bystander) could be stable over time, leading to the need to test the deleterious effects of chronic bullying involvement, a more severe stressor than cursory or episodic involvement at one point in time. While one extant study (Evans et al. 2014) examined how cumulative bullying victimization related to future optimism, self-esteem, depression, anxiety, and aggression, this study did not examine the impact of cumulative bullying perpetration and cumulative bystander behavior on these outcomes. Further, this research did not examine the impact of cumulative bullying experiences on academic outcomes. In addition, classification studies using

Latent Class Analysis have looked at classes of youth involved in bullying and one study found a low involvement group, a victim group, and a bully-victim group (Goldweber et al. 2013); however, this research base did not examine youth involved in the bullying dynamic as bystanders nor did these studies relate group profiles to multiple behavioral, mental health, and academic outcomes. Bystanders are vital to the power-imbalance inherent in bullying dynamics through encouraging or joining in the bullying (i.e., negative bystander) or by intervening in support of the victim (i.e., prosocial bystander). Engaging in negative or prosocial bystander behaviors over time could be associated, respectively, with engagement in other negative or prosocial behaviors and outcomes over time. There is very limited research on bystanders and the National Academies of Sciences, Engineering, and Medicine has made a call to collect more longitudinal data on bystanders (Rivara and Le Menestral (2016)).

The bullying research literature is extensive, but tends to be segregated into studies devoted separately to victimization, perpetration, or bystander behavior. The current study aimed to synthesize these disparate areas within one integrative model by ascertaining how involvement as a bullying victim, perpetrator, negative bystander, or prosocial bystander over 5 years beginning in middle school was associated with adolescent behavioral and mental health (i.e., aggression, internalizing symptoms, self-esteem, future optimism) and academic achievement at the end of high school. Within this integrative model of bullying roles, we examined cumulative bullying experiences over time to consider how the chronic stress of bullying is connected to adolescent psychosocial outcomes. Bullying victimization is an example of toxic stress, especially when it is cumulative and occurs year after year. The term dose-response refers to the concept that differing degrees of exposure (i.e., dose) to a stimulus results in differing outcomes (i.e., responses; Waddell 2010). Past research has established a dose-response relationship between bullying victimization and behavioral health outcomes – increased exposure to bullying victimization, both over time and in terms of multiple types (e.g., traditional, cyber, relational, verbal) is associated with progressively worse behavioral health outcomes (Evans et al. 2014; Wolke et al. 2015).

Minimal existing research has examined if there is a dose-response relationship between bullying perpetration and behavioral and mental health outcomes, such as aggression or internalizing problems. However, aggression researchers have long confirmed that there is a dose-response relationship between aggression and future aggression. For example, there are well-established developmental pathways from minor aggression to more severe crime and delinquency (See Loeber and Burke 2011 for a review). Based on this research, it appears that as youth

become increasingly entrenched in an aggressive lifestyle, the more aggressive behavior they display. It follows that this relationship would extend to bullying and that engaging in bullying perpetration over time could increase the prevalence of other negative behaviors (e.g., aggression) in a dose-response manner – the more bullying perpetration youth engage in, the more aggressively they behave. Youth who engage in bullying perpetration over time likely do so because they receive some benefit, which reinforces their bullying behavior. Although disliked by some classmates, children who bully others are often viewed as popular (de Bruyn 2010; Vaillancourt et al. 2003) and seem to gain additional social status from their bullying. Perhaps due to their high levels of perceived popularity and power among their peers, bullies commonly report levels of self-esteem on par with levels reported by youth not involved in bullying (Pollastri et al. 2009). Given the positive reinforcement from popularity and power, bullying perpetrators might also report high future optimism and self-esteem, increasing over time in a dose-response manner.

Witnessing bullying as a bystander could also be considered a toxic stress as youth often feel powerless to stop the bullying and worry they might become the next victim, which may lead to poor health outcomes. It is possible that ongoing participation in negative or prosocial bystander behavior impacts and shapes other behaviors in a dose-response manner; the more negative or prosocial bystander behavior youth engage in, the more their behavioral health and academic outcomes are influenced. There is minimal research examining negative and prosocial bystander behavior specifically, and the minimal research on bystander behavior in general suggests the experience of witnessing bullying is associated with poor mental health. One study found that witnessing bullying was associated with a significant increase in interpersonal sensitivity, helplessness, and suicidal ideation (Rivers and Noret 2013). Being a bystander was also found to be significantly associated with increased somatic complaints, depression, anxiety, and substance use (Rivers et al. 2009). Witnessing bullying over and over again can be considered a form of toxic stress. However, it is unclear if these aforementioned results extend specifically to bystanders who engage in negative or prosocial behavior and how cumulative bystander behavior is related to psychosocial outcomes.

Engagement in negative bystander behavior entails supporting the bullying perpetrator's actions directly by joining in the bullying or indirectly by cheering or verbally supporting the perpetrator; negative bystanders participate in anti-social and aggressive behaviors. Youth who reported bullying others and engaging in high rates of physical and verbal perpetration (i.e., general youth violence perpetration and not bullying perpetration) had a significantly higher probability of reporting negative bystander behavior (Evans

and Smokowski 2017). This finding suggests that negative bystander behavior is associated with aggression. However, research is needed to investigate the link between negative bystander behavior and adolescent behavioral or mental health (e.g., internalizing symptoms, future optimism), and academic achievement. There is very limited research on bystander behavior in general and negative bystander behavior specifically. In fact, there is no prior research examining the link between negative bystander behavior and the aforementioned outcomes, highlighting the importance of the current research.

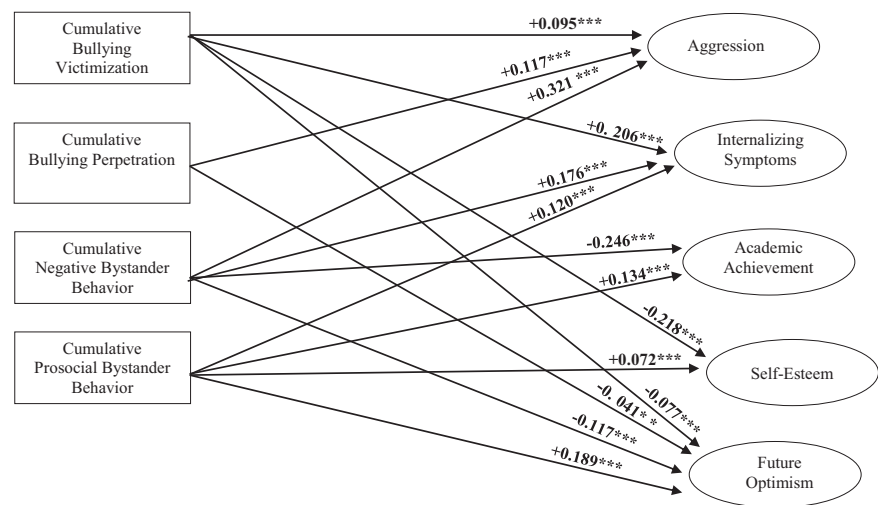
The main research question guiding the current study is: how are cumulative bullying experiences associated with adolescent behavioral and mental health (i.e., aggression, internalizing symptoms, self-esteem, future optimism) and academic achievement)? Based on past research and exploratory data analysis conducted by the authors, it is hypothesized that: 1) cumulative bullying victimization would be positively associated with aggression and internalizing symptoms, and negatively associated with academic achievement, self-esteem, and future optimism; 2) cumulative bullying perpetration would be positively associated with aggression and future optimism; 3) cumulative negative bystander behavior would be positively associated with aggression and internalizing symptoms and negatively associated with academic achievement and future optimism; and 4) cumulative prosocial bystander behavior would be negatively associated with internalizing symptoms and positively associated with academic achievement and future optimism. A hypothesis about the relationship between prosocial bystander behavior and self-esteem was not made given conflicting past research. Figure 1 depicts the associations between the variables of interest. Paths between variables that were not included in the final model lacked a foundation from past research and were not significant in exploratory analysis. For example, based on past research and exploratory analysis, there was no support for a relationship between prosocial bystander behavior and aggression. Consequently, this path was not included in the final model.

Method

Participants

The sample was comprised of 8030 adolescents in Grades 6 through 12. Participating children in grades 6–8 were recruited in Year 1 and were followed for the next 5 years throughout middle- and high-school. Each year all the incoming sixth graders in one county were added to the sample and due to the large size of the school district in the second county, a random sample of 500 sixth graders was

Fig. 1 Structural Equation Model of the Relationship Between Cumulative Bullying Experiences and Adolescent Behavioral and Mental Health and Academic Outcomes. Note: For parsimony, the items for each latent factor are not shown, however Table 2 presents the factor loadings for each item. Path coefficients are standardized. * $p < .05$; ** $p < .01$; *** $p < .001$. CFI = 0.995, TLI = 0.994, RMSEA = 0.033



added to the sample. These sixth grade cohorts were tracked longitudinally as they moved through middle- and high-school. All students were eligible to participate. The average age of the sample in year 5 was 12.48 years and about half of the sample were female (50.7%). The race/ethnicity of the sample reflected the diversity of the surrounding community and 29.6% identified as Caucasian, 26.1% as African American, 25.2% as American Indian, 11.4% as mixed race/other, and 7.8% as Hispanic/Latino. Over half of the sample resided with two parents (54.5%) and most (83.3%) received free/reduced price lunch.

Procedure

The Centers for Disease Control and Prevention and the National Institute of Justice funded the current research through a cooperative agreement and grant with the North Carolina Youth Violence Prevention Center's Rural Adaptation Project (RAP). RAP is a 5-year longitudinal panel study of more than 8000 middle- and high-school students from 26 public middle schools and 12 high schools in two rural, economically disadvantaged counties in North Carolina. In Year 1, a complete census of all middle school students in Grades 6 through 8 was taken in County 1 and each year the incoming class of sixth graders was added to the sample. County 2 was geographically larger with a student population approximately 40% larger than County 1, thus a random sample of 40% of middle school students was taken in Year 1 and each subsequent year a random sample of 500 sixth graders was added to the sample. Students in Counties 1 and 2 were tracked as they moved through middle school and into high school so that by Year 5, the RAP sample included students in Grades 6 through 12. The independent variable of cumulative bullying victimization used data from Year 1 through Year 5, cumulative bullying perpetration used data from Year 2 through Year 5,

and cumulative negative and prosocial bystander behavior used data from Year 4 and Year 5. The dependent variables were drawn from Year 5 data.

The Institutional Review Board of the University of North Carolina at Chapel Hill approved the current study. Nearly identical data collection procedures were used in both counties, with the exception of parental consent. In accordance with school district policies, County 1 adopted the RAP assessment as part of the normal school procedures, while County 2 sent a letter home to all parents/caregivers explaining the RAP study. Parents/caregivers who did not want their child to participate were advised to return a letter requesting non-participation and the removal of their child from the study roster; no such letters were received.

In both counties, participants filled out the School Success Profile Plus (SSP+) assessment in school computer labs (during the school day) closely monitored by research staff. All participants were notified that participation was voluntary and that they could skip any question they did not want to answer or could withdraw at any time without negative consequences or loss of incentive. Each participant assented to participate by reading and electronically signing an assent screen. No identifying information was collected in the assessment and each participant had a unique identification number to maintain confidentiality. The SSP+ assessment took 30 - 45 min to complete and participants received a \$5 gift card for their time and effort.

Measures

The School Success Profile (SSP) is a 195-item youth self-report with 22 scales measuring perceptions of school, friends, family, neighborhood, self, health and well-being (Bowen and Richman 2008). Created in 1993, the SSP has been administered to tens of thousands of students in the

ensuing two decades; its reliability and validity have been well documented (Bowen et al. 2005). The RAP project used a modified version of the SSP, the School Success Profile Plus (SSP+). The SSP+ was used throughout the 5 years of the RAP study and numerous articles have been published using this instrument (e.g., Cotter et al. 2014; Smokowski et al. 2016a; Smokowski et al. (2016b)). The current study used one of the original SSP scales (future optimism), five scales added to the SSP+ (aggression, internalizing symptoms, self-esteem, negative bystander behavior, prosocial bystander behavior), and five items added to the SSP+ (bullying perpetration, bullying victimization, and three items assessing academic achievement).

Cumulative bullying victimization

Similar the Youth Risk Behavior Surveillance Survey (YRBSS; CDC, 2016), bullying victimization was measured by a dichotomous variable that asked students: “During the past 12 months, have you ever been bullied on school property?” The response options were Yes coded as 1 and No coded as 0. To create a cumulative bullying victimization variable, the score on this item was summed for Year 1 through Year 5. Scores ranged from 0 (never victimized) to 5 (victimized throughout 5 years- Year 1 through Year 5). Participants who were missing three, four, or 5 years of data were dropped from the analysis ($n=2997$). While we can assess if a youth was victimized at least once every year, the frequency of victimization per year is unknown. Therefore, this measure provides a limited dose response view of youth being victimized multiple years throughout middle- and high-school.

Cumulative bullying perpetration

In line with how the YRBSS (CDC, 2016) assesses bullying victimization, bullying perpetration was measured by a dichotomous variable that asked students: “During the past 12 months, have you bullied someone weaker than you?” The response options were Yes coded 1 and No coded 0. This question was added to the SSP+ in Year 2 of the study. To create a cumulative bullying perpetration variable, the score on this item was summed for Years 2 through 5. Scores ranged from 0 (never bullied others) to 4 (bullied others for 4 years- Year 2 throughout Year 5). Participants who were missing two, three, or 4 years of data were dropped from the analysis ($n=2403$).

Cumulative negative bystander behavior

Negative bystander behavior was defined as any behavior that supported the bully perpetrators actions. Like many of the scales used on the SSP+, the negative bystander scale

was a modified version of a longer scale (The Colorado Trust Bullying Prevention Initiative Student Survey; Colorado Trust 2014). A prompt preceded the three-item measure: “When you see someone else being bullied, how often do you behave in the following ways?” Items included: “I cheered when someone was beating up another student,” “I joined in when students were teasing and being mean to certain students,” and “I joined in when students told lies about another student.” Each item was rated on a 4-point Likert scale (*Never, Once, Sometimes, Often*). The Cronbach’s alpha was 0.76 in Year 4 ($M = 1.23$, $SD = 0.50$) and 0.78 in Year 5 ($M = 1.22$, $SD = 0.50$).

Data from the negative bystander scale were available for Years 4 and 5 of the RAP study. To create the cumulative negative bystander scale, a dichotomous variable was first created for Year 4 and for Year 5; if a participant reported *Never* behaving as a negative bystander he/she received a score of 0 and if a participant reported *Once, Sometimes, or Often* behaving as a negative bystander he/she received a score of 1. These dichotomized scores were then added up over the two data points (Year 4 and Year 5) so that the score on the cumulative negative bystander scale ranged from 0 (never engaged in negative bystander behavior) to 2 (engaged in negative bystander behavior for 2 years – Year 4 and Year 5). Participants with 1 year of missing negative bystander data were not included ($n = 4514$).

Cumulative prosocial bystander behavior

Prosocial bystander behavior was defined as any action taken on the part of a bystander to protect or defend the victim. Four modified items from the Defender Scale of the Participant Role Questionnaire (PRQ; Salmivalli et al. 1996) were used to assess prosocial bystander behavior. The original items from the PRQ are short, so three items were altered to include more information. The PRQ item “Comforts the victim afterward” was reworded to read, “I tried to comfort the person who always gets pushed, shoved, or teased;” the PRQ item “Tells some adult about the bullying” was reworded to read, “I asked an adult to help someone who was getting pushed, shoved, or teased;” and the PRQ item “Encourages the victim to tell the teacher about the bullying” was reworded to read “I encouraged the person who gets pushed, shoved, or teased to tell a teacher.” The defender subscale has items assessing how the bystander attempted to defend the victim; however, due to limited space on a lengthy assessment, these items were combined into a single item that read, “I tried to defend the students who always get pushed, shoved, or teased.” Each item was rated on a 4-point Likert scale (*Never, Once, Sometimes, Often*). Cronbach’s alpha was 0.91 in Year 4 ($M = 1.97$, $SD = 0.98$) and 0.91 in Year 5 ($M = 1.91$, $SD = 0.99$).

The cumulative prosocial bystander scale was created in an identical manner to the cumulative negative bystander scale so that scores ranged from 0 (never a prosocial bystander) to 2 (engaged in prosocial bystander behavior for 2 years-Year 4 and Year 5). Participants with 1 year of missing prosocial bystander data were not included ($n = 4489$).

Aggression

Aggression was measured using a modified 6-item aggression subscale from the Youth Self-Report (YSR; Achenbach and Rescorla 2001). The RAP study traditionally used a 12-item subscale, but following an omnibus exploratory factor analysis, six items were removed due to low path coefficients. Example items included: “I get in many fights” and “I break rules at home, school, or elsewhere.” Each item was rated on a 3-point Likert scale (*Not Like Me, A Little Like Me, A Lot Like Me*). Aggression data from Year 5 were used in the current study and the Cronbach’s alpha was 0.90 ($M = 1.31$, $SD = 0.43$).

Internalizing symptoms

Internalizing symptoms were measured with seven items from the YSR that assess symptoms of anxiety and depression (Achenbach and Rescorla 2001). Items included: “I often feel sad” and “I often feel nervous or tense.” Items were rated on a 3-point Likert scale (*Not Like Me, A Little Like Me, A Lot Like Me*). Internalizing symptoms data from Year 5 were used and the Cronbach’s alpha was 0.92 in the current sample ($M = 1.40$, $SD = 0.52$).

Academic achievement

Three items were used to assess academic achievement: 1) “What kind of grades did you make on your most recent report card?”; response options were dichotomized into High Grades coded as 1 (*Mostly A’s and B’s*) and Low Grades coded as 0 (*Mostly B’s and C’s, Mostly C’s, Mostly C’s and D’s, Mostly D’s and F’s*); 2) “How many D’s or F’s did you make on your most recent report card?” (*None, One, Two, Three or More*), dichotomized into Yes-Received a D or F coded as 1 (*One, Two, Three or More*) and No-Did Receive a D or F coded as 0; and 3) “Compared to other students in your class, how would you describe your grades?”; response options were dichotomized into Yes-Better Than Most coded as 1 (*Much Better Than Most, Better Than Most*) and No-Not Better Than Most coded as 0 (*About the Same As Most, Worse Than Most, Much Worse Than Most*). Year 5 academic achievement data were used and the Cronbach’s alpha was 0.67 ($M = 0.60$, $SD = 0.38$).

Self-esteem

Self-esteem was measured using an 8-item modified version of the Rosenberg Self-Esteem Scale (Rosenberg 1965). Example items included: “I feel good about myself” and “I am able to do things as well as most other people.” Each item was rated on a 3-point Likert scale (*Not Like Me, A Little Like Me, or A Lot Like Me*). Year 5 self-esteem data were used and the Cronbach’s alpha reliability was 0.97 ($M = 2.59$, $SD = 0.56$).

Future optimism

Expectations for future success were assessed with the 12-item Future Optimism scale (Bowen and Richman 2008). Example items included: “When I think about my future, I feel very positive” and “I see myself accomplishing great things in life.” Each item was rated on a 4-point Likert scale (*Strongly Disagree, Disagree, Agree, and Strongly Agree*). Year 5 future optimism data were used and Cronbach’s alpha reliability was 0.97 in the current sample ($M = 3.32$, $SD = 0.71$).

Data Analyses

Missing data

There were missing values on nearly all the variables and items used in the analysis, ranging from 2403 (30%) for bullying perpetration to 4514 (56%) for negative bystander behavior. With categorical items, the model was too complex for full information maximum likelihood, so multiple imputation was used instead. A model with all the items and scales used in the structural model was supplemented with additional items and scales from Year 4 and demographic variables. An exploratory analysis suggested that 20 imputations minimized missing information. The measurement and structural models were run on both complete case and imputed data. Because they ultimately did not differ, we present the results from the complete case data.

Structural equation model

The model was tested using Mplus version 7.4. A measurement model for the latent dependent variables was tested first, followed by a structural model specifying the paths from the cumulative bullying experiences to the dependent variables. Categorical items were specified and demographics were not included in the models. The structural model appears in Fig. 1. Model fit was assessed using the Chi Square statistic (X^2), Comparative Fit Index (CFI), the Tucker Lewis Index (TLI), and the Root Mean Squared Error of Approximation (RMSEA). Prior to running the

final model, cutoff values indicating good fit were established. A non-significant X^2 statistic is desirable, however, the X^2 statistic is very sensitive to a large sample size and the current sample was quite large, making a significant X^2 value likely (Hoyle 2012). Thus, additional fit statistics were used to gauge model fit. CFI and TLI values of 0.95 and higher and an RMSEA value of 0.06 or lower were selected to indicate good model fit (Hu and Bentler 1999). These criteria were used to assess the fit of the final model; they were not used when re-specifying models, sensitivity tests were used for re-specification.

Sensitivity tests were conducted to assess the robustness of the path coefficients to other variables in the model using a change-in-estimates strategy (Greenland and Pearce 2015). One path was removed at a time to determine whether there were any paths with a strong influence on the other path coefficients or the model fit in a meaningful way (i.e., a change in significance, change in direction, or large change in magnitude). After identifying influential paths, exploratory factor analysis with promax rotation was used to examine strong inter-factor correlations in the latent dependent variables, suggesting some items for removal. Items failing to show simple structure were removed and a final model was run.

Results

The analytic sample was comprised of 6475 adolescents. Based on the correlation matrix shown in Table 1, there are a few correlations that are moderately high, which include the correlation between aggression and internalizing and aggression and cumulative negative bystander behavior. Because the path from cumulative bullying victimization to academic achievement was non-significant in the final

model, this path was ultimately removed for parsimony; a final model with this path and without this path were compared and path coefficients did not differ. A final model without the non-significant path from cumulative victimization to academic achievement and without the one academic achievement item and the six aggression items that had low loadings was run ($X^2 = 5816.765(714)$, $p < 0.001$). The model fit was excellent with a CFI of 0.995, a TLI of 0.994, and an RMSEA of 0.033, 90% CI [0.032, 0.034; Fig. 1]. Table 2 displays the factor loadings of each item on each factor.

Cumulative bullying victimization was significantly associated with increased levels of aggression ($p < 0.001$) and internalizing symptoms ($p < 0.001$) and decreased levels of self-esteem ($p < 0.001$) and future optimism ($p < 0.001$). Cumulative bullying perpetration was significantly associated with increased levels of aggression ($p < 0.001$) and decreased levels of future optimism ($p < 0.05$). Cumulative negative bystander behavior was significantly associated with increased aggression ($p < 0.001$) and internalizing symptoms ($p < 0.001$) and decreased academic achievement ($p < 0.001$) and future optimism ($p < 0.01$). Cumulative prosocial bystander behavior was significantly associated with increased levels of internalizing symptoms ($p < 0.001$), academic achievement ($p < 0.001$), self-esteem ($p < 0.001$), and future optimism ($p < 0.001$).

Discussion

The integrative model of bullying dynamics and adolescent behavioral health and academic achievement shown in Fig. 1 replicates some effects that have been found in the past with the current sample of rural, impoverished, ethnically diverse adolescents (Evans et al. 2014; Smokowski

Table 1 Correlation matrix for cumulative bullying and bystander behaviors and adolescent behavioral and mental health, and academic outcomes

	1	2	3	4	5	6	7	8	9
1. Cumulative Bullying Victimization	1.000								
2. Cumulative Bullying Perpetration	0.2917***	1.000							
3. Cumulative Negative Bystander Behavior	0.1108***	0.2938***	1.000						
4. Cumulative Prosocial Bystander Behavior	0.1130***	0.0277***	0.1785***	1.000					
5. Aggression	0.1775***	0.2335***	0.3214***	0.0989***	1.000				
6. Internalizing	0.2254***	0.1240***	0.1941***	0.1356***	0.6920***	1.000			
7. Academic Achievement	-0.0353*	-0.0667***	-0.1809***	0.0785***	-0.1470***	-0.1292***	1.000		
8. Self-Esteem	-0.1835***	-0.0813***	-0.0569**	0.0467**	-0.2196***	-0.3253***	0.1458***	1.000	
9. Future Optimism	-0.0808***	-0.1041***	-0.1037***	0.1543***	-0.1571***	-0.1088***	0.2190***	0.3965***	1.000

* $p < .05$; ** $p < .01$; *** $p < .001$, $N = 8030$

Table 2 Standardized factor loadings for items on the Adolescent Behavioral and Mental Health and Academic Outcomes Scales

Scale Items	Aggression	Internalizing	Academic Achievement	Self-Esteem	Future Optimism
Item 1	0.884 (0.009)	0.853 (0.007)	0.928 (0.022)	0.948 (0.003)	0.911 (0.004)
Item 2	0.931 (0.006)	0.889 (0.005)	0.794 (0.020)	0.925 (0.004)	0.923 (0.003)
Item 3	0.882 (0.010)	0.909 (0.005)	0.623 (0.023)	0.906 (0.004)	0.686 (0.008)
Item 4	0.888 (0.008)	0.936 (0.005)	N/A	0.941 (0.004)	0.906 (0.004)
Item 5	0.854 (0.009)	0.747 (0.011)	N/A	0.958 (0.003)	0.887 (0.004)
Item 6	0.864 (0.010)	0.892 (0.007)	N/A	0.967 (0.002)	0.934 (0.004)
Item 7	N/A	0.910 (0.005)	N/A	0.951 (0.003)	0.897 (0.004)
Item 8	N/A	N/A	N/A	0.944 (0.003)	0.928 (0.003)
Item 9	N/A	N/A	N/A	N/A	0.943 (0.003)
Item 10	N/A	N/A	N/A	N/A	0.920 (0.004)
Item 11	N/A	N/A	N/A	N/A	0.871 (0.006)
Item 12	N/A	N/A	N/A	N/A	0.940 (0.003)

S.E. in parenthesis

et al. 2014). This model illustrates the deleterious effects of cumulative or chronic exposure to bullying over time rather than cross-sectional or episodic exposure. Most importantly, the model integrates a large number of effects that have been researched in isolation in the past. The inclusion of bullying victimization, perpetration, and bystander behavior with behavioral, mental health, and academic domains of adolescent functioning advances the literature by examining multiple forms of bullying in one integrative model. Existing research commonly examines bullying victimization, perpetration, and bystander behavior separately. Consequently, we are able to compare and contrast the impact of filling the various roles in the bullying dynamic (i.e., perpetrator, victim, bystander) on the outcomes in order to form a more comprehensive view of bullying.

Cumulative Bullying Victimization

In accordance with our hypothesis and past research (Evans et al. 2014), cumulative bullying victimization was positively and significantly associated with aggression and internalizing symptoms, and significantly and negatively associated with self-esteem and future optimism. Current findings over multiple years further indicate that cumulative bullying victimization can be considered a form of toxic stress that erodes behavioral and mental health functioning. The current results supported prior evidence that as youth are victimized over multiple years in middle- and high-school their behavioral and mental health declines. Although the current integrated model expanded on past research to also include academic achievement, cumulative victimization was not significantly related to academic achievement. Consequently, this path was removed in the final model for parsimony. It is heartening that in this sample cumulative victimization does not seem to impact

students' academic achievement, even though it is of great concern for mental health. While victims may struggle with longitudinal impacts of their experiences being bullied on their mental health, it is unclear if the effects from past research linking victimization and decreased academic achievement (Juvonen et al. 2011; Nakamoto and Schwartz 2009) extend to rural youth. Based on our non-significant result, we recommend further research in this area.

These findings highlight that, as victimization experiences accumulate over time, victims appear to be at risk for displaying aggression. Although it is unclear in the current study if victims engaged in reactive aggression (i.e., an aggressively defensive response to provocation; Crick and Dodge 1996) or proactive aggression (i.e., the deliberate use of aggression to obtain a desired goal; Crick and Dodge 1996), past research suggests that victims most commonly display reactive aggression (Camodeca and Goossens 2005; Camodeca et al. 2002). If victims in the current study did engage in reactive aggression in response to being bullied, this could have served to anger the adolescent who bullied them, ultimately increasing and perpetuating their victimization.

Adopting aggressive behaviors may be seen by victims as an adaptive response to the toxic stress of victimization and a reasonable accommodation to an adverse environmental context (Ellis 2017). It is possible that a subset of bully-victims are driving this increase in aggressive behavior, seeing aggression as a necessary defense mechanism or a way to retaliate in the context of cumulative victimization experiences. An evolutionary psychology interpretation of this positive relationship between cumulative victimization and aggression may be that adolescents who were victimized begin to use aggressive behavior as the characteristic way to compete for status and resources within their environmental context.

The consequences of cumulative victimization were clear, with significant paths to increased internalizing symptoms (i.e., anxiety and depression), low self-esteem, and low future optimism. These results parallel previous studies that reported child and adolescent bullying victims displayed poor adult mental health (Copeland et al. 2013) and physical health (Copeland et al. 2014). Evolutionary psychologists might suggest that this pattern of effects makes sense for youth relegated to the bottom of the social dominance hierarchy. The deleterious results of victimization form a potential vicious cycle where insecure, pessimistic, anxious, and depressed youth are easy targets for bullying perpetrators to continue to dominate. It is unclear if bullying victimization causes poor mental health, which can exacerbate the victimization or, if pre-existing poor mental health invites bullying victimization, and becomes worse over time. Regardless of the temporal order, youth who endure ongoing victimization suffer from a constellation of negative mental health outcomes that may exacerbate and fuel ongoing victimization, keeping them at the bottom of the social hierarchy. Therefore, it is vital that school personnel pay attention to youth whose victim status is consistent from year to year and attempt to interrupt this devastating cycle. Finding ways to empower victims might bolster their self-esteem and future optimism and help keep them engaged in school. If academic achievement is not impacted (see discussion above), engagement in school may be a domain where victims can find positive status and avoid further humiliation.

Targeted intervention strategies (e.g., support groups for victims, trauma-focused cognitive behavioral therapy) may be warranted as long as these attempts to help do not embarrass victims or make them feel even more marginalized and singled out. Redirecting bullying behavior through the creation of meaningful positive school roles for all students is another more holistic intervention strategy (Ellis et al. 2016), but requires additional evidence before scaling up. Restorative practices, such as school based Teen Courts (Smokwoski et al. 2018) or restorative circles (Clifford 2015) where victims and offenders meet in facilitated conferences to allow victims a voice in expressing their emotions, avoiding shame and isolation, and planning appropriate restitution may be particularly warranted. These restorative practices are only effective if both the victim and perpetrator agree to a face-to-face meeting, both bring support persons to attend the meeting, there are preparation meetings, and the facilitator is trained in restorative practices (Molnar-Main 2014). While gaining popularity, there is currently minimal research on the impact of restorative practices in bullying situations. Emerging holistic approaches, such as defining meaningful prosocial roles or addressing the harm caused by bullying through restorative practices, have the potential to benefit victims

and perpetrators (Ellis et al. 2016; Molnar-Main 2014), but have received less attention than zero-tolerance policies that have dominated anti-bullying intervention discussions.

Cumulative Bullying Perpetration

In support of our hypothesis, cumulative bullying perpetration was significantly and positively associated with aggression. Given that bullying perpetration is a form of aggression, it follows that bullying others over multiple years would translate into increased aggressive behavior in general. This finding highlights that youth who bully over time are at risk for displaying increased rates of aggression, which could potentially increase the likelihood of more intense anti-social behaviors such as delinquency (Farrington and Ttofi 2011) and/or substance use (Niemela et al. 2011) over time. From an evolutionary perspective, this positive association between cumulative perpetration and increased aggression is not surprising. This finding suggests that perpetrators have found bullying effective in moving them towards their goals, (i.e., gaining power and influence in the peer group) and so they engage in more bullying with increasing aggression. This escalating aggression may be a sign of perpetrators adapting increasingly intense aggressive strategies to heighten their social status and dominance (Ellis et al. 2016; Volk et al. (2012)). Given that many anti-bullying interventions are not effective (Evans et al. 2014), this path from cumulative perpetration to increased aggression may be a sign that bullying is working and increasingly attractive to youth seeking power.

Current findings also suggest that youth engaging in ongoing bullying perpetration might be at higher risk for moving to serious antisocial behaviors, highlighting the importance of focusing intervention efforts on youth entrenched in ongoing perpetration. School personnel should pay special attention to youth who bully others year after year, indicating the need for teachers and counselors across grades and schools to communicate with one another about students who bully others. As mentioned above, there are strategies to redirect bullies into prosocial roles that may negate the positive cost-benefit ratio that makes chronic bullying perpetration attractive (Ellis et al. 2016). It is important to note that primary prevention is equally important and schools should implement anti-bullying strategies in an effort to prevent bullying from occurring in the first place. Some interventions have been shown to be effective in reducing bullying perpetration during adolescence (David-Ferdon et al. 2016), however a recent meta-analysis found that bullying interventions are most effective at reducing bullying in seventh grade and below, but are ineffective in eighth grade and high school (Yeager et al. 2015). While more research is needed in this area, the finding from Yeager et al. (2015) could suggest that

alternative interventions such as restorative practices, might be useful in reducing bullying in older age groups. In the meantime, bullying will likely occur in school settings in line with current findings, and school personnel should focus on youth engaged in ongoing perpetration.

Counter to an evolutionary interpretation linking perpetration to an optimistic future, cumulative bullying perpetration was inversely associated with future optimism. This could suggest that as youth bully over time, their view of the future may be negatively impacted. This is an important novel finding because past research suggests that perpetrators do not suffer many adverse psychological effects from their behavior aside from the potential risk for escalation to serious antisocial behaviors (See Wolke and Lereya 2015 for a review). The previously untested, inverse relationship between cumulative bullying perpetration and future optimism suggests a negative psychological cost over the longer term. It is possible that the high self-esteem reported by bullying perpetrators in cross-sectional and short-term studies is fleeting and does not endure over time and therefore does not positively impact future optimism as hypothesized. More longitudinal research on the relationship between cumulative bullying perpetration and self-esteem is needed to confirm the nature of this association over time. Although youth who bully may derive popularity and high social status, they are often disliked by their classmates (de Bruyn et al. 2010; Vaillancourt et al. 2003). Perhaps these youth are aware that, although popular (or at least powerful within peer hierarchies), they are disliked and this knowledge may gradually lead to feelings of negativity about the future.

Applying an evolutionary perspective, bullying perpetrators may see their pursuit of access, status, dominance, power, sex, wealth, and privilege as effective but also as alienating them from others. Being mean and aggressive towards others over time could result in a worldview that is relentlessly competitive and threatened by rivals (Anderson and Graham 2007). If youth engage in bullying over time, they may begin to view the world as aggressive and hostile, which would make it difficult to feel optimistic about the future, at least in the conventional prosocial sense. Bullying perpetration over an extended period may lead to a general cognitive model of the world as a coercive place filled with conflict where one's status is largely determined by power and control of others. This cognitive template may connect to a bleak view of the future as an ongoing struggle for dominance within a system where others dislike you. Popularity centers on power, not working relationships. Children who chronically bully others may create a worldview for themselves where they must constantly show their strength by humiliating others, a dystopian cycle that makes thoughts of the future unpleasant. According to Resource Control Theory (Hawley 2003), these perpetrators

have a coercive style for obtaining goals (e.g., they force or bully others to do what they want). Coercive perpetrators have low levels of self-reported agreeableness, attention to social cues, and conscientiousness and high levels of aggression, hostility, and cheating relative to youth who engage in prosocial behavior to obtain goals (Hawley 2003).

To combat this cycle, teachers and counselors should act early and often to find positive social roles and prosocial children to pair with perpetrators in order to reinforce the perpetrator's positive functioning (Ellis et al. 2016). Further, teaching coercive perpetrators prosocial skills through leadership positions could also be useful. As previously mentioned, restorative practices may also help perpetrators understand the full impact of their actions, take responsibility, and find new ways to function within the overall community rather than being marginalized and increasingly aggressive. Alternately, it is also possible that youth who bully might get in trouble at school for their bullying behavior, which could negatively impact their future optimism. The current study's social context may also play into this relationship. This decreased future optimism may be salient for rural youth, who may see few job opportunities or pathways out of their current circumstances within the disadvantaged environment from which the current sample was drawn.

Cumulative Negative and Prosocial Bystander Behavior

In line with our hypothesis, cumulative negative bystander behavior was significantly and positively associated with aggression and internalizing symptoms and significantly inversely associated with academic achievement and future optimism. Counter to our hypothesis, cumulative prosocial bystander behavior was significantly and positively associated with internalizing symptoms and in accordance with our hypothesis, cumulative prosocial bystander behavior was significantly and positively associated with academic achievement and future optimism. Cumulative prosocial bystander behavior was also significantly and positively associated with self-esteem.

Witnessing bullying can be traumatizing (Janson and Hazler 2004) and current findings suggest that as youth witness bullying over time, their mental health is negatively impacted as evidenced by increased internalizing symptoms reported by both negative and prosocial bystanders. Witnessing bullying was associated with increased anxiety and depression regardless of whether the bystander supported the victim or perpetrator, suggesting that being a bystander in general is a difficult position with some potentially negative consequences. This finding highlights the fact that the presence of bullying in schools not only impacts those

directly involved, but bystanders as well. However, it is important to highlight the fact that being a prosocial bystander was positively associated with beneficial outcomes, indicating that it is vital to encourage youth to intervene and support their victimized peers. Prosocial bystander behavior not only assists the victim, but also can benefit the prosocial youth who intervenes due to increased self-esteem, academic achievement, and future optimism that is associated with prosocial bystander behavior.

Cumulative negative and prosocial bystander behavior was associated with academic achievement and future optimism in opposite ways. While cumulative negative bystander behavior was inversely associated with these outcomes, cumulative prosocial bystander behavior was positively associated with these outcomes, as well as with self-esteem. It is possible that negative bystanders have low future optimism and academic achievement before even engaging in negative bystander behavior; subsequent engagement in this anti-social behavior could further erode their functioning. It is conceivable that negative bystanders are youth at risk of being victimized, who decide to support the perpetrator in order to protect themselves from becoming the next victim. It is also possible that behaving as a negative bystander over time erodes future optimism and academic achievement, which is an important area for future research.

Engagement in negative bystander behavior is one step removed from bullying others; rather than initiating bullying, negative bystanders support the actions of perpetrators. As youth increasingly engage in negative bystander behavior year after year, they could become enmeshed in an aggressive peer group that causes their overall level of aggression to increase. In the current study, these students resemble children who bully others in their aggression and low future optimism; however, their adjustment is even poorer in manifesting low academic achievement and internalizing symptoms. From an evolutionary perspective, this pattern brings up interesting speculation. Given that bullying perpetrators have been characterized as achieving status and power with their behavior, negative bystanders may be less dominant youth trying to affiliate with a powerful, albeit negative, leader. Negative bystanders may be struggling with prosocial pathways, such as academics and future optimism, and instead may seek the aggressive status and power that perpetrators have. This negative bystander behavior may be the gateway to becoming a full-fledged perpetrator or it may be an affiliation process for youth trying to find their place in the anti-social peer hierarchy. This is speculative, but provides fertile opportunities for future research.

Engaging in a positive behavior that helps others could cause prosocial bystanders to feel good about themselves, thus increasing future optimism, self-esteem, and academic

achievement. Prosocial bystanders are defenders of the oppressed who display courage and conviction under stressful circumstances. However, they also pay the price of experiencing increases in internalizing symptoms. From the evolutionary perspective, this profile of effects for prosocial bystanders shows them to be high functioning youth who pursue their goals by conventional, positive means (i.e., academic achievement, future optimism, self-esteem). Because they are invested in these positive pathways to success, intervening in bullying by telling a teacher or helping the victim may enhance their reputations and lead to movement towards their goals. The prosocial bystander behavior can enhance their reputations in an analogous way to the perpetrator's negative power accumulation. Prosocial bystanders may also become closer to authorities (e.g., teachers, principals) from their actions to break up bullying situations. They may also be admired by grateful victims and, outside of the cost-benefit calculation, may feel empowered by their altruism and advocacy. It is also important to consider that these prosocial bystanders could also be victimized and that their internalizing symptoms may be a result of their own personal victimization. Their inclination to engage in prosocial bystander behavior may arise out of high empathy.

Teachers and counselors should encourage and celebrate the fortitude shown by prosocial bystanders. If all adolescents moved to intervene on behalf of victims, the power inherent in the bullying dynamic could move to the prosocial side, potentially decreasing the frequency and intensity of bullying behaviors. Several strategies can be implemented to reduce bullying and increase prosocial bystander behavior. CDC recently released several technical packages to prevent various forms of violence. These technical packages represent a core set of strategies based on the best available evidence to prevent violence. The youth violence technical package (David-Ferdon et al. 2016) includes universal school-based programs, which can help strengthen youth's skills to reduce bullying and increase positive behaviors and anti-bullying school policies.

Limitations and Future Research

Although this study adds to the research base showing the connection between cumulative bullying involvement and behavioral health outcomes and academic achievement, the results must be understood in light of certain limitations. First, data were gathered from two low income, racially/ethnically diverse, rural communities in the South. Thus, findings may not generalize to other populations. Second, participants filled out SSP + assessments in school computer labs and it is possible their answers were impacted by the presence of their classmates. To mitigate these effects,

RAP staff closely monitored the data collection process to ensure privacy and confidentiality. Third, only 2 years of bystander data were available; it would have been ideal to have additional years of data to more fully examine how engagement in negative and prosocial bystander behavior over time was associated with the dependent variables, however this was not feasible and future studies should gather more waves of bystander data. Further, it would have been ideal if longitudinal data on all included variables could have been collected throughout adolescence and into adulthood, however, this was beyond the scope of the current study and is an area for future research. Fourth, it is conceivable that bullying roles could change over time and/or that adolescents could have multiple roles as bullying bystanders, perpetrators, and victims during the same time periods. Since the focus of the current study was to explore how involvement in different cumulative bullying roles impact students' behavioral health and academic outcomes, an examination of how bullying roles might overlap or change over time was not explored. Examining the particular experience of bully-victims and that role's association with behavioral health and academic outcomes should be included in future research. Fifth, a measure of cyber bullying victimization was not included and, given the virulent nature of this form of bullying, future research should examine the impact of cumulative victimization via cyber bullying. Sixth, the four bullying variables did not involve frequency counts so it is not possible to know how often a participant experienced or engaged in a certain bullying behavior; a participants' endorsement of 1 year of bullying victimization indicates he/she could have, for example, been bullied twice in that year or every day. Further, it would have been ideal to have included more behaviorally specific items to measure bullying, however, a definition of bullying was provided for youth. Seventh, the collection of biological data would have greatly enhanced this study, but again, that was beyond the scope of the current study and should be considered for future research. Finally, the academic achievement variable was limited to self-reported grades. It would have been ideal to have actual transcript grades and teacher reports of student achievement; however, this was beyond the scope of the study. Despite these limitations, our integrative model of bullying dynamics allows for direct comparison of participant roles and the risks and benefits of engaging in different bullying roles. Involvement in bullying in any capacity erodes adolescent adjustment in numerous ways; however, advocating for the victim enhances mental health and academic achievement.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Research Involving Human Participants and/or Animals Procedures involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The Institutional Review Board of the University of North Carolina at Chapel Hill approved this study.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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