Exposure to parental and community violence and the relationship to bullying perpetration and victimization among early adolescents: A parallel process growth mixture latent transition analysis

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This study examined heterogeneity in parental and community violence exposure during middle school and its association with bullying perpetration and victimization in high school. Youth ($N = 1,611$) in four Midwestern middle schools participated. Parallel process growth mixture latent transition analysis was used to understand how trajectory profiles of middle school violence exposure was associated with high school bullying profiles. Impulsivity, depression, school belonging, and delinquency were assessed as moderators of the transition probabilities. A three class solution was found for violence exposure: *decreasing parental violence/increasing community violence* ($n = 103$; 6.4%), *stable high parental violence* and *low community violence* ($n = 1,027$; 63.7%), and *increasing parental violence* and *stable high community violence* ($n = 481$; 29.8%). Similarly, a three class solution was found for high school bullying: *High Bullying Perpetration and High Victimization* class ($n = 259$; 16%), *Victimization only* ($n = 1145$; 71%), and *low all* class ($n = 207$; 13%). The largest proportion of youth transitioning into the high bullying and high victimization class were from the *decreasing parental violence/ increasing community violence*. Depression, impulsivity, school belonging, and delinquency all had various moderating effects on transition probabilities. Our findings make it apparent that early forms of parental and community violence are associated with aggressive behaviors and experiences with victimization during high school. Prevention and intervention efforts should target individuals who display early and chronic patterns of exposure to violence as these individuals have the greatest risk of later aggressive and victimization in high school.

Key words: Child trauma, victimization, bullying, impulsivity, depression, delinquency.

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INTRODUCTION

Exposure to violence (forceful behavior intended to cause harm) is a ubiquitous problem in the United States with upwards of 80% of youth reporting witnessing violence in schools and nearly 90% reporting witnessing violence in their community (Finkelhor, Ormrod & Turner, 2007; Finkelhor, Turner, Shattuk & Hamby, 2015; Flannery, Wester & Singer, 2004; Weist, Acosta & Youngstrom, 2001). Between 17% and 25% of youth report witnessing violence in the home and upwards of 60% report being directly victimized in the home (Finkelhor, *et al*., 2007, 2015; Flannery, *et al*., 2004; Weist *et al*., 2001). Specific to violence exposure in the school, bullying has been defined as "as aggressive, goal-directed, behavior that harms another individual within the context of a power imbalance" (Volk, Dane & Marini, 2014, p. 2). Like exposure to violence, bullying (both perpetration and victimization) is a public health concern with 28%–37% of students ages 12 to 18 reporting being victimized by their peers (Zhang, Musu-Gillette & Oudekerk, 2016) and nearly 35% reporting being perpetrators of traditional bullying (e.g., face to face or in person). Cyberbullying (e.g., bullying occurring online, via text) has also emerged as a distinct and widely prevalent form of peer aggression (Jones, Mitchell & Finkelhor, 2013) with prevalence increasing from 9% in 2007 (Bradshaw, Sawyer & O'Brennan, 2007) to 23% in 2012 (Mishna, Khoury-Kassabri,

Gadalla & Daciuk, 2012). Prior research has noted associations between exposure to violence and increased prevalence of bullying perpetration and bullying victimization (Holt & Espelage, 2007; Schwartz, 2000). Researchers have also identified overlapping risk and protective factors associated with both forms of bullying such as impulsivity, delinquency, internalizing problems (e.g., depression), and school belonging (Bradshaw & Garbarino, 2004; Davis *et al*., 2018, Ttofi & Farrington, 2011). Given that successful prevention programming hinges on reducing risk for high-risk groups during high-risk times (Morgan & Vera, 2012), more insight into specific trajectories of how violence exposure risk-profiles are related to bullying perpetration and bullying victimization will provide a stronger basis for intervention design.

For the last few decades, research has demonstrated that youths' involvement in bullying can vary across the bully-victim continuum (Schwartz, 2000). That is, youth are not simply either a bully or victim, but can take on a more complex role of a bully and a victim, coined "bully-victim." Bully-victims are students who have both been victimized and have perpetrated bullying (Holt & Espelage, 2007) with recent estimates indicating nearly 25% of students report being a bully-victim (Mishna *et al*., 2012). This phenomenon can be broadly understood through General Strain Theory (Agnew, 2000), which posits that individuals who experience "strain" (i.e., hardship that prevents accessing rewarding experiences) are more likely to respond with deviant,

criminal, or high-risk behavior as alternate means of goal attainment. Meanwhile, Social Learning Theory argues that youth shape their own behavior based on what is modeled for them (implicitly or explicitly) and how it is rewarded and punished (Bandura, 1973). Taken together in this context, these theories indicate that behavior patterns are shaped over time by: (1) circumstances and the rewards they produce or do not produce for the individual and (2) observing what happens to others as they navigate this process. Thus, to understand the complex heterogeneity of behavioral outcomes along the bully-victim continuum, it is critical to understand how experiences at the concentric levels of a student's social ecology have led them to their place along the continuum. This is especially important given that students classified as bully-victims have the highest rates of depression, aggression, and impulsivity; and the lowest rates of self-esteem and academic performance compared to students classified as only bullies or only victims (Espelage, Low & De La Rue, 2012; Hanish & Guerra, 2004; Schwartz, 2000). Thus, understanding the contexts in which youth engage in bully perpetration and experience bully victimization is critical to creating informed prevention strategies.

Exposure to violence as predictors of bullying and cyberbullying

According to US national surveys, in 2014 about 66% of youth under the age of 18 years had been exposed to violence in the past year (Child Trends, 2016). Forms of violence included physical assault, maltreatment, or sexual victimization either in the home or in the community (Child Trends, 2016). Exposure to violence at emanating levels of one's social ecology has been identified as strong predictors of individual risk for aggression and victimization (Hong & Espelage, 2012). Specifically, direct or indirect violence exposure in the home (Bauer, Herrenkohl, Lozano, Rivara, Hill & Hawkins, 2006; Espelage, Low, Rao, Hong & Little, 2014) increases risk of future involvement in peer aggression and victimization. Previous work suggests that microsystem dynamics such as inter-familial violence should be examined in evaluating a youth's individual risk for involvement in bullying or peer aggression (Hong & Espelage, 2012). Several researchers have established correlational links between witnessing violence in the home and future violence involvement, both as a bully and victim of bullying (Bauer *et al.*, 2006; Holt, Buckley & Whelan, 2008; Lucas, Jernbro, Tindberg & Janson, 2016).

Beyond the microsystem lies the exosystem, the environments just beyond a youth's immediate sphere of interaction that contain and influence concentric layers of one's social ecology (Bronfenbrenner, 1979; Bronfenbrenner & Morris, 2006). Neighborhoods and alike communities are examples of exosystems, and also shape development, including the exposure to and emergence of aggression (Hong & Espelage, 2012) and academic achievement (Ruiz, McMahon & Jason, 2018). Community violence refers to violence that is intended to harm others in ways such as robbing, threatening, beating, rape, shooting, stabbing or killing outside the home in one's community or neighborhood (Buka, Stichick, Birdthistle & Earls, 2001). Perhaps because districting ties public schools to neighborhoods, it is unsurprising that effects of community violence bleed into the school environment. Youth who live in neighborhoods where violence is more common are more likely to experience bullying victimization and to perpetrate bullying (including cyberbullying) themselves (Bacchini, Esposito & Affuso, 2009; Espelage, Bosworth & Simon, 2000; Guerra, Rowell Huesmann & Spindler, 2003; Low & Espelage, 2013).

Moderators of violence exposure and bullying involvement

The current research finds it valuable to evaluate how exposure to various forms of violence, namely community and home violence, place individuals at differential risk for engaging in bullying behavior and/or becoming a victim. Extant literature indicates that depression, impulsivity, school belonging, and delinquency moderate associations between early risk factors and bullying engagement as perpetrators or victims (Bosworth, Espelage & Simon, 1999; Cook, Williams, Guerra, Kim & Sadek, 2010; Hong & Espelage, 2012).

Depression. A wealth of research has explored the compounded consequences of exposure to violence and its association with depression (DuRant, Getts, Cadenhead, Emans & Woods, 1995; Fitzpatrick, 1993; Wheaton & Clarke, 2003). One study found, after accounting for typical risk factors for internalizing and externalizing problems, youth who were dually exposed to both childhood violence (e.g., abuse, neglect) and domestic violence (e.g., between parents) were more likely experience both internalizing and externalizing problems (Moylan, Herrenkohl, Sousa, Tajima, Herrenkohl & Russo, 2010). Similar results were found when exploring the cumulative effect of exposure to interpersonal violence (e.g., sexual assault, physical assault, witnessing violence) with youth evidencing higher rates of post-traumatic stress disorder, depression, and delinquency (Cisler, Begle, Amstadter *et al.*, 2012). These findings are important in the context of youth involved in bullying with prior research finding higher rates of depression among bullies, victims, and bully-victims, compared to their un-involved peers (Cook *et al.*, 2010; Wang, Nansel & Iannotti, 2011).

Impulsivity. Impulsivity, defined as a pattern of acting without considering the future consequences of one's actions, is strongly associated with exposure to violence and aggression. For example, past research has found that youth with higher levels of exposure to violence are at heightened risk for a myriad of problems such as delinquency, aggression, and dampened impulse control (Bosworth *et al.*, 1999; Davis *et al.*, 2018). For example, in a study of juvenile offenders Davis and colleagues (2018) found that poly-victimized youth had the lowest levels of impulse control and emotion regulation compared to youth who had low levels or only witnessed violence. Further, students who bully others are often significantly more likely to also be highly impulsive (Bosworth *et al.*, 1999). This link has been replicated several times with Espelage, Bosworth and Simon (2001) finding impulsivity to predict bullying involvement four months later even after controlling for previous bullying involvement. In comparing a group of identified bullies to a group of non-bully controls, Haynie, Nansel, Eitel *et al.* (2001) found the bully group to have significantly higher scores on impulsivity measures than controls.

Sense of school belonging. A constellation of research suggests that perceptions of school environment vary between students highly involved in conflict and those who are not (Bradshaw & Garbarino, 2004; Dodge & Pettit, 2003). Understandably, students who are constantly victimized perceive school to be much less safe and less accepting than students in the same school who are not victimized (Bradshaw & Garbarino, 2004; Dodge & Pettit, 2003). Students who report a lower sense of belonging at school are more likely to engage in and become a victim of peer aggression (Goldweber, Waasdorp & Bradshaw, 2013; Nickerson, Singleton, Schnurr & Collen, 2014). Others have found that early exposure to community violence is associated with lower rates of school connectedness and lower academic achievement (Borofsky, Kellerman, Baucom, Oliver & Margolin, 2013). Other studies have echoed these findings with exposure to community violence predicting lower academic engagement in the transition to high school (Elsaesser, Gorman-Smith, Henry & Schoeny, 2017).

Delinquency. Bullying and delinquency have been found to co-occur, but bullying has also been found to be a longitudinal predictor of later delinquency (Augimeri, Walsh & Slater, 2011; Ttofi & Farrington, 2011). For example, prior research has found that bullies and bully-victims were more likely to be perpetrators of violent delinquency such as vandalism and criminal behavior compared to youth who were not engaged in bullying behavior (Perren & Hornung, 2005). Others have found similar results with bullying perpetration in early adolescence (age 10 years) predicted delinquency 1, 3, and 5 years later (Farrington, 2011). Additionally, prior research has found youth who are exposed to interparental violence were more likely to be engaged in delinquent behaviors and be referred to juvenile court (Herrera & McCloskey, 2001). Similar results have been found for youth exposed to community violence and increased delinquency (Rosario, Salzinger, Feldman & Ng-Mak, 2003).

Current study and hypotheses

While a few studies acknowledge a resilience-building process that may occur as a result of early life violence exposure (Aisenberg & Herrenkohl 2008; Margolin & Gordis, 2004), largely these events predict negative future outcomes for students. Unfortunately, many of the studies reviewed above were cross sectional in nature or utilized methods that did not allow for the prospective prediction of early adolescent violence exposure and later bullying and victimization experiences. The current study addresses these gaps in the literature by employing latent transition mixture modeling to understand how different profiles of parental and community violence exposure place students at differential risk for involvement in bullying and exposure to bullying victimization in the future. First, we aim to create parallel latent trajectory classes based on parental and community violence exposure over the course of four time points over two years of middle school. We anticipate the formation of more than 2 latent trajectories (middle school parental and community violence) and latent classes (high school bullying perpetration and victimization) given past research (Hypothesis 1). We will then use a Latent Transition Analysis (LTA) to examine the probability

of transitioning from emergent violence exposure trajectory classes into bullying and cyberbullying perpetration and victimization classes in high school. Based on prior literature, we anticipate that students exposed to more violence will be overrepresented in the bully-victim outcome classes (defined by students exhibiting high rates of both perpetration and victimization) for both traditional bullying and cyberbullying (Hypothesis 2). Finally, we hypothesized that impulsivity, depression, delinquency (higher risk), and school belonging (lower risk) would moderate the association between parental and community violence exposure during childhood and bullying perpetration and victimization in high school (Hypothesis 3).

METHODS

Participants

Students from four middle schools and six high schools in the Midwest ($n = 1,611$) were surveyed six times from Spring 2008 to Spring 2013. Surveys were administered in the following matter: Spring/Fall 2008, Spring/Fall 2009, Spring 2010, 2012, and 2013. At baseline, students were in 5th (4.0%), 6th (34.1%), 7th (34.2%), and 8th (27.7%) grade. In wave six, participants had become freshmen, sophomores, or juniors in high school. In early middle school, participants average age was 12.7 (range 11–16),50.2% female and racially diverse: 47.7% Black, 36.4% White, 3.4% Hispanic, 1.7% Asian/Pacific Islander, and 10.8%

Table 1. *Means (or n) and standard deviations (or %) of demographic, violence, perpetration, victimization, and moderation variables*

	Mean (*SD*) or *n* (%)
Demographics	
Female	808 (50.2%)
Age	12.8 (0.98)
African-American	769 (47.7%)
White	586 (36.4%)
Hispanic	54 (3.4%)
Asian	27 (1.7%)
Other	175 (10.8%)
SES (Mother's Education)	
Less than high school	170 (10.6%)
High school diploma or GED	442 (27.4%)
Some College	287 (17.8%)
Graduated from college	465 (28.9%)
Some graduate school	95 (5.9%)
Graduate or professional school	152 (9.4%)
Violence Exposure	
Parental Violence	2.50 (1.93)
Community Violence	5.79 (4.38)
Bullying Perpetration and Victimization	
Bullying Perpetration	4.07 (4.49)
Cyber Bullying Perpetration	0.71 (1.52)
Peer Victimization	2.16 (3.10)
Cyber Peer Victimization	1.19 (1.75)
Mental Health, Self-Regulation, School Level	
Depression	14.3 (6.23)
Impulsivity	5.32 (3.37)
School Belonging	11.7 (2.43)
Delinquency	2.61 (3.28)

other (Table 1). Seven percent of the students at this school were on free or reduced lunch.

Procedures

A waiver of active parental consent was approved by the Institutional Review Board, so parents only returned signed consent forms if they did not wish for their child to participate. During survey administrations, trained proctors described the study, collected student assent, and read the survey aloud while students completed it. Student assent to participate in the study was obtained at each of the subsequent follow-up waves prior to the start of the survey. Nearly 98% of students participated in the study (see Espelage, Basile, Leemis, Hipp & Davis, 2018a; Espelage, Hong, Merrin, Davis, Rose & Little, 2018b for more details on study procedure).

MEASURES

Middle school violence exposure

Exposure to parental violence. We used the Family Conflict and Hostility Scale (Thornberry, Lizotte, Krohn, Smith & Porter, 2003) which measures the level of perceived conflict and hostility in the family environment. The scale contains three items from a larger survey, which was designed for the Rochester Youth Development Study. The three items were: "*How often is there yelling, quarreling, or arguing in your household?*" "*How often do family members lose their temper or blow up for no good reason?*" and "*How often are there physical fights in the household, like people hitting, shoving, or throwing things?*" Response options range from 0 = "Never" through 4 = "Always." Cronbach's alpha coefficients ranged from 0.79–0.81 (M_{alpha} = 0.80) for this sample. Each of these items were dichotomized to indicate whether the adolescent had experienced the item (coded 1) or not (coded 0 or "never"). In addition to assessing family violence, we also included a three-item measure of parental violence that assesses direct physical and sexual violence as well as indirect witnessing of inter-parental violence. Response items were "yes" (coded 1) or "no" (coded 0). Cronbach alpha coefficients ranged from 0.75–0.79 (M_{alpha} = 0.77) for this sample.

At each time point we summed the six items from both scales giving each exposure to parental violence measure a score range from zero to six. The Chronbach alpha coefficients ranged from 0.77–0.88 (M_{alpha}=0.81)

Community violence exposure. To assess exposure to community violence we used five items from the 12-item Children's Exposure to Community Violence scale (Richters & Martinez, 1990). Students are asked "*How often do you hear or see the following in your neighborhood, school, or at your home?*": (1) I have heard guns being shot; (2) I have seen somebody arrested; (3) I have seen drug deals; (4) I have seen somebody being beaten up; and (5) I have seen gangs. Response options range from "Never" through "Often" on a four-point Likert scale. Chronbach alpha coefficients ranged from 0.88–0.91 for the current study.

High school bullying perpetration and victimization

Traditional bullying perpetration and victimization. Traditional bullying perpetration and victimization measures were assessed in high school. The nine-item Illinois Bully Scale (Espelage & Holt, 2001) assessed the frequency of bullying perpetration at school. Students were asked to recall how frequently they teased others, upset others for the fun of it, excluded others from their group of friends, helped harass others, and threatened to hit or hurt another student in the last 30 days. The four-item Illinois Peer Victimization Scale (Espelage & Holt, 2001) was used for victimization but asked how often other students teased you, upset you, harassed you, excluded you, or hit you. Prior to dichotomization, response options ranged from "*Never*" through "*7 or more times*" in the past 30 days on a five-point Likert scale (0–4). Exploratory and confirmatory factor analysis has demonstrated the construct validity of this scale (Espelage & Holt, 2001), and Cronbach alpha's were 0.86 and 0.84 for this study.

Cyberbullying perpetration and victimization. Cyberbullying perpetration and cyberbullying victimization were assessed with two, four-item scales based on Ybarra, Espelage and Mitchell (2007) during high school. One scale assesses perpetration and one scale assesses victimization. Students were asked how often they did these things or how often these things happened to them during the school year: made rude or mean comments to anyone online; spread rumors about someone online, whether they were true or not; made aggressive or threatening comments to anyone online; and sent a text message that said rude or mean things. Response options range from "Never" through "Often" on a four-point Likert scale. Chronbach alpha's were 0.79 and 0.82.

Moderators

All moderators were taken from the baseline survey (e.g., early middle school).

Impulsivity. The four-item Impulsivity subscale from the Teen Conflict Survey (Bosworth *et al.*, 1999) assesses the self-reported impulsivity of respondents. Example items include "*I have a hard time sitting still,*" and "*I need to use a lot of self-control to keep out of trouble.*" Response options were "Never," "Seldom," "Sometimes," "Often," and "Always." Chronbach's alpha was 0.87 for the current study.

School belonging scale. Perceived belonging at school was assessed with four of the 20 items from the Psychological Sense of School Members Scale (Goodenow, 1993). Students were asked how much they agree with statements regarding school belongingness (e.g., "*I feel proud of belonging to this school*"). Response options were "Strongly Disagree," "Disagree," "Agree," or "Strongly Agree." In the current sample, Cronbach's alpha was 0.74.

Delinquency. This eight-item scale is based on Jessor and Jessor's (1977) General Deviant Behavior Scale and asks students to report how many behaviors listed on the measure they took part in during the last year. The scale consists of items such as, "*Skipped school*", and "*Damaged school or other property that did not belong to you.*" Responses are recorded on a five-point

Likert-type scale with options ranging from 1 "Never" through 5 "10 or more times." In the current sample, we found a Cronbach's alpha of 0.81.

Depression. The six-item Orpinas Modified Depression scale (Orpinas, 1993) asked adolescents to indicate how often they felt or acted certain ways in the previous 30 days. Examples include: "*Did you feel happy,*" and "*Did you feel hopeless about your future.*" Higher scores indicated more depressive symptoms Response options include "Never," "Seldom," "Sometimes," "Often," and "Always." Chronbach's alpha was 0.87 for the current study.

Covariates

We controlled for participant's biological sex (female reference group), race/ethnicity (nonwhite reference group), age in years at baseline, as well as early middle school traditional and cyber bullying perpetration and victimization.

Analytic plan

To understand how exposure to both parental violence and community violence in middle school is related to both traditional and cyber bullying perpetration and victimization in high school, we used a latent transition mixture model (Nylund-Gibson, Grimm & Furlong, 2014). A latent transition analysis (LTA) is a longitudinal extension of latent class analysis (LCA) as it involves multiple latent class variables where LCA is the measurement model at each time point. To model change in latent classes from time 1 to time 2, typically researchers regress the latent class variable at time 2 on the previous latent class variable. This procedure quantifies change as a matrix of transition probabilities between two consecutive time points and is used to assess the probability of transitioning between emergent latent classes. More recently LTA has been used to understand change by, instead, using two mixture models (e.g., two different measurement models), namely LCA and growth mixture models (GMM). See Fig. 1 for theoretical LTA model.

In the current study, we used a parallel process growth mixture model (PP-GMM) to model simultaneous heterogeneity in parental violence and community violence exposure during middle school and LCA to model heterogeneity in traditional and cyber bullying perpetration and victimization in high school (Hix-Small, Duncan, Duncan & Okut, 2004; Wu, Witkiewitz, McMahon & Dodge, 2010). Below we discuss, in detail, the process of specifying our LTA.

Class enumeration for parallel process growth mixture and latent classes analysis

When specifying complex models that include multiple latent class variables with different measurement models, multiple steps are required. For the current study, the number of classes for the PP-GMM (parental violence and community violence) and LCA (traditional and cyber bullying perpetration and victimization) were estimated separately. As with all mixture models, we used several indicators to assess model fit: lower values of negative

two log likelihood (2LL), Akaike information criteria (AIC), Bayesian information criteria (BIC), the sample size adjusted Bayesian information criteria (aBIC), and a non-significant the Lo-Mendell-Rubin adjusted likelihood ratio test (LRT), and bootstrapped likelihood ratio test (BLRT) indicate better model fit.

First, a series of models were run for the PP-GMM to simultaneously model heterogeneity and understand patterns of *both* parental violence and community violence during middle school (grades 6–8). The latent class variable was defined by both parental violence and community violence growth factors (e.g., intercept and slope). We estimated a series of models with one to five classes and the fit of these models was assessed using the above mentioned criteria.

Next, we estimated a series of latent class analyses to understand heterogeneity in both traditional and cyber bullying perpetration and victimization for youth in high school. In the current study, each individual is assigned a class membership probability based on four high school indicators of bullying perpetration or victimization: (1) traditional bullying perpetration; (2) cyberbullying perpetration; (3) traditional bullying victimization; and (4) cyberbullying victimization. Similar to the process for the PP-GMM, a series of one to four models were estimated and the fit was assessed by traditional model fit indicators outlined above.

Three-step LTA method and moderation analyses

To assess the latent transition probabilities, we regressed the latent class variable from our PP-GMM in middle school onto the latent class variable for our high school LCA. Doing this procured a matrix of transition probabilities from emergent classes of exposure to parental and community violence during the course of middle school to emergent classes of traditional and cyber bullying perpetration and victimization in high school (see Fig. 1 for theoretical model).

In order to understand these transitions more fully, we also estimated a series of models where covariates were introduced as moderators of the transition probabilities. That is, in our final model we estimated an LTA model and incorporated predictors of class membership (for both PP-GMM and LCA) as well as predictors of the transition in behavior from middle school exposure to violence growth mixture trajectories to high school bullying perpetration and victimization profiles. These moderators included impulsivity, school belonging, depression, and delinquency. All four proposed moderators were allowed to influence the transition probabilities; however, demographic control variables were only allowed to influence the latent class variables and not the transition probabilities. The dotted line in Fig. 1 represents moderation of covariates for our LTA model.

RESULTS

Middle school parental violence and community violence PP-GMM

A series of PP-GMM models were fit starting with a one class model. Fit indices for our PP-GMM (see Table 2) were used to determine the best fitting parallel process model. The non-significant
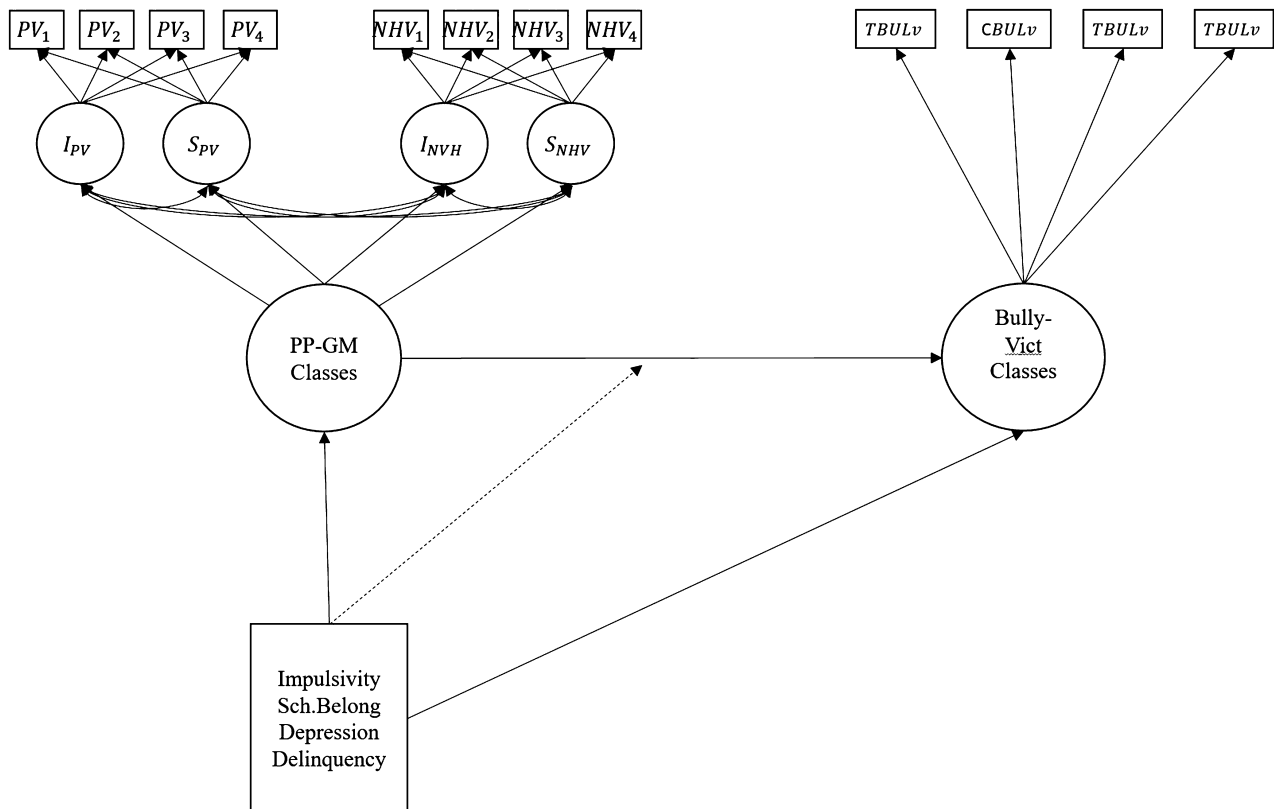
Fig. 1. Conceptual model.
Notes: The dashed line represents the moderation of transition probabilities. PP-GM = Parallel Process Growth Mixture; PV = parental violence; NHV = Neighborhood Violence; TBULv = traditional bullying victimization; TBULp = traditional bullying perpetration; CBULv = cyber bullying victimization; CBULp = cyber bullying perpetration.

LRT and BLRT value for the five class solution indicates that a four class solution fit the data best. While the aBIC values always dropped an 'elbow' in decreasing aBIC occurred at the four class solution, indicating a three class may fit the model best. We plotted the item probabilities for both a three and four class solution. Based on the observed probability plots we chose the three class solution for two reasons. First, the four class solution provided a class with less than 2% of the sample ($n = 25$). Second, the four class solution did not provide any

more information with the additional class compared to the three class solution.

Figure 2 displays the item probability plots for both parental violence and community violence exposure. The dotted line with circle markers represents a class that experienced *decreasing parental violence* and *increasing community violence* during middle school ($n = 103$; 6.4%). The dashed line with square markers represents a class that experienced *stable high parental violence* and *low community violence* ($n = 1,027$; 63.7%). The

Table 2. *Model fit indices of parallel process growth mixture model and latent class analysis*

No. classes	-2 LL	AIC	BIC	aBIC	Entropy	VLRT	p	LMRT	p	BLRT	p
PP-GMM											
1 class	56166.02	56202.02	56298.94	56241.76							
2 class	55696.48	55742.49	55866.33	55793.26	0.822	469.53	0.00	457.15	0.00	469.53	0.00
3 class	**55489.60**	**55545.61**	**55696.37**	**55607.42**	**0.845**	**206.87**	**0.00**	**201.42**	**0.00**	**206.87**	**0.00**
4 class	55232.95	55298.95	55476.64	55371.81	0.864	256.65	0.00	249.88	0.005	256.65	0.00
5 class	55073.28	55149.29	55353.9	55233.18	0.882	159.66	0.08	155.45	0.09	159.66	0.00
LCA											
1 class	6820.54	6828.54	6850.08	6837.37							
2 class	6242.01	6260.01	6308.47	6279.88	0.86	578.52	0.00	563.27	0.00	578.52	0.00
3 class	**6091.46**	**6119.46**	**6194.84**	**6150.37**	**0.909**	**150.55**	**0.00**	**146.58**	**0.00**	**150.5**	**0.00**
4 class	6074.69	6112.69	6215.00	6154.64	0.934	16.765	0.00	16.322	0.01	16.76	0.00
5 class	6073.27	6121.27	6250.50	6174.26	0.730	1.422	0.48	1.385	0.49	1.422	0.54

Notes: -2LL = negative 2 log likelihood; AIC = Akaike Information Criteria; BIC = Bayesian Information Criteria; aBIC = sample size adjusted Bayesian Information Criteria; LMRT = Lo-Mendell-Rubin test; BLRT = Bootstrapped log-likelihood ratio test.
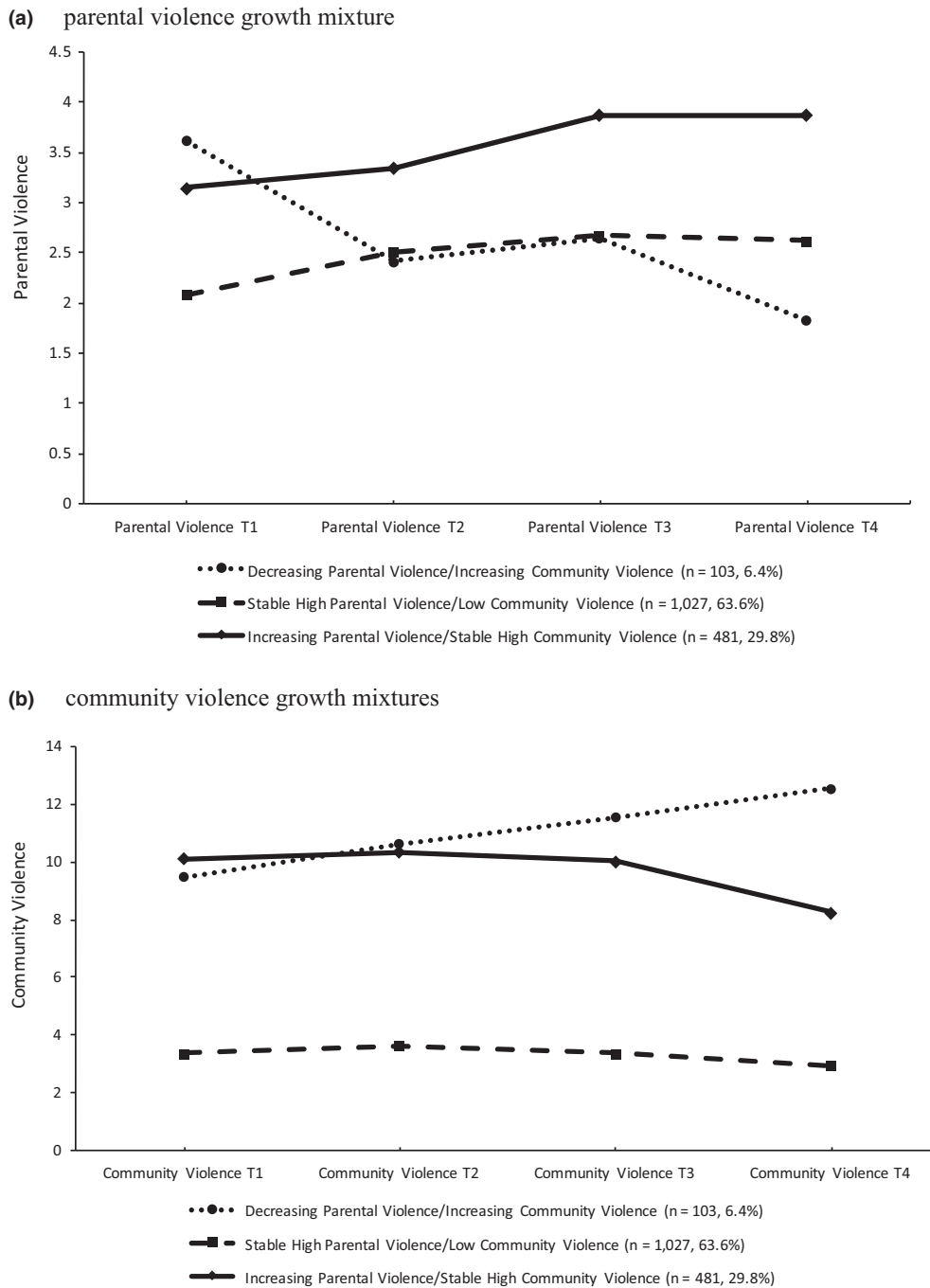
(a) parental violence growth mixture

(b) community violence growth mixtures

Fig. 2. Parallel process growth mixtures of parental violence and community violence during middle school.

solid black line with diamond markers represents a class of youth who experienced *increasing parental violence* and *stable high community violence* (n = 481; 29.8%).

High school bullying perpetration and victimization LCA

Model fit indices for the LCA used to assess the best fitting model for high school bullying perpetration and victimization are presented in the lower portion of Table 2. Based on model fit indices and analysis of the plotted probability profiles, the four-class model fit the data best. However, after examining the

probability plot one of the classes represented less than 3% of the sample (n = 36). When examining the probability plot for the three class solution we do not have a low cell size problem and was similar to the four class solution. Thus, we chose the three class solution for our final model. Figure 3 presents the item probability plot. The dotted line with circle markers represents the *High Bullying Perpetration and Victimization* class (n = 259; 16%). The *Victimization only* class represented by the dashed line with square markers (n = 1145; 71%). Youth in the *low all* class (n = 207; 13%) represented by the solid black line with diamond markers.
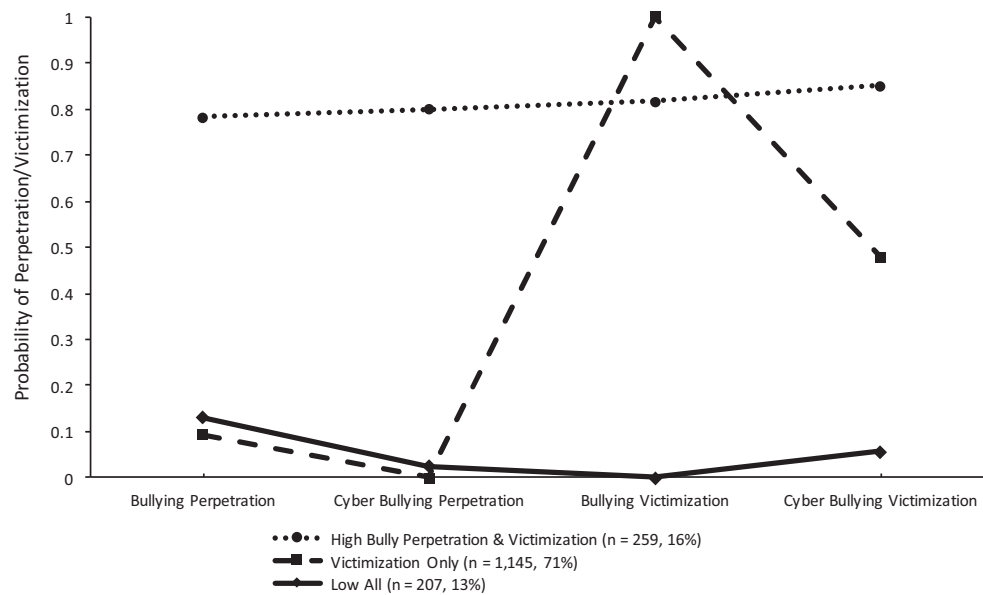
Fig. 3. Latent class probabilities for traditional and cyber bullying perpetration and victimization in high school.

Combined LTA model

After the models for the PP-GMM and LCA were established, the LTA model was fit using the three-step procedure. First, a model without covariates was fit and then an LTA model with covariates was fit. Table 3 presents the transition probabilities describing middle school patterns of change for youth in parental and community violence exposure trajectories to classes of bullying perpetration and victimization in high school. Results indicate that the majority of youth in *all* violence trajectory classes were more likely to enter into the *victimization only* class. For example, 58% youth in the *increasing community/decreasing parental violence* class, 67% of youth in the *stable high parental violence/low community violence* trajectory, and 71% of youth in the *increasing parental/stable high community* transitioned into the *victimization only* class.

Interestingly, the largest proportion (25%) of youth to transition into the *bullying-victim* class in high school were youth in the *increasing community/decreasing parental* class. Similar

Table 3. *Latent transition probabilities from middle school parental and community violence parallel process growth mixtures classes (Waves 1–4) to high school bullying perpetration and victimization classes (Waves 5 & 6)*

	High Bullying Perpetration and Victimization	Victimization Only	Low All
Decreasing Parental Violence & Increasing Community Violence	0.258	0.579	0.163
Stable High Parental Violence & Low Community Violence	0.191	0.674	0.135
Increasing Parental Violence & Stable High Community Violence	0.189	0.709	0.102

proportions of youth in the *stable high parental violence/low community violence* (19%) and the *increasing parental/stable high community* class (18%) transitioned into the *bullying-victim* class in high school. Between 10% and 16% of youth across all middle school violence exposure trajectory classes transitioned into the *low all* bullying class in high school.

LTA moderation results

The final LTA model allowed a regression of both latent class variables on the set of covariates. Covariate results on the latent class variables can be found in the supplemental materials. Because we were only interested in how our proposed moderators influenced the transition probabilities we present the results of this interaction in Table 4. Several key findings were found across all proposed moderators. For youth in the *increasing community/ decreasing parental* trajectory class results indicated an interaction with depression and school belonging. Specifically, youth who were more depressed in the *increasing community/ decreasing parental* class had a 1.79 higher odds of transitioning into the *bullying-victim* class compared to the *low perpetration and victimization* class. Interestingly, youth who reported higher school belonging in the *increasing community/decreasing parental* trajectory class were less likely (*OR* = .08, inverse *OR* = 12.3) to transition into the *bullying-victim* class, pointing to the high importance of school climate for youth who have been exposed to high amounts of violence. We also found an effect for depression for youth in the *sustained parental violence/low community violence* trajectory class. Specifically, youth who reported higher depression in the *sustained parental violence/low community violence* class were more likely (*OR* = 1.04) to transition to the *victimization only* class. Finally, we found an interaction for impulsivity and delinquency for youth in the *increasing parental/stable high community violence* class. In particular, youth who reported higher impulsivity (*OR* = 1.28) and more delinquent behavior (*OR* = 1.16) in the *increasing parental/*

Table 4. *Peer and individual factors moderating transitions from violence growth mixture classes to bullying and victimization classes*

	High Bullying Perpetration and Victimization (n = 259)		Victimization Only (n = 1,145)	
	Estimate (SE)	OR	Estimate (SE)	OR
Decreasing Parental Violence & Increasing Community Violence				
Depression	0.59* (.25)	1.79	−0.12 (.17)	0.88
Impulsivity	−1.85 (1.14)	0.16	−0.09 (.29)	0.75
School Belonging	−2.53* (1.24)	0.08	−0.90 (.85)	0.29
Delinquency	1.21 (.75)	3.36	0.71 (.68)	2.03
Stable High Parental Violence & Low Community Violence				
Depression	−0.00 (.03)	1.00	0.42* (.02)	1.04
Impulsivity	0.06 (.06)	1.06	0.02 (.05)	1.02
School Belonging	0.00 (.08)	1.00	0.05 (.06)	1.05
Delinquency	0.71 (.68)	2.03	−0.09 (.06)	0.91
Increasing Parental Violence & Stable High Community Violence				
Depression	0.07 (.05)	1.07	0.02 (.04)	1.02
Impulsivity	0.25* (.08)	1.28	0.07 (.07)	1.07
School Belonging	0.01 (.14)	1.01	−0.02 (.10)	0.98
Delinquency	0.15* (.08)	1.16	0.26 (.04)	1.03

Notes: *$p < .05$. The reference class is the 'Low All' class ($n = 207$).

stable high community were more likely to transition into the *bullying-victimization* class in high school compared to the *low perpetration and victimization* class.

DISCUSSION

This study provided the first assessment of how long term exposure to multiple types of violence, namely parental and community violence, relate to multiple forms of bullying perpetration and bullying victimization. In concordance with our first hypothesis, we found support for three distinct parallel process trajectories: *decreasing parental violence/increasing community violence*, *stable high parental/low community violence*, and *increasing parental/stable high community violence*. Interestingly, the largest proportion of youth were classified as *stable high parental violence/low community violence* (64%) – which is consistent with recent prevalence estimates that a larger proportion of youth report exposure to violence in the home compared to community (Finkelhor *et al.*, 2015; Macmillan & Hagan, 2004). More importantly, results from our mixture models point to a need to address heterogeneity in experiences of violence across multiple contexts. This is akin to the literature on poly-victimization which appreciates the cumulative burden that multiple types of experiences of violence can have on an individual (Finkelhor, Ormrod & Turner, 2009). Further, living in high risk homes and neighborhoods that are under-resourced and have low social connectivity and supervision creates additional strain for families which contributes to strife inside the home (Baumer, Horney, Felson & Lauritsen, 2003; Finkelhor *et al.*, 2009). Poly-victims face an elevated risk of future victimization (Finkelhor *et al.*, 2007), increased internalizing and externalizing problems, heighted prevalence of substance use (Charak, Ford, Modrowski & Kerig, 2018; Davis *et al.*, 2018; Ford, Elhai,

Connor & Frueh, 2010) and attenuated self-regulatory abilities (Davis *et al.*, 2018).

Further, we found support for three distinct latent classes of traditional and cyber bullying perpetration and victimization: *bully-victims*, *victimization only*, and *low all*. Again, results from the current study mirror prior research on the prevalence of bully-victims (16%) among adolescents (71%; Mishna *et al.*, 2012). Our results point to the need to assess bullying from multiple contexts: traditional (e.g., face to face) and cyber (e.g., online, texting). Prior longitudinal research has shown that involvement in cyber bullying as either a perpetrator or victim is associated with lower well-being over and above traditional bullying behaviors (Blais, 2008). Other research has found that youth who were bullied at school were more likely to be perpetrators online (Ybarra & Mitchell, 2004) or, in some cases, more likely to experience extended victimization online (Raskauskas & Stoltz, 2007). While it is interesting that we did not find a perpetration only class like some prior research (e.g., Gage, Prykanowski & Larson, 2014; Wang, Iannotti, Luk & Nansel, 2010), our results speak to the overlap between perpetration and victimization. That is, it may be that youth who are typically labeled as only perpetrators may be experiencing victimization in other areas such as online, at home, or in the community.

Our second hypothesis was partially supported such that youth in the increasing parental violence and stable high community violence trajectory in middle school had the highest probability of transitioning into the victimization only (e.g., both traditional and cyber victimization) class in high school. Interestingly, youth who were in the trajectory class that experienced decreasing parental violence and increasing community violence were more likely to transition into the bully-victim class. These results follow prior literature that has found youth who experience heightened community level violence are more likely to both be victims and perpetrators of bullying (Bacchini *et al.*, 2009; Espelage *et al.*, 2000; Guerra *et al.*, 2003; Low & Espelage, 2014). These results indicate that communities that are marked by heightened violence may reflect a larger contextual environment of violence that is evidenced in schools (Espelage *et al.*, 2000; Low & Espelage, 2014). We also found that nearly 20% of youth who experience increasing levels of parental violence (regardless of the community violence levels) transitioned into the bully-victim class. Prior research has linked witnessing parental violence, early childhood abuse and future violence involvement, both as a bully and victim of bullying (Bauer *et al.*, 2006; Holt *et al.*, 2008; Lucas *et al.*, 2016). Some call this phenomenon *intergenerational transmission of violence* (e.g., Hotaling & Sugarman, 1986), acknowledging that the behavior that parents model is central to a child's learning process (Bandura, 1973). Thus, students' involvement in peer aggression is often determined in the home long before the behavior surfaces at school.

Our moderation results partially supported Hypothesis 3, and begin to answer an important question of how youth with the same family and community violence exposure end up in different places along the bully-victim continuum? We found youth with higher rates of impulsivity and delinquency in the increasing parental violence and stable high community violence class were more likely to be in the bully-victim class. Prior

research has found that poly-victimized youth have lower self-regulation and dampened ability to cope with the stress of constant exposure to violence (Davis *et al*., 2018; Ford *et al*., 2010). These results may be related to prior research showing that early encounters of victimization may result in a dysregulated stress response system, leading youth to be more susceptible to self-regulation problems (Davis *et al*., 2017). Thus, if we use the self-control strengths model as a reference, self-regulation is viewed as a finite resource and, once depleted, results in an inability to regulate behavioral impulses when exposed to additional stressors (Baumeister & Vohs, 2003; Muraven & Baumeister, 2000). As such, youth who are exposed to stable and continuous parental and community violence may benefit from early interventions that address emotional regulation and impulse control. Over the past two decades, numerous programs have been developed to promote social-emotional competencies or social-emotional learning skills in order to reduce bullying and other forms of youth aggression (see Espelage & Low, 2012, for review). Social-emotional learning or SEL emphasizes five broad competencies – self-awareness, self-management, social awareness, relationship skills, responsible decision-making – that serve as "master skills" underlying human behavior (Domitrovich, Durlak, Staley & Weissberg, 2017; Zins, Weissberg, Wang & Walberg, 2004). Many of these programs include direct instruction in emotional regulation including identifying emotions, understanding triggers of negative affect, and self-calming techniques (e.g., counting, breathing, distraction through mediation or music). These school-based programs when implemented with fidelity have led to significant reductions in bullying and other forms of aggression (Espelage *et al*., 2014; Espelage, Rose & Polanin, 2015; Rivers, Brackett, Reyes, Elbertson & Salovey, 2013).

Further, our results found that youth in the increasing community violence and decreasing parental violence trajectory classes who evidenced higher school belonging were nearly 12 times less likely to be in the bully-victim class. These results clearly point to the need for schools to increase school climate and connectedness. School climate is a multidimensional construct that encompasses the educational structures, values, practices, and relationships that influence student perceptions of their educational experiences (Thapa, Cohen, Guffey & Higgins-D'Alessandro, 2013), including their feelings of safety, both physical and emotional, and the quality of their relationships with teachers and peers (Cohen, McCabe, Michelli & Pickeral, 2009). Findings consistently show that if students have positive perceptions of their school's climate, they are less likely to engage in aggressive behavior and violence (Espelage *et al*., 2000; Goldweber *et al*., 2013). Others have found that students who are socially neglected, and thus likely perceive the school climate negatively, are more likely to perpetrate bullying (Longobardi, Iotti, Jungert & Settanni, 2018). Interestingly, the same study found that even students of average or popular social standing who had conflictual relationships with teachers (an indicator of negative climate perception) had a higher likelihood of bullying perpetration (Longobardi *et al*., 2018). These results from prior studies on school climate, and the current study's findings indicate schools that focus on increasing school climate can reduce rates and consequences of peer aggression and

violence. This may be especially true for youth who experience violence in their home or community.

We also found that youth who evidenced higher depression scores and experienced increasing community violence (but decreasing parental violence) and increasing parental violence (but low community violence) had higher likelihood of being in the bully-victim class and the victimization only class in high school, respectively. These findings are consistent with the extant literature that finds victims and bully-victims report greater depression and anxiety compared to their un-involved peers (Cook *et al*., 2010; Wang *et al*., 2011). Moreover, the association between bullying involvement during childhood and negative outcomes in adulthood is strongest for youth who report frequent involvement in bullying as victims (Klomek, Sourander & Elonheimo, 2015). Thus, it is important to intervene with youth who present with depression, a history of violence exposures, and a history of being victimized by peers face-to-face and online. Schools should screen for depression on a regular basis and provide services to reduce depression.

Limitations and Conclusion

Notwithstanding these findings, the current study has several limitations that should be noted. The study used self-report measures that assessed the same individuals across several waves, future studies should include multiple reporters like parent and teacher ratings. The sole focus on self-reports may have biased the results given that some youth might not be willing to admit to bullying other children, although our measure of bullying has converged strongly with peer nominations of bullying. Also, this project included sampling of a small number of schools given the scope of the funding received. Given the small number of schools, it was not possible to examine school level effects, which would require enough schools to allow adequate school level variance (typically over 5% is considered acceptable, which may require upwards of 20 schools). Our sample was also collected in the Midwest and the findings are geographically limited to low-income students (70% receiving free or reduced lunch). Further, the absence of a "bully only" group might be a limitation, however, it is not surprising given the fluidity of bully perpetration and victimization. Finally, while we examined classes of parental and community violence over time we did not consider other forms of violence that may have also contributed to rates of bullying perpetration and victimization in high school (i.e., sexual violence, peer violence; Longobardi, Prino, Fabris & Settanni, 2018). Similarly, we only examined a small subset of moderators of the transition from violence exposure to bully-victim classes; additional social ecological moderators, especially protective factors, need to be examined in future studies including parenting (e.g., monitoring, knowledge, parental warmth), peer factors (positive peer relationships), intraindividual factors (e.g., empathy, self-esteem).

In closing, the current study leveraged mixture modeling strategies to reveal more detailed insights into the exposure of multiple forms of violence (i.e., parental and community) during early adolescence and their association with transitions to engage in aggressive behaviors and experience victimization during high school. Taken together, our findings make it apparent that early

forms of parental and community violence are associated with aggressive behaviors and experiences with victimization during high school. In addition, individual moderators showed that impulsivity, delinquency, and depression are important factors that exacerbated an adolescent's probability of reporting bullying perpetration and/or victimization during high school; while school belonging was associated with reductions in these behaviors. Prevention and intervention efforts aimed at reducing aggression and victimization should target individuals who display early and chronic patterns of exposure to violence as these individuals are likely to have the greatest risk of later aggressive and victimization in high school. It is also clear that prevention programs need to address violence in the communities outside of the school building, and address aggressive beliefs and behaviors that stem from exposure to conflict in homes and communities.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article:

Table S1 Peer and Individual Factors Predicting Bullying Perpetration and Victimization Classes in High School.