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Understanding the Buffering Effects of Protective Factors on the Relationship between Adverse Childhood Experiences and Teen Dating Violence Perpetration

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Abstract

Prior research has demonstrated the scope and impact of adverse childhood experiences (ACEs) on health and wellbeing. Less is known about the trajectories from exposure to ACEs, such as witnessing family conflict and violence in the community, to teen dating violence perpetration, and the protective factors that buffer the association between early exposure to ACEs and later teen dating violence perpetration. Students (n = 1611) completed self-report surveys six times during middle and high school from 2008 to 2013. In early middle school, the sub-sample was 50.2% female and racially/ethnically diverse: 47.7% Black, 36.4% White, 3.4% Hispanic, 1.7% Asian/Pacific Islander, and 10.8% other. Youth were, on average, 12.7 years old. Latent transition analysis was used to assess how trajectories of exposure to parental conflict and community violence during middle school transition into classes of teen dating violence perpetration (e.*g*., sexual, physical, threatening, relational, and verbal) in high school. Protective factors were then analyzed as moderators of the transition probabilities. Three class trajectories of ACEs during

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Compliance with Ethical Standards

Ethical Approval "All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee (University of Illinois at Urbana Champaign) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards."

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middle school were identified: *decreasing family conflict and increasing community violence (n =* 103; 6.4%), *stable low family conflict and stable low community violence (n =* 1027; 63.7%), *stable high family conflict and stable high community violence (n =* 481; 29.9%). A three class solution for teen dating violence perpetration in high school was found: *high all teen dating violence* class (*n* = 113; 7.0%), physical *and verbal only teen dating violence* class (*n* = 335; 20.8%), and *low all teen dating violence* class (*n* = 1163; 72.2%). Social support, empathy, school belonging and parental monitoring buffered some transitions from ACEs exposure trajectory classes to teen dating violence perpetration classes. Comprehensive prevention strategies that address multiple forms of violence while bolstering protective factors across the social ecology may buffer negative effects of exposure to violence in adolescence.

Keywords

Adverse childhood experiences; Trauma; PTSD; Teen dating violence; Adolescent; Development

Introduction

Adverse childhood experiences (ACEs) are a collection of potentially traumatic exposures that occur during the first 18 years of life. ACEs have traditionally included exposure to abuse and neglect and household challenges (e.g., intimate partner violence and substance abuse), and have more recently included additional exposures, such as economic hardship and witnessing community violence (Bethell et al. 2017), Research on ACEs has demonstrated that exposure to early adversity can result in a host of harmful outcomes immediately and throughout the life course (Felitti et al. 1998; Finkelhor et al. 2013; Gilbert et al. 2015). ACEs are common with nearly two-thirds of adult samples reporting exposure to at least one and one-quarter reporting exposure to three or more distinct types of ACEs (Merrick et al. 2018). In the United States, 38.1% of youth (ages 14–17 years) have experienced some form of child maltreatment (i.e., abuse by a caregiver) in their life, with 23.9% reporting emotional abuse, 18.1% reporting physical abuse, and 18.4% reporting neglect (Finkelhor et al. 2015). The same study found that 10.2% of youth ages 14–17 reported lifetime sexual assault victimization by an adult or peer (Finkelhor et al. 2015). Adolescents are also likely to experience indirect violence in their lifetime with over 32% reporting witnessing family assault, 25% witnessing partner assault, and almost 58% witnessing assaults in the community (e.g., seeing someone get attacked, hearing gun shots) (Finkelhor et al. 2015). Much of the scholarship to date has focused on ACEs in the immediate family (e.g., substance abuse in the household, child abuse and neglect) and less on the external negative influences on child development, such as witnessing community violence (Cronholm et al. 2015; Finkelhor et al. 2015). Further, most ACEs research has measured ACEs experienced at any time in childhood (ages 0 – 18 years), hampering the ability to examine critical developmental periods, such as early childhood or adolescence, when ACEs may occur.

Of particular interest to the present study is the connection between two specific types of ACEs—family conflict and community violence—experienced during or prior to early adolescence (e.g., middle school), and how these two ACEs are related to later perpetration

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of dating violence in high school, as well as protective factors that may buffer that relationship. Teen dating violence includes physical violence, sexual violence, stalking and psychological aggression by a current or former intimate partner (CDC 2017). Teen dating violence is a major public health concern. In a study of high risk middle school students from four U.S. cities, among those who had dated, nearly 77% reported perpetration of verbal/emotional violence, 32% reported perpetration of physical violence, 20% reported threatening a partner, 15% reported perpetrating sexual violence, and 13% reported perpetrating relational violence (Niolon et al. 2015). Given that effective teen dating violence prevention strategies are contingent on addressing the needs of youth who may be progressing toward high risk behaviors, understanding how trajectories of childhood exposure to violence are related to teen dating violence may help identify youth who are at risk. Thus, identifying youth who are at risk and potential protective factors that may buffer the association between exposure to ACEs and later teen dating violence may provide a more tailored approach to prevention design. In the teen dating violence prevention field, little is known about protective factors that may decrease the likelihood of teen dating violence perpetration among youth at risk (e.g., who have experienced ACEs), particularly in the critical developmental period of adolescence.

Theoretical and Empirical Evidence: ACEs and Teen Dating Violence Perpetration

Research has demonstrated that ACEs often co-occur (Finkelhor et al. 2007a, 2007b) and exposure to multiple forms of violence (i.e., poly-victimization), such as witnessing parental conflict, being directly victimized in the home, and witnessing violence in the community has a graded dose-response relationship with negative outcomes (Davis et al. 2018a, 2018b; Finkelhor et al. 2007a, 2007b; Ford et al. 2007). The more ACEs experienced, the greater the risk for future social, mental, and physical health problems. In particular, research has noted how exposure to ACEs can increase risk for later violent experiences. For example, exposure to ACEs has been associated with both perpetration of and victimization from physical violence (Bellis et al. 2014) and sexual violence (Ports et al. 2016). In a review of cross-sectional studies, Lewis and Fremouw (2001) reported mixed findings on the association between witnessing violence (e.g., interparental violence) and later teen dating violence perpetration. Additional studies have been conducted since Lewis and Fremouw's review, including longitudinal designs, and this limited research is demonstrating a more consistent link between ACEs and future perpetration of teen dating violence, including, exposure to ACEs and risk of intimate partner violence (Whitfield et al. 2003) and violence within adolescent dating relationships (Basile et al. 2013; Miller et al. 2011). In addition, a number of longitudinal studies have noted associations between witnessing violence or experiencing direct violence in the home or community and perpetration of violence within relationships during adolescence (Vagi et al. 2013).

There are numerous theories that support the associations between ACEs and perpetration of teen dating violence, including intergenerational transmission of violence (Langhinrichsen-Rohling 2005; O'Leary 1988), social information processing (Huesmann 1988), and social cognitive theory (Bandura 1977). In particular, the theory of intergenerational transmission of violence posits that witnessing intimate partner violence early in life places youth at higher risk of repeating violence perpetration in their own relationships (O'Leary 1998).

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Several early studies found that exposure to family violence, in general, is one of the most robust and important predictors of relationship violence among adults and adolescents (see Lewis and Fremouw 2001 and Vagi et al. 2013 for review). For example, in one of the seminal studies, Ehrensaft and colleagues (2003) found that, over the course of 20 years, compared to non-exposed children, those who witnessed intimate partner violence were more likely to perpetrate against and be victimized by their partners as adults. Prior research has also found that witnessing intimate partner violence is associated with increased physiological arousal, affect dysregulation, heightened self-blame, and increases in internalizing problems (Morris et al. 2007; Saltzman et al. 2005). Other research notes that witnessing violence in the family during childhood or mid-adolescence (e.g., between parents) is associated with higher rates of aggression in relationships and marriages, later in life (Lohman et al. 2013). In a meta-analysis assessing effects of exposure to domestic violence (defined broadly) on internalizing and externalizing problems, Evans et al. (2008) found medium to large effect sizes for internalizing problems ($d = 0.48$), externalizing problems ($d = 0.47$), and trauma symptomology ($d = 1.54$). Thus, in general, exposure to parental violence appears to have moderate to large effects on problems later in life. The association between exposure to violence and future dating violence among adolescents is less clear; however, several studies have found a direct association between exposure to violence in the family and higher rates of dating violence. For example, early longitudinal research has found that harsh parenting, child abuse, and witnessing intimate partner violence was associated with heightened risk of dating violence among men (Magdol et al. 1998), more hostile talk and aggression toward women in relationships (Capaldi et al. 2001), and increased dating violence perpetration (Lavoie et al. 2002).

Because exposure to violence in the home or community provides the ground work for basic socialization and learning, aggression that is modeled within families or a community can be thought of as initial scripts for understanding the consequences of relationship violence (Black et al. 2010). Thus, the association between exposure to violence and future dating violence perpetration can also be viewed through the lens of social learning theory. Social learning theory posits that, when youth repeatedly observe aggression between family members or in the community, such as verbal or physical aggression, this aggressive behavior may be imitated in their own relationships (Bandura 1977). This learned behavior is also posited to be cognitively mediated, such that observation of violence leads to belief systems that violence is normal and acceptable, which may increase the likelihood of violence perpetration (Calvete and Orue 2011). Thus, if youth witness positive outcomes of violence perpetration, maladaptive schemas are developed and some youth may learn that violence is an effective means of conflict resolution with partners (Ehrensaft et al. 2003). For example, early research has found that between 15% and 20% of physical dating violence perpetration could be accounted for by social learning theory mediating variables, such as conflict-response styles, expectation of positive outcomes, and acceptance of dating violence (Foshee et al. 1999).

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Protective Factors That May Buffer the Association between ACEs and Teen Dating Violence

Given linkages between exposure to violence in childhood and future violence perpetration, there is a need to identify protective factors that buffer the impact of exposure to ACEs on later violence. The concept of protective factors can be split into specific domains based on Bronfenbrenner's ecological theory including the individual, relationship or family level, and community level influences (Bronfenbrenner 1977). Numerous longitudinal and cross-sectional studies have investigated protective factors at different levels of the social ecology as they relate to youth who have been exposed to early childhood trauma. For example, longitudinal work has found that, among sexually abused girls, having a stable family, graduation from high school, social support, and adaptive coping strategies were all related to resilience factors (e.g., better mental health functioning, no criminal justice involvement) later in adulthood (Banyard and Williams 2007; Hyman and Williams 2001). Similarly, longitudinal studies have found, among cases of child maltreatment, parent or caregiver support, academic functioning, and adaptive coping are the most robust protective factors associated with adaptive functioning in young adulthood (Collishaw et al. 2007; DuMont et al. 2007). Other longitudinal studies, focused primarily on childhood and adolescence, have found that the most consistent protective factors related to better functioning following exposure to violence were family level factors (e.g., parental monitoring, family relationships) and individual level factors (e.g., selfesteem) (Cicchetti and Rogosch 1993; Flores and Cicchetti 2005; Kim et al. 2009; Turner et al. 2017).

Few studies have investigated protective factors directly associated with teen dating violence perpetration. However, some research has found family functioning to be a moderator of later violence perpetration (not specific to dating violence). For example, Gorman-Smith et al. (2004) found that youth from families with lower discipline and conflict, higher cohesiveness and parental monitoring, *and* who were exposed to high rates of community violence were less likely to perpetrate violence compared to youth with similar community violence exposure, but from less well functioning families. Others have found that parental monitoring minimized the negative effects of exposure to community violence on anti-social behavior (e.g. alcohol and drug use, theft, fighting) among adolescents (Bacchini et al. 2011). In a recent review, Vagi and colleagues (2013) identified studies that examined individual and interpersonal risk and protective factors for perpetration of adolescent dating violence, of which three investigated protective factors (Cleveland et al. 2003; McCloskey and Lichter 2003; Schumacher and Slep 2004). These limited studies found protective factors for teen dating violence perpetration included high cognitive dissonance (e.g., beliefs and attitudes that perpetrating teen dating violence is wrong), high empathy, good school performance and attachment to school, and a positive relationship with mother. Research has also shown that youth who engage in a variety of teen dating violence perpetration types in high school have slower growth in empathy, social support, parental monitoring, and school belonging during middle school, compared to youth who reported never engaging in any teen dating violence. Absent from the teen dating violence prevention literature are studies that examine the buffering effect of protective factors on the relationship between ACEs and later adolescent teen dating violence perpetration. The present study investigates how specific protective factors from different levels of influence buffer the relationship between

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ACEs and physical, sexual, threatening, verbal and relational teen dating violence perpetration.

Current Study

While prior research has increased the understanding of the scope and impact of ACEs, fewer studies have examined simultaneously adversity that happens in the home and in the community during or prior to early adolescence, nor have researchers examined these risk factors across time for risk of perpetration of different types of teen dating violence perpetrated in high school. Thus, it is hypothesized that two or more ACEs trajectory classes will emerge that represent reports of family conflict and community violence (Hypothesis 1) in middle school. The novelty of this study is further strengthened by simultaneously examining multiple types of teen dating violence perpetraiont in high school. Thus, in line with theories of intergenerational transmission of violence, it is hypothesized that youth who report being exposed to higher levels of *both* family conflict and community violence in middle school will evidence the highest probability of engaging in all teen dating violence types (physical, sexual, threatening, verbal and relational) in high school compared to youth who are exposed to lower levels of both family conflict and community violence in middle school (Hypothesis 2). Further, in line with social learning theory, it is hypothesized that, compared to youth who are exposed to lower levels of family conflict in middle school, youth who are exposed to higher levels of family conflict will evidence a higher likelihood of engaging in physical and verbal teen dating violence perpetration later on, because they witnessed these behaviors in their family (Hypothesis 3). Research has also demonstrated that several individual and interpersonal protective factors are associated with future teen dating violence, but whether these factors moderate this risk trajectory between middle and high school is unknown. This study addresses these gaps in the literature by examining how protective factors during middle school (i.e., empathy, social support, parental monitoring, school belonging, and academic achievement) affect the relationship between middle school ACEs exposure (i.e., family conflict and community violence) and subsequent perpetration of teen dating violence in high school. Based on prior research and theory, it was expected that protective factors will buffer the association between youth in higher ACE trajectory classes and teen dating violence perpetration (Hypothesis 4).

Methods

Participants

Students from four middle schools who then transitioned to six high schools in the Midwest ($n = 3549$) were surveyed six times from Spring 2008 to Spring 2013 (see Espelage et al. 2018; Espelage et al. 2018 for more details on study participants). The current study included a subset of the sample, students who indicated they had been in a dating relationship in high school ($n = 1611$). In early middle school, the subsample was 50.2% female and racially/ethnically diverse: 47.7% Black, 36.4% white, 3.4% Hispanic, 1.7% Asian/ Pacific Islander, and 10.8% other. At the school level, 60–70% of students (depending on the school) received free or reduced lunch. See Table 1 for more demographic information.

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Procedures

A waiver of active parental consent was approved by the Institutional Review Board and the school district administration. Parents only returned signed consent forms if they did not wish for their child to participate. During survey administrations in middle schools, 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. Resources were provided to all participants in each wave related to peer victimization and mental health (middle school) and teen dating violence (high school). All students were eligible, and 98% of students participated in the study (see Espelage et al. 2018; Espelage et al. 2018 for more details on study procedure).

Measures

Control variables—Several variables were used in our models as controls including biological sex (female reference group), race/ethnicity (nonwhite reference group), age in years at baseline, as well as physical and sexual child abuse experienced prior to the age of 9 years).

Middle school violence ACEs exposure

Family conflict: The Family Conflict and Hostility Scale (Thornberry et al. 2003) measured the level of past year 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 “*Never*” (0) through *“Always”* (3) on a 4-point Likert scale. Each of these items was dichotomized to indicate whether the adolescent had experienced the item (coded 1) or never experienced (coded 0), and summed. The total score ranged from 0 to 3 with higher scores indicating exposure to more types of family conflict. Cronbach’s alpha coefficients ranged from .79–.81 *(M_{alpha} =* .80) across waves for this sample.

Community violence: Exposure to community violence was assessed with five items from the 12-item Children’ s Exposure to Community Violence scale (Richters and Martinez 1993). Students were asked “In the past year 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”* (0) through *“Often”* (3) on a 4-point Likert scale. Each of these items was dichotomized to indicate whether the adolescent had experienced the item (coded 1) or never experienced (coded 0) in the past year, and summed. The total scores can range from 0 to 5 with higher scores indicating exposure to more types of community violence. Cronbach’s alpha coefficients ranged from .88–.91 (M_{alpha} = .90) across waves for the current study.

High school teen dating violence perpetration—Teen dating violence perpetration was assessed in the last two waves (during high school) with 25 items from the Conflict in

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Adolescent Dating Relationships Inventory (CADRI, (Wolfe et al. 2001) that comprise five subscales: sexual (4-items), physical (4-items), threatening (4-items), relational (3-items), and verbal (10-items) perpetration in the past year. Students were presented with this stem prior to completing the measure: "The next questions ask about 'dating.' By 'dating,' we mean spending time with someone you are seeing or going out with (one time dates, long-term relationship)." Example items include "I brought up something bad he/she had done in the past" (relational), "I insulted him/her with put downs" (verbal), "I pushed, shoved, or shook him/her" (physical), "I threatened to hurt him/her" (threatening), and "I forced him/her to have sex when he/she didn't want to" (sexual). Response options were on a 4-point scale ranging from "*Never*" (0) through "*Often*" (3). The CADRI has strong internal consistency with a Cronbach's alpha of .83 across waves for this sample. Because the distribution for teen dating violence perpetration types was skewed, teen dating violence perpetration was dichotomized into *ever engaging* in any teen dating violence perpetration (1 = *yes*) or *never engaging* in teen dating violence perpetration (0 = *no)* during high school for each of the subscales.

Protective factor moderators

Empathy: The 5-item Empathy subscale of the Teen Conflict Scale (Bosworth and Espelage 1995) measured adolescents' ability to listen to, care for, and trust others. Students indicated how often they would use items in the scale to describe themselves (e.g., "I can listen to others"; "I get upset when my friends are sad") on a 5-point Likert scale with options ranging from "*Never*" (0) through *"Always"* (4). Scores range from 0 to 20. High values indicate more frequent empathic behaviors. In the current study, Cronbach's alpha ranged from .71 to .76 (M_{alpha} = .74) across waves.

Academic achievement: Participants reported their average grades for the semester in which assessments were taking place. Options range from 1 = *"Mostly Ds and Fs"* through 7 = *"Mostly* As." Scores could range from 1 to 7. Higher scores indicate better academic achievement.

Social support: The Vaux Social Support Record (VSSR) is a 9-item questionnaire that was designed to assess the degree to which a person feels cared for, respected, and involved (Vaux 1988). The VSSR is comprised of three 3-item subscales that measure the support available from family, peers, and school respectively; the 3-item subscales are then summed into a total scale score, which can range from 0 to 18. Higher scores reflect more social support. Students reported the number of people that fit the description of each item (e.g., "I have (insert friend, family, adult at school) I can talk to, who care about my feelings and what happens to me"). Response options were *"None"* (0), *"Some"* (1), and "*All*" (2). The total scale and subscales showed good internal consistency across waves, with Cronbach' s alpha coefficients ranging from .83 to .94 *(M_{alpha} =* .86).

Parental monitoring: The Parental Monitoring/Supervision subscale from the Seattle Social Development Project (Arthur et al. 2002) was used to measure respondents' perceptions of established familial rules and perceived parental awareness regarding schoolwork and attendance, peer relationships, alcohol or drug use, and weapon possession.

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The subscale includes 8 items measured on a 4-point Likert scale ranging from "*Never*" (0) through "*Always*" (3). Example items include, "My family has clear rules about alcohol and drug use" and "My parents ask if I've gotten my homework done." Scores can range from 0 to 24 with higher scores indicating more parental monitoring. In the current study, Cronbach's alpha ranged from .86 to .90 (M_{alpha} = .88) across all waves.

School belonging: Perceived belonging at school was assessed with 4 of the 20 items from the Psychological Sense of School Members Scale (Goodenow 1993). Students were asked how much they agree with the following statements: (1) "I feel proud of belonging to this school," (2) "I am treated with as much respect as other students," (3) The teachers here respect me," and (4) "There is at least one teacher or other adult in this school I can talk to if I have a problem." A 5-point response scale ranged from *"Strongly Disagree*" (0) through *"Strongly Agree*" (3). Scores could range from 0–12 with higher scores reflecting greater school belonging. In the current sample, Cronbach's alpha ranged from .68 to .74 (M_{alpha} = .72) across all waves.

Analytic Plan

In the current study, a parallel process growth mixture model (PP-GMM) was used to model simultaneous heterogeneity in family conflict and exposure to community violence during middle school. Latent class analysis (LCA) was used to model heterogeneity in the five types of teen dating violence, namely sexual, physical, threatening, relational, and verbal (Hix-Small et al. 2004; Wu et al. 2010). To understand how exposure to the specific types of ACEs are related to teen dating violence perpetration, a latent transition mixture model (Nylund-Gibson et al. 2014) was used. A latent transition analysis (LTA) is a longitudinal extension of 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 at Time 1. 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 using two mixture models (e.g., two different measurement models), namely LCA and growth mixture modeling (GMM). As with all mixture models, several indicators were used 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 Vuong-Lo-Mendell-Rubin Likelihood Ratio test (VLRT), Lo-Mendell-Rubin adjusted likelihood ratio test (LRT), and bootstrapped likelihood ratio test (BLRT) indicate better model fit (Nylund et al. 2007). In summary, our analysis plan includes the following steps: (1) Establish the PG-GM trajectories for ACEs, (2) Establish LTA for perpetration, (3) Regress LTA classes on PG-GMM classes, 4. Examine moderators.

Class Enumeration for Parallel Process Growth Mixture Model

A series of models were run for the PP-GMM to simultaneously model heterogeneity and understand patterns of *both* family conflict and community violence during middle school (grades 6 – 8). The latent class variable was defined by both family conflict and community

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violence growth factors (e.g., intercept and slope). Growth mixture models identify unobserved subpopulations that describe longitudinal change within (and between) emergent subpopulations (Ram and Grimm 2009). They also allow for the extraction of heterogeneity within a variable that is measured over time. Thus, GMMs allow for variation in growth trajectories, resulting in separate growth models for each emergent latent class, which have unique parameter estimates (e.g., means, variance, and co-variate influences). We used log likelihood ratio tests to assess the need for random linear and quadratic slopes. A series of models were estimated with one to five classes and the fit of these models was assessed using the above mentioned criteria.

Class Enumeration for Latent Class Analysis

Next, a series of latent class analyses were estimated to understand heterogeneity in teen dating violence perpetration for youth in high school. Each individual was assigned class membership probability based on the five indicators of teen dating violence. Similar to the process for the PP- GMM, a series of models were estimated with one to four classes and the fit was assessed by the model fit indicators.

LTA Method and Moderation Analyses

To assess the latent transition probabilities, the latent class variable from the high school LCA was regressed on the emergent latent PP-GMM in middle school. That is, emergent classes from our PP-GMM assessing heterogeneity in ACEs predicts emergent classes of teen dating violence. Doing this procures a matrix of transition probabilities from emergent classes of exposure to family and community violence during the course of middle school to emergent classes of teen dating violence perpetration in high school (see Fig. 1 for theoretical model). These probabilities allow us to determine how likely someone is to transition from a specific ACEs class to a specific teen dating violence class.

In order to understand these transitions more fully, a series of multinomial logistic regressions were estimated where covariates were introduced as moderators of the transition probabilities. In the final model the LTA model was estimated which incorporated predictors of class membership (for both PP-GMM and LCA) as well as predictors of the transition from middle school exposure to violence growth mixture trajectories to high school teen dating violence perpetration profiles. These moderators included empathy, social support, parental monitoring, school belonging, and academic achievement. All five proposed moderators were allowed to simultaneously influence the transition probabilities; however, demographic control variables (e.g., biological sex [female reference group]), race/ethnicity (nonwhite reference group), age in years at baseline, as well as child abuse (e.g., physical, and sexual abuse) 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 the LTA model.

Missing Data

All models were estimated in *Mplus* version 8 (Muthén and Muthén 1998–2017). Missing data ranged from 4–25% across the study period. *Mplus* adjusts for missing data using a maximum likelihood estimator under the assumption that data are missing at random and

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uses all data that are available for each participant. FIML treats all observed predictors as a single-item latent variable; therefore, each individual contributes to the data they have available at each time point to the likelihood function and no individuals are removed from the analysis through listwise deletion. Under the assumption that data are missing at random (MAR), or are conditionally random after adjusting for other variables in the model (MCAR), estimates and *SE*s are unbiased by the missing data (Enders 2011). Attrition has been assessed in multiple manuscripts from this data set (see Davis et al. 2018a, 2019). In general, few differences existed across variables of interest, across participant demographics. Thus, with the modest amount of missing data, coupled with the large sample size, and using important covariates in the data analysis, it likely that missing data had a small effect on model estimates.

Results

Middle School ACEs (Family Conflict and Community Violence) PP-GMM

A series of PP-GMM models were fit starting with a one-class model. Fit indices for the PP-GMM (see Table 2) were used to determine the best fitting parallel process model. The nonsignificant 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' a decreasing aBIC occurred at the four-class solution, indicating a three-class solution may fit the model best. Item probabilities for both a three- and four-class solution were plotted. The four-class solution provided a class with less than 2% of the sample ($n = 25$). Additionally, the four-class solution did not provide any more information with the additional class compared to the three class solution. Based on the observed probability plots the three-class solution was chosen.

Figures 2a, b display the item probability plots for both family conflict and exposure to community violence. The dotted line with circle markers represents a class that experienced *decreasing family conflict and increasing community violence* during middle school ($n = 103$; 6.4%). The dashed line with square markers represents a class that experienced *stable low family conflict and stable low community violence* ($n = 1027$; 63.7%). The solid black line with diamond markers represents a class of youth who experienced *stable high family conflict and stable high community violence* ($n = 481$; 29.9%).

High School Teen Dating Violence Perpetration LCA

Model fit indices for the LCA for high school teen dating violence perpetration are presented in the lower portion of Table 2. Based on model fit indices and analysis of the plotted probability profiles, the three-class model fit the data best. Specifically, the three-class solution had the smallest aBIC and BIC values, as well as a non-significant VLRT and LRT values when estimating a four-class solution, indicating a $k - 1$ solution fits the data best. Figure 3 presents the item probability plot. The dotted line with circle markers represents the *High all Teen Dating Violence* class ($n = 113$; 7.0%). This class had high endorsement of all teen dating violence perpetration types. The dashed line with square markers represent *the physical and verbal Teen Dating Violence* perpetration class ($n = 335$; 20.8%). Youth in this class had the highest endorsement probability of both physical (1.0) and verbal (0.98) teen

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dating violence perpetration, with lower endorsement of sexual (0.02), relational (0.0), and threatening (0.35) items. Youth in the *low all Teen Dating Violence* class (n = 1163; 72.2%) are represented by the solid black line with diamond markers. Youth in this class generally had the lowest endorsement of all teen dating violence perpetration items.

Combined LTA Model

Table 3 includes the transition probabilities describing middle school patterns of change for youth exposed to family conflict and community violence and their trajectories to classes of teen dating violence perpetration in high school. Starting with youth in the *decreasing family conflict /increasing community violence* trajectory class, youth in this class were the highest contributor to the *high all teen dating violence* class (0.20), the lowest contributor to the *low all teen dating violence* class (0.56), and they had a probability of 0.24 of transitioning into the *physical/verbal teen dating violence* class. Continuing to youth in the *stable high family conflict/stable high community violence* class, youth in this class had the highest contribution to transitioning to the *physical/verbal teen dating violence* class. Further, youth in the *stable high family conflict/stable high community violence* had a 0.06 probability of transitioning into the *high all teen dating violence* class and a 0.68 probability of transitioning into the *low all teen dating violence* class. Finally, youth in the *stable low family/stable low community violence* class contributed to the highest probability of transitioning into the *low all teen dating violence* class (0.76), with relatively low probabilities of transitioning into the *high all teen dating violence* class (0.06) and *physical/verbal teen dating violence* class (0.18).

LTA Moderation Results

In the final LTA model, moderation of protective factors on the transition probabilities was assessed. Results are presented in Table 4. Several key findings were found across moderators. For youth in the *decreasing family conflict /increasing community violence* trajectory class results indicated an interaction with social support and parental monitoring. Specifically, relative to youth who transitioned into *low all teen dating violence class*, youth who had a unit increase in social support in the *decreasing family conflict /increasing community violence* class had a 43% *(AOR* = 0.57, 95% *CI* [0.34, 0.98]) lower odds of transitioning into the *high all teen dating violence* class, and a 33% *(AOR* = 0.67, 95% *CI* [0.55, .82]) lower odds of transitioning intob the *physical/verbal teen dating violence* class. Further, a unit increase in parental monitoring evidenced a 15% (*AOR* = 0.85, 95% *CI* [0.75, 0.96]) lower odds of transitioning into the *physical/verbal teen dating violence* class. Academic achievement, empathy, and school belonging did not moderate any transitions for youth in the *decreasing family/increasing community violence* class. Interestingly, school belonging emerged as significant moderators for youth in the *Stable High family/stable high community violence* class. Specifically, a unit increase in school belonging resulted in a 23% (*AOR* = 0.77, 95% *CI* [0.58, 0.94]) lower odds of transitioning into the *physical/verbal* class. Academic achievement, social support, and parental monitoring did not moderate any transitions for youth in the *increasing family/stable high community violence* class. Finally, an effect for social support, school belonging, and academic achievement for youth in the *low family/low community* violence class was found. Specifically, a unit increase in social support was associated with a 33% (*AOR* = 0.67, 95% *CI* [0.48, .084]) and 15% (*AOR* =

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0.85, 95% *CI* [0.76, 0.95]) lower odds of transitioning into the *high all teen dating violence* and *physical/verbal teen dating violence* classes, respectively. Finally, a unit increase in school belonging evidenced a 21% *(AOR* = 0.79, 95% *CI* [0.70, 0.92]) lower odds of transitioning into the *high all teen dating violence* class and a unit increase in academic achievement was associated with a 38% *(AOR* = 0.62, 95% *CI* [0.39, 0.98]) lower odds of transitioning into the *physical/verbal teen dating violence* class.

Alternative Models

To understand the independent effects of both types of ACEs (e.g., parental conflict and community violence) we estimated our latent transition models separately for each ACEs type. Specifically, we followed the same procedures outlined above except, instead of modeling the simultaneous heterogeneity in family conflict and community violence during middle school, we modeled the transition probability of emergent family conflict and community violence classes, separately. We report results for each separately, below. All results can be found in supplemental materials.

Class enumeration for family conflict (see Supplemental Table 1) resulted in a four class solution fitting the data best. However, after comparing probability plots of the three and four class solution, the additional class form the four class solution was nearly identical to an existing class (stable high family conflict). Thus, for parsimony we chose the three class solution for family conflict. The resulting classes (see Supplemental Fig. 1) included an *increasing family conflict* class (53.3%, *n* = 859), an *early high, decreasing family conflict* class (15.0%, *n* = 243), and a *stable low family conflict class* (31.2%, *n* = 509).

We should note, the early high, decreasing family conflict class had the highest reported family conflict at the beginning of middle school, yet had the lowest reported family conflict at the end of middle school. Results for the teen dating violence latent class remained the same, which included a *high all teen dating violence* class (*n* = 113; 7.0%), a *physical/verbal teen dating violence* perpetration class *(n* = 335; 20.8%), and a *low all teen dating violence* class (*n* = 1163; 72.2%). Supplemental Table 2 presents transition probabilities from our emergent family conflict classes to emergent teen dating violence classes. Interestingly, youth in the *stable high family conflict* class had the lowest probability of transitioning into the *high all teen dating violence* class (0.04) but had the highest probability of transitioning into the *physical/verbal teen dating violence* class (0.27). Interestingly, youth in the *early high, decreasing family conflict* (0.11) and the *stable low family conflict* class (0.11) had the same probability of transitioning into the *high all teen dating violence* class and similar probabilities *(early high, decreasing family conflict:* 0.14; *stable low family conflict:* 0.13) of transitioning into the *physical verbal teen dating violence* class. When assessing moderators (see Supplemental Table 4) we found both social support (*AOR* = 0.83, 95% *CI* [0.69, 0.98]) and school belonging (*AOR* = 0.81, 95% *CI* [0.69, 0.95]) decreased the odds of transitioning from the *increasing family conflict* class to the *physical/verbal teen dating violence* class. For youth in the *high early, decreasing family conflict* class, a unit increase in parental monitoring *(AOR* = 0.84, 95% *CI* [0.73, 0.97]) was associated with a lower odds of transitioning into the *high all teen dating violence* class. Thus, it appears that general support from family and a sense of belonging at school is protective for youth experiencing

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increasing family conflict in middle school and for those who have high values early on in middle school, parental monitoring is protective.

When extracting classes for community violence (see Supplemental Table 1) a three class solution fit the data best. Resulting classes included a *stable high community violence* class (22.1%, $n = 357$), a *moderate, decreasing community violence* class (26.3%, $n = 423$), and a *stable low community violence class* (51.5%, $n = 831$). When assessing transitions to teen dating violence classes in high school (see Supplemental Table 4) we found youth in the *stable high community violence class* had the highest probability of transitioning into the *high all* teen dating violence class (0.20) and the lowest probability of transitioning into the *low all teen dating violence* class (0.56). Youth in the *moderate, decreasing community violence* class (0.06) and the *stable low community violence* class (0.06) had similar probabilities of transitioning into the *high all teen dating violence* class. Finally, youth in the *stable high community violence* class (0.24) and the *stable low community violence* class (0.26) had similar probabilities of transitioning into the *physical/verbal teen dating violence* class. When assessing moderation (see Supplemental Table 5) we found empathy (*AOR* = 0.83, 95%*CI* [0.69, 0.98]), social support (*AOR* = 0.83, 95%*CI* [0.69, 0.98]), and parental monitoring (*AOR* = 0.83, 95%*CI* [0.69, 0.98]) to all decrease the probability of transitioning from the *stable high community violence* class to the *high all teen dating violence* class. Only social support *(AOR* = 0.83, 95%CI [0.69, 0.98]) moderated the transition from the *stable high community violence* class to the *physical/verbal teen dating violence* class. Finally, school belonging reduced the odds of transiting from the *moderate, decreasing community violence* class to the *physical/verbal teen dating violence* class.

Discussion

Adolescence is a time when youth navigate biological changes (e.g., puberty), multiple transitions (e.g., middle school to high school), expectations of self-regulation or self-dicipline, increasing desire to be more autonomous (e.g., peer influence), and potential experimentation with high risk behaviors (e.g., substance use, delinquency) (Lerner and Steinberg 2009). Youth who experience ACEs have increased vulnerability and may engage in unhealthy behaviors to cope with adversity. Prior reseach has shown that youth exposed to ACEs during childhood and adolescence are at risk for developmental challenges, such as internalizing and externalizing problems, behavioral problems, and increased propensity for aggression (Davis et al. 2018 a, 2018b; Finkelhor et al. 2007a, 2007b; Ford et al. 2007). In particular, there are some studies indicating that exposure to ACEs such as witnessing violence between parents or witnessing violence in their neighborhood is associated with higher odds of engaging in dating violence (Vagi et al. 2013). The characterization of ACEs exposure across both family and community violence in middle school is particularly important given that adolescents spend large amount of time both within (e.g., with parents and siblings) and outside (e.g., within the community) of the family context. Unfortunatley, few studies have included community violence in the conceptualization of ACEs and even fewer have attempted to undertand how trajectories of multiple ACEs are related to later dating violence. The current study advances the understanding regarding the heterogeneity of the co-occurrence of multiple types of exposures to ACEs during early adolescence and

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the effects of protective factors that buffer the association between exposure to ACEs and later teen dating violence perpetration.

This study found heterogeneity in exposure to multiple forms of violence during adolescence and sought to understand how various trajectories of ACEs exposure were related to engagement in multiple forms of teen dating violence. In regards to common trajectories from ACEs classes to teen dating violence perpetration, and in support of both hypotheses 2 and 3, the highest proportion of individuals in the physical and verbal teen dating violence class transitioned from those who reported *stable high family conflict and stable high community violence* and *decreasing family and increasing community violence* (26% and 24%, respectively). In the current study, family conflict included yelling, loss of temper, and physical fights between family members. Results provide a more nuanced understanding of why some youth may engage in verbal or physical teen dating violence. Specifically, in line with hypothesis 3, and regardless of the level of family conflict over time, high levels of family conflict at any period during early adolescence appears to be related to teen dating violence perpetration. High levels of community violence (both stable and more proximal) are also related to teen dating violence perpetration. Thus, focusing only on family conflict may underestimate the propensity for future teen dating violence perpetration among youth; witnessing of community violence may provide added risk for the development of maladaptive learned behaviors.

In this study, and as expected given the low prevalence of teen dating violence, only a small proportion of youth transitioned to the high all teen dating violence class. However, the highest proportion of individuals in the high all teen dating violence class transitioned from those who experienced *decreasing family conflict and increasing community violence* (20%); with less than 6% of youth in the *stable high family conflict and stable high community violence* class transitioning into the high all teen dating violence class. Of these emergent classes, youth reporting decreasing family conflict and increasing community violence was not expected. It is possible that youth could reside in families that have decreasing conflict due to youth getting older, one parent leaving, or conflict being resolved, but yet they may remain in a violent neighborhood. In fact, prior research has found similar trends. For example, in a prior study, at baseline nearly all youth had reported witnessing violence between parents (Kennedy et al. 2010). However, half way through the study the proportion reporting witnessing parental violence decreased to 41%, and yet, throughout the entire length of the study (two years) exposure to community violence remained stable and high with nearly 90% reporting some form of community violence during each of the follow up periods. Thus, results from the current study, again, show the influence of community violence on later behavior, and suggest that early experiences of witnessing violence in the home and community, and particularly *increases* in exposure to community violence during the critical adolescence developmental period, have a significant effect on later perpetration of all forms of teen dating violence.

These results are in line with prior theoretical and empirical work. Broadly speaking, youth who witness or directly experience violence early in life are at risk of engaging in future interpersonal violence due to learned behaviors about the functional nature of violence (Wekerle and Wolfe 1999). That is, social learning theory posits that youth will model

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behaviors that appear to provide positive rewards (Bandura 1977). In the case of exposure to violence, youth may see violence as a way to solve problems, maintain control in relationships, decrease feelings of tension, or increase feelings of agency. Theories of intergenerational transmission of violence posit that some youth may try to replicate or reproduce particular types of aggression in which they were exposed to early in life in their own relationships (Kalmuss 1984). In fact, studies have noted that youth who were maltreated have a higher propensity for engaging in dating violence (Vagi et al. 2013). In terms of exposure to community violence, prior research suggests that youth may become desensitized to violence and, in turn, experience a lack of emotional response or accumulate beliefs about how to resolve conflict (Ng-Mak et al. 2002). Findings from the current study extend prior work in this area. For example, Gorman-Smith et al. (2004) found that youth from high functioning families (e.g., high parental monitoring, low discipline) and exposed to community violence had the lowest odds of perpetrating youth violence compared to lower functioning families (e.g., low monitoring, high discipline). High levels of exposure to community violence may create a sense of pathologic adaptation which is characterized by heightened aggressive behaviors and diminished internalizing distress. Children and families need safe, stable, nurturing relationships to thrive, but these relationships also exist within an environment that may normalize violence, and subsequently influence their behavior. Findings demonstrate that modeling of behavior may extend beyond the family environment, and that violence in the community also shapes teen dating violence behaviors.

In line with hypothesis 4, findings suggest that different protective factors buffer the relationship between ACEs and teen dating violence perpetration depending on the balance of and changes in ACEs. For example, support of and engagement with others, through social support and parental monitoring during middle school, influences the likelihood of teen dating violence perpetration when early adolescent exposure to community violence is increasing. On the other hand, when exposure to both family conflict and community violence is stable and high during middle school, having empathy and feeling connected to school appear to buffer the likelihood of perpetrating teen dating violence in high school. Social support and school belonging also seem to be important in preventing middle school youth with little or no ACEs exposure from perpetrating teen dating violence, so these two protective factors may be critically important to primary prevention. This study also indicates which kinds of teen dating violence perpetration may be most influenced by protective factors in the presence of ACEs exposure. For instance, social support appears to reduce the odds of all forms of teen dating violence perpetration for those youth with increased exposure to community violence, while parental monitoring was only found to have significant buffering effects on physical and verbal teen dating violence perpetration. A similar pattern emerged for school belonging wherein its buffering effects were specifically for physical and verbal teen dating violence perpetration among those who experienced stable high family conflict/stable high community violence and stable low family conflict/stable low community violence. It appears that there is something about having parents and school-related influences checking on high risk adolescents that makes them less likely to perpetrate physical and verbal TDV. Additional research on the role of parents and other relationship influences is needed to understand these patterns better.

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Prevention Approaches

Findings have direct implications for prevention efforts. Several protective factors, including empathy and social support, emerged in this study that affected the relationship between ACEs and teen dating violence perpetration. Increasing social-emotional skills, such as empathy, to promote healthy relationships between youth has long been the target of many school-based violence prevention programs (Mihalic et al. 2004). Many of these programs also focus on increasing social support provided by peers and teachers and a sense of belonging to school to reduce the risk of violence perpetration and victimization. Increasingly, violence prevention approaches (e.g., mentoring and after school programs) have also adopted models with a greater emphasis on bolstering stronger relationships among youth and adults in their school and larger communities, including teachers, coaches, extended family members, neighbors, and community volunteers (David-Ferdon et al. 2016). Exposure to positive adult role models helps youth learn acceptable and appropriate behavior, which can be particularly important for youth exposed to violence at home and in the community. In addition, this study suggests addressing caregiver behavior and skills, such as monitoring, rule setting, and use of nonviolent discipline, should be a key element of preventing teen dating violence. This finding is consistent with previous research highlighting the important role parents play in preventing teen dating violence and other risk behavior (Farrington et al. 2012; Foshee et al. 2012).

The current study also supports the importance of preventing ACEs as an upstream teen dating violence prevention strategy. Given the associations between family conflict and community violence and teen dating violence perpetration, prevention strategies that strengthen safe, stable, nurturing relationships as well as the environments in which families live, work, play, and learn are critical. Strategies that enhance parenting skills and family relationships (e.g., Nurse Family Partnership, Incredible Years, SafeCare) can protect children from ACEs and long-term consequences (Fortson et al. 2016). In addition, community- level approaches that modify the physical and social environments of neighborhoods in order to reduce community violence may subsequently prevent teen dating violence perpetration and victimization and can also impact many risk and protective factors for interpersonal violence, such as violent crime, community pride, physical health, stress, and collective efficacy (David-Ferdon et al. 2016; Niolon et al. 2017). Community- and societal-level prevention strategies (e.g., strengthening economic supports for families) that address the social and structural factors associated with ACEs and violence can be powerful levers because of their potential to reach a large number of people and address conditions that contribute to higher risk for violence among some groups and communities (Frieden 2010). Additional research is needed to understand whether these are effective approaches for preventing teen dating violence.

Limitations

The current study has several important limitations. First, all data are self-reported, thus there may be bias in reporting of events (e.g., ACEs, teen dating violence). Second, while the current study is longitudinal, teen dating violence data was only collected in high school. Understanding how *changes* in teen dating violence are related to early ACEs trajectories can better inform prevention. Third, the sample was derived from schools in the Midwestern

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United States, thus findings may not generalize to all youth. Fourth, the construct of community violence included crime-related items, and may reflect community exposures that include factors that are highly correlated with violence. Fifth, we did not explore larger system (e.g., such as school- or community-level) protective factors. Future research may wish to explore this possibility by assessing how, for example, school- and community-level connectedness or support may be important buffering factors. Sixth, because the available child sexual and physical abuse measure reflected only one-time point in early childhood (before the age of 9), it was not included in the longitudinal models. Child abuse is an important ACE and was controlled for in analyses; however, the current analyses focused on exposure to ACEs throughout middle school, a unique developmental time period. Finally, exposure to ACEs relied on a count and sum of different types of exposures in middle school, and did not consider important dimensions of exposure, including chronicity and severity.

Conclusion

Adverse childhood experiences, such as witnessing parental violence and community violence, is a major public health concern. Prior research has found that witnessing violence (in the home or community) is associated with increased violence perpetration and other externalizing problems later in life. However, we currently have little understanding of how chronic exposure to family conflict and community violence during early adolescence may be related to increased probability of perpetrating teen dating violence. Further, we also know little about what factors buffer negative consequences of exposure to violence and later teen dating violence perpetration. The current study extends theories of intergenerational transmission of violence by assessing how changes in experiences of family conflict and community violence relate to teen dating violence perpetration. We found various protective factors such as social support, parental monitoring, and school belonging all buffered the odds of teen dating violence perpetration, but from different youth profiles of violence exposure. Thus, our results indicate that the type of ACEs trajectory matters in terms of later teen dating violence perpetration and protective factors vary based on these ACEs trajectories. Comprehensive prevention strategies that address multiple forms of violence in childhood and adolescence while bolstering protective factors at multiple levels of the social ecology can help ensure that all children thrive.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Biography

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References

Arthur MW, Hawkins JD, Pollard JA, Catalano RF, & Baglioni AJ (2002). Measuring risk and protective factors for use, delinquency, and other adolescent problem behaviors. Evaluation Review, 26(6), 575–601. 10.1177/0193841X0202600601. [PubMed: 12465571]

Bacchini D, Concetta Miranda M., & Affuso G (2011). Effects of parental monitoring and exposure to community violence on antisocial behavior and anxiety/depression among adolescents. Journal of Interpersonal Violence, 26(2), 269–292. 10.1177/0886260510362879. [PubMed: 20234055]

Bandura A (1977). Social learning theory. New York: General Learning Press.

Banyard VL, & Williams LM (2007). Women's voices on recovery: a multi-method study of the complexity of recovery from child sexual abuse. Child Abuse & Neglect, 31(3), 275–290. https://doi.org/10.1016ZJ.CHIABU.2006.02.016. [PubMed: 17395261]

Basile KC, Hamburger ME, Swahn MH, & Choi C (2013). Sexual violence perpetration by adolescents in dating versus same-sex peer relationships: differences in associated risk and protective factors.

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The Western Journal of Emergency Medicine, 14(4), 329–40. 10.5811/westjem.2013.3.15684. [PubMed: 23930146]

Bellis MA, Hughes K, Leckenby N, Perkins C, & Lowey H (2014). National household survey of adverse childhood experiences and their relationship with resilience to health-harming behaviors in England. BMC Medicine, 12(1), 72 10.1186/1741-7015-12-72. [PubMed: 24886026]

Bethell CD, Davis MB, Gombojav N, Stumbo S, & Powers K (2017). Issue brief: adverse childhood experiences among US children, child and adolescent health measurement initiative. Johns Hopkins Bloomberg School of Public Health, Hobokon, New Jersey, 10 2017. cahmi.org/projects/adverse-childhood-experiences-aces.

Black DS, Sussman S, & Unger JB (2010). A Further look at the intergenerational transmission of violence: witnessing interparental violence in emerging adulthood. Journal of Interpersonal Violence, 25(6), 1022–1042. 10.1177/0886260509340539. [PubMed: 19801446]

Bosworth K, & Espelage DL (1995). Teen Conflict Survey. Bloomington, IN: Center for Adolescent Studies, Indiana University.

Bronfenbrenner U (1977). Toward an experimental ecology of human development. American Psychologist, 32(7), 513.

Calvete E, & Orue I (2011). The impact of violence exposure on aggressive behavior through social information processing in adolescents. American Journal of Orthopsychiatry, 81(1), 38–50. 10.1111/j.1939-0025.2010.01070.x. [PubMed: 21219274]

Capaldi D, Dishion T, Stoolmiller M, & Yoerger K (2001). Aggression toward female partners by at-risk young men: The contribution of male adolescent friendships. Developmental Psychology, 37(1), 61 http://psycnet.apa.org/fulltext/2000-14218-006.html. [PubMed: 11206434]

CDC. (2017). Preventing Teen Dating Violence. Atlanta: Centers for Disease Control and Prevention www.cdc.gov/.

Cicchetti D, & Rogosch F (1993). Resilience in maltreated children: processes leading to adaptive outcome. Cambridge.Org, 5(4), 629–647.

Cleveland HH, Herrera VM, & Stuewig J (2003). Abusive males and abused females in adolescent relationships: risk factor similarity and dissimilarity and the role of relationship seriousness. Journal of Family Violence, 18(6), 325–339. 10.1023/A:1026297515314.

Collishaw S, Pickles A, Messer J, Rutter M, Shearer C, & Maughan B (2007). Resilience to adult psychopathology following childhood maltreatment: evidence from a community sample. Child Abuse & Neglect, 31(3), 211–229. 10.1016/J.CHIABU.2007.02.004. [PubMed: 17399786]

Cronholm PF, Forke CM, Wade R, Bair-Merritt MH, Davis M, Harkins-Schwarz M, & Fein JA (2015). Adverse childhood experiences: expanding the concept of adversity. American Journal of Preventive Medicine, 49(3), 354–361. 10.1016/J.AMEPRE.2015.02.001. [PubMed: 26296440]

David-Ferdon C, Vivolo-Kantor AM, Dahlberg LL, Marshall KJ, Rainford N, & Hall JE (2016). A Comprehensive Technical Package for the Prevention of Youth Violence and Associated Risk Behaviors. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention.

Davis JP, Dumas TM, Berey B, Merrin GJ, Tan K, & Madden DR (2018a). Poly-victimization and trajectories of binge drinking from adolescence to young adulthood among serious juvenile offenders. Drug and Alcohol Dependence, 10.1016/j.drugalcdep.2018.01.006.

Davis JP, Dumas TM, Merrin GJ, Espelage DL, Tan K, Madden D, & Hong JS (2018b). Examining the pathways between bully victimization, depression, academic achievement, and problematic drinking in adolescence. Psychology of Addictive Behaviors, 32(6), 605–616. 10.1037/adb0000394. [PubMed: 30211583]

Davis JP, Merrin GJ, Ingram KM, Espelage DL, Valido A, & El Sheikh AJ (2019). Examining pathways between bully victimization, depression, & school belonging among early adolescents. Journal of Child and Family Studies, 1–14. in press

DuMont KA, Widom CS, & Czaja SJ (2007). Predictors of resilience in abused and neglected children grown-up: the role of individual and neighborhood characteristics. Child Abuse & Neglect, 31(3), 255–274. 10.1016/J.CHIABU.2005.11.015. [PubMed: 17386940]

Ehrensaft M, Cohen P, Brown J, Smailes E, Chen H, & Johnson J (2003). Intergenerational transmission of partner violence: a 20-year prospective study. Psycnet.Apa.Org, 74(4), 741.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Enders CK (2011). Analyzing longitudinal data with missing values. Rehabilitation psychology, 56(4), 267. [PubMed: 21967118]

Espelage DL, Basile KC, Leemis RW, Hipp TN, & Davis JP (2018). Longitudinal examination of the bullying-sexual violence pathway across early to late adolescence: implicating homophobic name-calling. Journal of Youth and Adolescence, 47 (9), 1880–1893. 10.1007/s10964-018-0827-. [PubMed: 29500577]

Espelage DL, Leemis RW, Niolon PH, Kearns M, Basile KC, & Davis JP (in press). Teen dating violence perpetration: Protective factor trajectories from middle to high school among adolescents. Journal of Research on Adolescence.

Espelage DL, Davis JP, Basile KC, Rostad WL, & Leemis RW (2018). Alcohol, prescription drug misuse, sexual violence, and dating violence among high school youth. Journal of Adolescent Health, 63(5), 601–607. 10.1016/J.JAD0HEALTH.2018.05.024. [PubMed: 30172675]

Evans SE, Davies C, & DiLillo D (2008). Exposure to domestic violence: a meta-analysis of child and adolescent outcomes. Aggression and Violent Behavior, 13(2), 131–140. 10.1016/j.avb. 2008.02.005.

Farrington DP, Loeber R, & Ttofi MM (2012). Risk and protective factors for offending In Welsh Brandon C. & Farrington David P. (Eds), The Oxford handbook of crime prevention (pp. 46–69). New York, NY: Oxford University Press.

Felitti VJ, Anda RF, Nordenberg D, Williamson DF, Spitz AM, Edwards V, & Marks JS (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) Study. American Journal of Preventive Medicine, 14(4), 245–58. [PubMed: 9635069]

Finkelhor D, Ormrod RK, & Turner HA (2007). Poly-victimization: a neglected component in child victimization. Child Abuse & Neglect, 31(1), 7–26. 10.1016/j.chiabu.2006.06.008. [PubMed: 17224181]

Finkelhor D, Ormrod RK, & Turner HA (2007). Poly-victimization and trauma in a national longitudinal cohort. Development and Psychopathology, 19(01), 149–166. 10.1017/ S0954579407070083. [PubMed: 17241488]

Finkelhor D, Shattuck A, Turner H, & Hamby SL (2015). A revised inventory of adverse childhood experiences. Child Abuse & Neglect, 48, 13–21. [PubMed: 26259971]

Finkelhor D, Turner HA, Shattuck A, & Hamby SL (2013). Violence, crime, and abuse exposure in a National Sample of Children and Youth. JAMA Pediatrics, 167(7), 614 10.1001/jamapediatrics. 2013.42. [PubMed: 23700186]

Finkelhor D, Turner HA, Shattuck A, Hamby SL, R G, JM L, & R C (2015). Prevalence of childhood exposure to violence, crime, and abuse. JAMAPediatrics, 169(8), 746 10.1001/jamapediatrics. 2015.0676.

Flores E, & Cicchetti D (2005). Predictors of resilience in maltreated and nonmaltreated Latino children. Developmental Psychology, 41(2), 338 http://psycnet.apa.org/fulltext/ 2005-02477-006.html. [PubMed: 15769190]

Ford JD, Hawke J, Alessi S, Ledgerwood D, & Petry N (2007). Psychological trauma and PTSD symptoms as predictors of substance dependence treatment outcomes. Behaviour Research and Therapy, 45(10), 2417–2431. 10.1016/J.BRAT.2007.04.001. [PubMed: 17531193]

Fortson BL, Klevens J, Merrick MT, Gilbert LK, & Alexander SP (2016). Preventing child abuse and neglect: a technical package for policy, norm, and programmatic activities. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention 10.15620/ cdc.38864.

Foshee VA, Bauman KE, & Linder GF (1999). Family violence and the perpetration of adolescent dating violence: examining social learning and social control processes. Journal of Marriage and the Family, 61(2), 331 10.2307/353752.

Foshee V, Reyes H, Ennett S, Cance J, Bauman K, & Bowling J (2012). Assessing the effects of Families for Safe Dates, a family-based teen dating abuse prevention program. Journal of Adolescent Health, 51(4), 349–356. [PubMed: 22999835]

Frieden TR (2010). A framework for public health action: the health impact pyramid. American journal of public health, 100(4), 590–595. [PubMed: 20167880]

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Gilbert LK, Breiding MJ, Merrick MT, Thompson WW, Ford DC, Dhingra SS, & Parks SE (2015). Childhood adversity and adult chronic disease: an update from ten states and the district of Columbia, 2010. American Journal of Preventive Medicine, 48(3), 345–349. 10.1016/J.AMEPRE.2014.09.006. [PubMed: 25300735]

Goodenow C (1993). The psychological sense of school membership among adolescents: scale development and educational correlates. Psychology in the Schools, 30(1), 79–90. 10.1002/1520-6807(199301)30:1<79::AID-PITS2310300113>3.0.CO;2X.

Gorman-Smith D, Henry DB, & Tolan PH (2004). Exposure to community violence and violence perpetration: the protective effects of family functioning. Journal of Clinical Child & Adolescent Psychology, 33(3), 439–449. 10.1207/s15374424jccp3303_2. [PubMed: 15271602]

Hix-Small H, Duncan TE, Duncan SC, & Okut H (2004). A multivariate associative finite growth mixture modeling approach examining adolescent alcohol and marijuana use. Journal of Psychopathology and Behavioral Assessment, 26(4), 255–270. 10.1023/BJ0BA.0000045341.56296.fa.

Huesmann RL (1988). An information processing model for the development of aggression. Aggressive Behavior, 14(1), 13–24. 10.1002/1098-2337(1988)14:13.0.CO;2J.

Hyman B, & Williams L (2001). Resilience among women survivors of child sexual abuse. Affilia, 16(2), 198–219. 10.1177/08861090122094226.

Kalmuss D (1984). The intergenerational transmission of marital aggression. Journal of Marriage and the Family, 11(1), 11–19.

Kennedy AC, Bybee D, Sullivan CM, & Greeson M (2010). The impact of family and community violence on children's depression trajectories: examining the interactions of violence exposure, family social support, and gender. Journal of Family Psychology, 24(2), 197–207. 10.1037/a0018787. [PubMed: 20438195]

Kim J, Cicchetti D, Rogosch FA, & Manly JT (2009). Child maltreatment and trajectories of personality and behavioral functioning: Implications for the development of personality disorder. Development and Psychopathology, 21(03), 889 10.1017/S0954579409000480. [PubMed: 19583889]

Langhinrichsen-Rohling J (2005). Top 10 greatest "Hits. Journal of Interpersonal Violence, 20(1), 108–118. 10.1177/0886260504268602. [PubMed: 15618567]

Lavoie F, Hébert M, Tremblay R, Vitaro F, Vézina L, & McDuff P (2002). History of family dysfunction and perpetration of dating violence by adolescent boys: a longitudinal study. Journal of Adolescent Health, 30(5), 375–383. 10.1016/S1054-139X(02)00347-6. [PubMed: 11996786]

Lerner RM, & Steinberg L (Eds.). (2009). Handbook of adolescent psychology, volume 1: Individual bases of adolescent development (Vol. 1). Hobokon, New Jersey: John Wiley & Sons.

Lewis SF, & Fremouw W (2001). Dating violence: a critical review of the literature. Clinical Psychology Review, 21(1), 105–127. 10.1016/S0272-7358(99)00042-2. [PubMed: 11148892]

Lohman BJ, Neppl TK, Senia JM, & Schofield TJ (2013). Understanding adolescent and family influences on intimate partner psychological violence during emerging adulthood and adulthood. Journal of Youth and Adolescence, 42(4), 500–17. 10.1007/s10964-013-9923-7. [PubMed: 23430562]

Magdol L, Moffitt TE, Caspi A, & Silva PA (1998). Developmental antecedents of partner abuse: a prospective-longitudinal study. Journal of Abnormal Psychology, 107(3), 375–89. [PubMed: 9715573]

McCloskey LA, & Lichter EL (2003). The Contribution of marital violence to adolescent aggression across different relationships. Journal of Interpersonal Violence, 18(4), 390–412. 10.1177/0886260503251179.

Merrick MT, Ford DC, Ports KA, & Guinn AS (2018). Prevalence of adverse childhood experiences from the 2011–2014 behavioral risk factor surveillance system in 23 States. JAMA Pediatrics, 172(11), 1038 10.1001/jamapediatrics.2018.2537. [PubMed: 30242348]

Miller E, Breslau J, Chung W, Green J, McLaughlin K, & Kessler R (2011). Adverse childhood experiences and risk of physical violence in adolescent dating relationships. Journal of Epidemiology and Community Health, 65(11), 1006–1013. [PubMed: 21321063]

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Mihalic S, Fagan A, Irwin K, Ballard D, & Elliiot D (2004). Blueprints for Violence Prevention. Center forthe Study and Prevetion of Violence, University of Colorado, Boulder. Office of Juvenile Justice and Deliquency Prevention, Washington, D.C.

Morris AS, Silk JS, Steinberg L, Myers SS, & Robinson LR (2007). The role of the family context in the development of emotion regulation. Social Development, 16(2), 361–388. 10.1111/j.1467-9507.2007.00389.x [PubMed: 19756175]

Muthen LK, & Muthen BO (1998). Mplus User's Guide. 8th edition Los Angeles: Muthen & Muthen.

Ng-Mak DS, Salzinger S, Feldman R, & Stueve A (2002). Normalization of violence among inner-city youth: a formulation for research. American Journal of Orthopsychiatry, 72(1), 92–101. 10.1037/0002-9432.72.1.92. [PubMed: 14964598]

Niolon PH, Kearns M, Dills J, Rambo K, Irving S, Armstead T, & Gilbert L (2017). Preventing intimate partner violence across the lifespan: A technical package of programs, policies, and practices. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention.

Niolon PH, Vivolo-Kantor AM, Latzman NE, Valle LA, Kuoh H, Burton T, & Tharp AT (2015). Prevalence of teen dating violence and co-occurring risk factors among middle school youth in high-risk Urban communities. Journal of Adolescent Health, 56(2), S5–S13. 10.1016/J.JAD0HEALTH.2014.07.019.

Nylund-Gibson K, Grimm R, Quirk M, & Furlong M (2014). A Latent Transition Mixture Model Using The Three-step Specification. Structural Equation Modeling: A Multidisciplinary Journal, 21(3), 439–454. 10.1080/10705511.2014.915375

Nylund KL, Asparouhov T, & Muthen BO (2007). Deciding on the number of classes in latent class analysis and growth mixture modeling: a Monte Carlo Simulation Study. Structural Equation Modeling A Multidisciplinary Journal, 14(4), 535–569. 10.1080/10705510701575396.

O'Leary KD (1988). Physical Aggression between Spouses In Van Hasselt VB, Morrison RL, Bellack AS & Hersen M (Eds). Handbook of Family Violence (pp. 31–55). Boston, MA: Springer US.

Ports KA, Ford DC, & Merrick MT (2016). Adverse childhood experiences and sexual victimization in adulthood. Child Abuse & Neglect, 51, 313–322. 10.1016/J.CHIABU.2015.08.017. [PubMed: 26386753]

Ram N, & Grimm KJ (2009). Growth mixture modeling: a method for identifying differences in longitudinal change among unobserved groups. International Journal of Behavioral Development, 33(6), 565–576. 10.1177/0165025409343765. [PubMed: 23885133]

Richters JE, & Martinez P (1993). The Nimh Community Violence Project: I. Children as Victims of and Witnesses to Violence. Psychiatry, 56(1), 7–21. 10.1080/00332747.1993.11024617. [PubMed: 8488215]

Saltzman KM, Holden GW, & Holahan CJ (2005). The psychobiology of children exposed to marital violence. Journal of Clinical Child & Adolescent Psychology, 34(1), 129–139. 10.1207/s15374424jccp3401_12.

Schumacher JA, & Slep AMS (2004). Attitudes and dating aggression: a cognitive dissonance approach. Prevention Science, 5(4), 231–243. 10.1023/B:PREV.0000045357.19100.77. [PubMed: 15566049]

Thornberry TP, Lizotte AJ, Krohn MD, Smith CA, & Porter PK (2003). Causes and Consequences of Delinquency In Thornberry TP & Krohn MD (Eds). Taking Stock of Delinquency (pp. 11–46). Boston, MA: Kluwer Academic Publishers.

Turner HA, Merrick MT, Finkelhor D, Hamby SL, Shattuck A, & Henly M (2017). The Prevalence of Safe, Stable, Nurturing Relationships Among Children and Adolescents. US Department of Justice, Office of Justice Programs, Office of Juvenile Justice and Delinquency Prevention.

Vagi KJ, Rothman EF, Latzman NE, Tharp AT, Hall DM, & Breiding MJ (2013). Beyond correlates: a review of risk and protective factors for adolescent dating violence perpetration. Journal of Youth and Adolescence, 42(4), 633–649. 10.1007/s10964-013-9907-7. [PubMed: 23385616]

Vaux A (1988). Social support: Theory, research, and intervention. New York: Praeger Publishers.

Wekerle C, & Wolfe DA (1999). Dating violence in mid-adolescence: Theory, significance, and emerging prevention initiatives. Clinical psychology review, 19(4), 435–456. [PubMed: 10429844]

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Whitfield CL, Anda RF, Dube SR, & Felitti VJ (2003). Violent childhood experiences and the risk of intimate partner violence in adults. Journal of Interpersonal Violence, 18(2), 166–185. 10.1177/0886260502238733.

Wolfe DA, Scott K, Reitzel-Jaffe D, Wekerle C, Grasley C, Straatman A-L, & Lavallee J (2001). Development and validation of the conflict in adolescent dating relationships inventory. Psychological Assessment, 13(2), 277–293. 10.1037/1040-3590.13.2.277. [PubMed: 11433803]

Wu J, Witkiewitz K, McMahon RJ, & Dodge KA (2010). A parallel process growth mixture model of conduct problems and substance use with risky sexual behavior. Drug and Alcohol Dependence, 111(3), 207–214. 10.1016/J.DRUGALCDEP.2010.04.013. [PubMed: 20558013]

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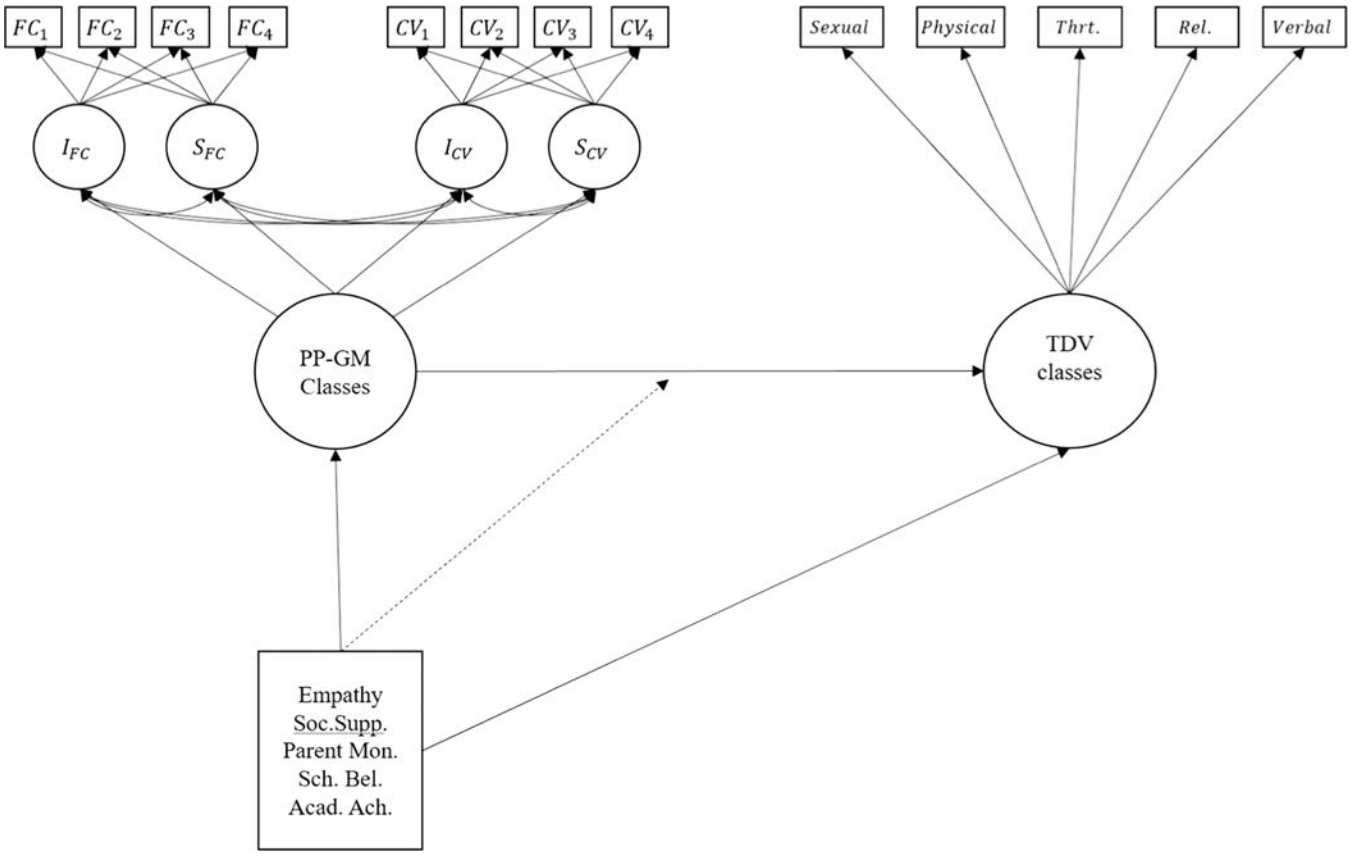

Fig. 1.

Conceptual Model. *Note*: The dashed line represents the moderation of transition probabilities. FC family conflict, CV community violence, Sexual sexual TDV, Phy physical TDV, Thrt. threatening TDV, Rel. relational TDV; Verb. = verbal TDV, Soc. Supp social support, Parent Mon parental monitoring, Sch. Bel school belonging, Acad. Ach academic achievement

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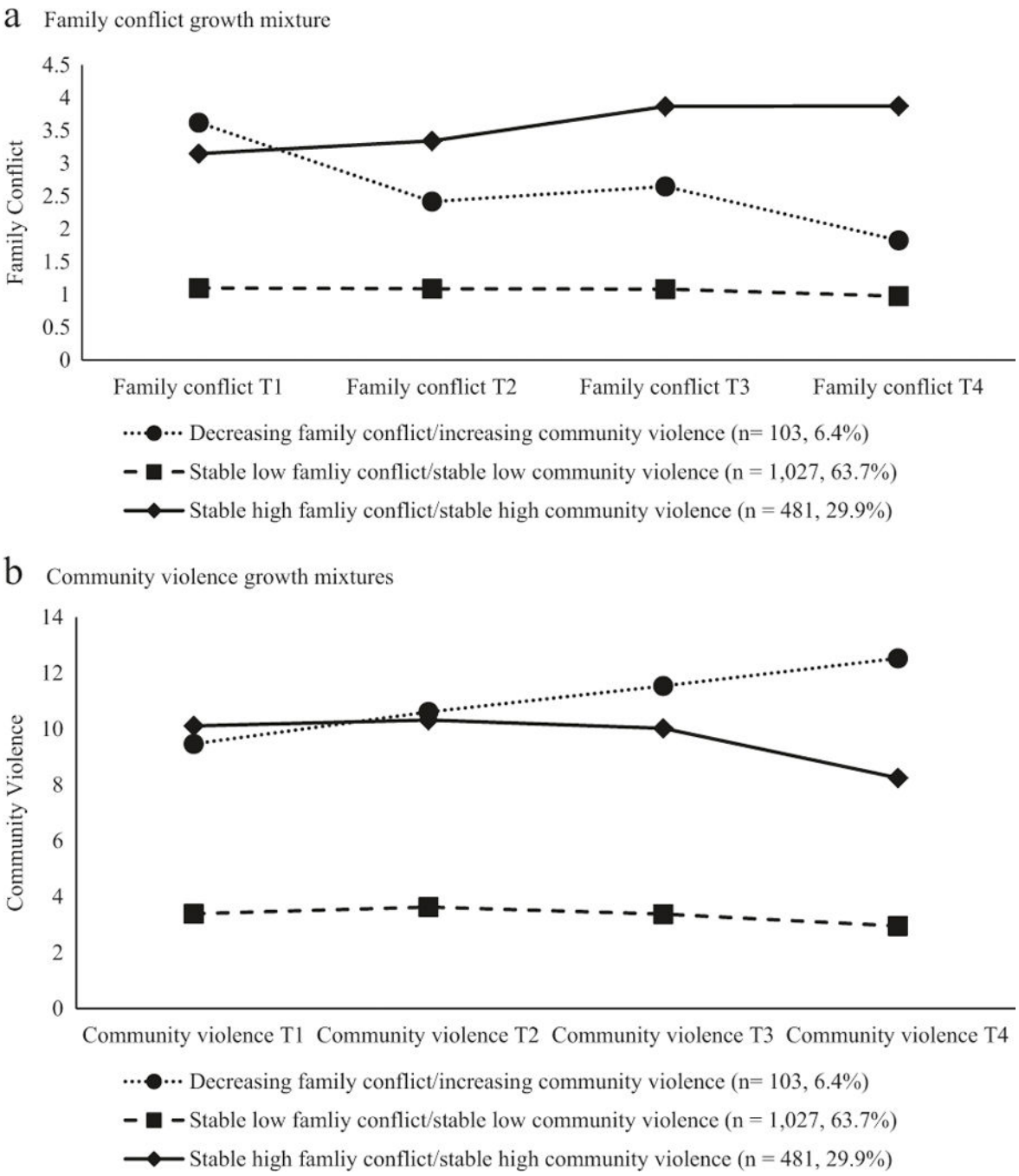

Fig. 2.

Parallel process growth mixtures of family conflict and community violence during middle school. **a** Family conflict growth mixture model. **b** Community violence growth mixture model

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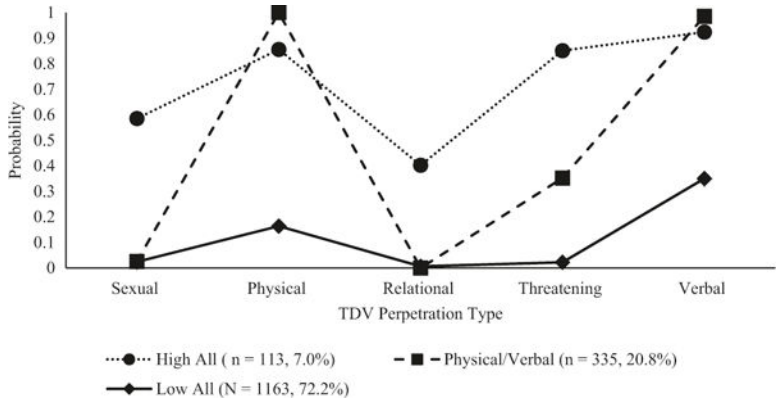

Fig. 3.

Latent class probabilities for teen dating violence perpetration in high school. *Note*: TDV = teen dating violence

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Table 1

Baseline characteristics

	Means (SD) or *n* (%) (*n* = 1611)
Demographics	
Age in years	12.77 (0.98)
Female	808 (50.2%)
Male	803 (49.8%)
Black	769 (47.7%)
White	586 (36.4%)
Hispanic	54 (3.4%)
Asian/Pacific Islander	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	
Family conflict	2.50 (1.93)
Community violence	5.79 (4.38)
Teen dating violence perpetration n (%)	
Sexual TDV	103 (6.2%)
Physical TDV	332 (37.6%)
Threatening TDV	240 (14.5%)
Relational TDV	153 (9.49%)
Verbal TDV	1079 (65.3%)
Protective factors	
Empathy	9.03 (3.82)
Social support	12.1 (3.24)
Parental monitoring	18.4 (5.02)
School belonging	11.6 (2.07)
Academic achievement	3.9 (1.81)

TDV teen dating violence

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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*
ACEs PP-GMM											
1 class	56,166.02	56,202.02	56,298.94	56,241.76							
2 class	55,696.48	55,742.49	55,866.33	55,793.26	0.822	469.53	0.00	457.15	0	469.53	0.00
3 class	**55,489.61**	**55,545.61**	**55,696.37**	**55,607.42**	**0.845**	**206.87**	**0.00**	**201.42**	**0**	**206.87**	**0.00**
4 class	55,232.95	55,298.95	55,476.64	55,371.81	0.864	256.65	0.04	249.88	0.04	256.65	0.00
5 class	55,073.29	55,149.29	55,353.90	55,233.18	0.882	159.66	0.001	155.45	0.007	159.66	0.00
Teen Dating Violence LCA											
1 class	6780.954	6790.954	6817.877	6801.993							
2 class	6166.342	6188.341	6247.572	6212.627	0.789	614.613	0.00	601.047	0.00	614.613	0.00
3 class	**6075.54**	**6109.541**	**6201.079**	**6147.073**	**0.803**	**90.801**	**0.00**	**88.797**	**0.00**	**90.801**	**0.00**
4 class	6054.606	6100.606	6224.452	6151.385	0.864	20.935	0.103	20.473	0.106	20.935	0.00

Bold indicates final class solution

−2LL negative 2 log likelihood, *AIC* Akaike Information Criteria; *BIC* Bayesian Information Criteria, *aBIC* sample size adjusted Bayesian Information Criteria, *VLRT* Vuong-Lo-Mendell-Rubin Likelihood Ratio Test, Lo-Mendell-Rubin test, *BLRT* Bootstrapped log-likelihood ratio test

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Table 3

Latent transition probabilities from middle school parental and community violence parallel process growth mixtures classes (Waves 1–4) to high TDV perpetration and victimization classes (Waves 5 and 6)

	High All TDV	Physical/verbal TDV	Low all TDV
Decreasing family conflict and increasing community violence	0.196	0.240	0.564
Stable high family conflict and stable high community violence	0.061	0.263	0.677
Stable low family conflict and stable low community violence	0.062	0.178	0.760

Columns refer to emergent TDV classes during high school, Rows refer to emergent ACEs trajectory classes during middle school

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Table 4

Peer and individual factors moderating transitions from violence growth mixture classes to TDV perpetration classes

	High all TDV (*n* = 113)		**Physical/ verbal TDV (*n* = 335)**	
	AOR	**95%CI**	***AOR***	**95% CI**
Decreasing family conflict and increasing community violence				
Empathy	1.01	[0.61, 1.67]	1.01	[0.71, 1.42]
Social support	**0.57**	**[0.34, 0.98]**	**0.67**	**[0.55, 0.82]**
Parental monitoring	0.90	[0.73, 1.10]	**0.85**	**[0.75, 0.96]**
School belonging	1.24	[0.65, 2.35]	1.23	[0.79, 1.91]
Academic achievement	0.72	[0.18, 2.90]	0.93	[0.49, 1.74]
Stable high family conflict and stable high community violence				
Empathy	0.80	[0.63, 1.01]	1.04	[0.93, 1.16]
Social support	0.92	[0.73, 1.17]	0.92	[0.79, 1.08]
Parental monitoring	0.90	[0.78, 1.05]	0.98	[0.90, 1.06]
School belonging	0.79	[0.53, 1.16]	**0.77**	**[0.58 0.94]**
Academic achievement	1.39	[0.88, 2.20]	1.14	[0.87 1.48]
Stable low family conflict and stable low community violence				
Empathy	1.00	[0.86, 1.17]	1.05	[0.96, 1.14]
Social support	**0.67**	**[0.55, 0.82]**	**0.85**	**[0.76, 0.95]**
Parental monitoring	0.95	[0.87, 1.04]	0.98	[0.93, 1.03]
School belonging	1.24	[0.90, 1.73]	**0.79**	**[0.70, 0.89]**
Academic achievement	**0.62**	**[0.39, 0.98]**	1.10	[0.92, 1.14]

Bold indicates confidence interval does not include 1. The reference class is the 'Low All' class ($n = 1163$). Covariates included biological sex, race/ethnicity, age in years at baseline, and child physical, and sexual abuse

TDV teen dating violence, *AOR* adjusted odds ratio