

Violent Victimization and Perpetration During Adolescence: Developmental Stage Dependent Ecological Models

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Abstract Using a variant of the ecological-transactional model and developmental theories of delinquency on a nationally representative sample of adolescents, the current study explored the ecological predictors of violent victimization, perpetration, and both for three different developmental stages during adolescence. We examined the relative influence of individual and family characteristics, peers, and neighborhood characteristics on the odds of experiencing violent victimization and perpetration over time with two waves of the National Longitudinal Study of Adolescent Health for those adolescents who reported no exposure to violence at Wave 1 ($N = 8,267$; 50% female; 59% Caucasian; 17% African-American; 14% Hispanic). We found that more proximal factors differentiated between different experiences with violence at Wave 2. Also, negative peers significantly differentiated between violent victimization and perpetration, and this influence

was strongest in early adolescence. In exploratory analyses, we found that middle adolescents were particularly vulnerable to their disadvantaged neighborhoods for a high-risk group. This analysis is one of the few that considers multiple ecological contexts simultaneously and provides support for developmental differences within adolescence on the influence that peers and neighborhoods have in predicting violent victimization and perpetration.

Keywords Violence · Ecological · Developmental

Introduction

Violent victimization and perpetration during adolescence is a critical concern in the United States. With the probability of violence increasing during adolescence, estimates show that more than 60% experience violent perpetration, victimization, or both at some point during their teenage years (Smith-Khur et al. 2004). Prior research has shown that ecological factors (i.e., families, peers, and neighborhoods) are important predictors of violent victimization and perpetration (Overstreet and Mazza 2003). Furthermore, within adolescence, there are developmental differences in both the rates of violent victimization and perpetration and in the relative importance of different ecological contexts (Loeber et al. 1991; Steinberg and Silverberg 1986). For example, Clark-Lempers et al. (1991) found that the meaning of parental and peer relationships varied over the course of adolescence and Steinberg and Silverberg (1986) found that neighborhoods and peers become increasingly important. It may also be the case that families, peers, and neighborhoods play a differential role in predicting violent victimization and perpetration depending on whether one is in early, middle,

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or late adolescence. Thus, it is important to explore developmental-stage dependent ecological models of violent victimization and perpetration *within* adolescence in order to gain a nuanced understanding of these developmental differences.

Perpetrators and Victims: How Type of Exposure Matters

Prior research on violence has differentiated between two different experiences: victimization and perpetration. In addition, physical fighting has been characterized as violent perpetration and those who report fighting are similar to those who report other violent perpetration in that they tend to be male and engage in alcohol and drug use (Rudatsikira et al. 2008). Furthermore, Lauritsen et al. (1991) found that there is significant overlap in victimization experiences among perpetrators of violent events. A subset of perpetrators reports victimization because they seek out violence and intentionally put themselves in harm's way. These victims-perpetrators have also been referred to as "aggressive or provocative victims" in research on bullying and have also reported being threatened with a weapon during a physical fight (Rudatsikira et al. 2008; Unnever 2005). Based on this research, the current study distinguished between violent victimization only, violent perpetration only, and those who report experiences with both because they may represent qualitatively different groups of adolescents.

For the purpose of this study, we focus on adolescents with no reported victimization or perpetration (i.e., the no exposure group) at the first wave of data collection. The Wave 1 no exposure group represents those who have the potential to make the transition to violent victimization and/or perpetration over time. In other words, they are at-risk for making the transition to violent victimization and/or perpetration. Understanding the ecological factors associated with this transition may highlight potential areas to focus violence prevention efforts. Furthermore, it is important to explore the factors that differentiate the adolescents who experience victimization only, perpetration only, and those who experience both. If different ecological factors significantly differentiate these experiences, then different strategies may be necessary in order to prevent exposure to violence during adolescence.

Risk of Violent Victimization and Perpetration: Considering Multiple Developmental Contexts

Using both the ecological-transactional model (Bronfenbrenner 1979; Cicchetti and Lynch 1993) and developmental theories of delinquency, we included a number of individual-, family-, peer-, and neighborhood-level characteristics as crucial sources of risk for violent

victimization, perpetration, or both. Studies have consistently shown that these ecologies play a significant role in adolescents' responses to violent victimization and perpetration (e.g., Brookmeyer et al. 2006; Haynie et al. 2006; LeBlanc 1997; Osgood and Anderson 2004; Reiss 1986; Shaw and McKay 1942). Past research on each of these ecological factors are described below.

Individual Factors

A wealth of studies on adolescent delinquency has shown that a number of individual characteristics are associated with violent perpetration and include predispositions towards violence (e.g., impulsivity), early adverse experiences, as well as race and gender (Moffitt 1997; Patterson et al. 1989). Individuals characterized as being either impulsive or having difficult temperaments generally report more involvement with violent perpetration (Moffitt 1997). Research has also shown that prior aggressive behavior and prior experiences with maltreatment are related to violent perpetration and victimization (Smith and Thornberry 1995).

In addition, other individual characteristics, including ethnicity and verbal ability, have been used as controls in prior research. Although violent victimization and perpetration are not limited to certain ethnicities (Singer et al. 1995), violent perpetration is more common among African Americans and Hispanics than among whites and much less common among Asian Americans (Haynie and Payne 2006; McNulty and Bellair 2003). These patterns can persist even after controlling for some individual and family characteristics (Haynie and Payne 2006; McNulty and Bellair 2003); however, once related factors like socioeconomic status (SES) and peer affiliations are accounted for, the relationship between ethnicity and violent perpetration often becomes insignificant (Haynie and Payne 2006). We, therefore, included ethnicity as an individual characteristic, even though its effects may be explained by SES or an adolescent's peer affiliations. In addition, Farrington (1989) found that verbal ability was related to violent conditions. Therefore, we added verbal ability (the PVT score) to measures of ethnicity as control variables in our analyses.

Last, we consider biological sex as an individual characteristic because boys and girls have been shown to follow qualitatively different pathways after reporting violent victimization and perpetration (Brookmeyer et al. 2006; Farrell and Bruce 1997; Schwab-Stone et al. 1995). Even though girls are less likely than boys to report violent perpetration and physical fighting (Farrell and Bruce 1997; Rudatsikira et al. 2008), females are more likely than males to continue violent perpetration (Brookmeyer et al. 2006). We, therefore, included sex—as well as ethnicity and difficult temperaments—as individual characteristics in the current analysis.

Family Characteristics

Both the ecological-transactional model and developmental theories of delinquency have pointed to the importance of the family in shaping the experiences of adolescents (Cicchetti and Lynch 1993; Moffitt 1997). Researchers have demonstrated that multiple characteristics of the family are related to adolescent victimization and perpetration, including the educational background of parents, their welfare status, family structure, harsh parenting, and the emotional closeness of family members. However, the results of these studies have been mixed. On the one hand, adolescents residing in either single parent families or stepfamilies (McLanahan 1999) or families that receive welfare (Crouch et al. 2000) have been shown to have a higher risk of violent victimization and perpetration due to the stress associated with the lack of resources in both situations. Other researchers have found that the family factor with the strongest association with violent victimization and perpetration is economic hardship, not family structure and/or parent–adolescent closeness (e.g., McNulty and Bellair 2003). In particular, these researchers have shown that low socioeconomic resources are associated with the likelihood that families will promote attitudes and tolerate behaviors conducive to participation in perpetration (e.g., Heimer 1997; McNulty and Bellair 2003). Thus, it is important to include measures of parental and family characteristics, parenting, and parent–adolescent relationship quality in ecological models predicting exposure to violence.

Still other researchers have found that family processes, such as harsh parenting and parent–adolescent closeness, are more important than family structure (Demuth and Brown 2004; Mack et al. 2007) or a family's economic status (Mack et al. 2007) in predicting violent victimization and perpetration. Pettit et al. (1997) found that having a close, strong relationship with parents fosters adolescents' responsiveness to the expectations and desires of their parents and acts as an indirect social control constraining adolescent violent perpetration. Parent–adolescent closeness, in contrast, was positively linked with perpetration (Pettit et al. 1997). Because of these mixed findings, we included family structure and economic status, as well as parent–adolescent conflict, as predictors of violent victimization and perpetration over time.

Adolescent Peers

During adolescence, peers become increasingly important. A large body of literature emphasizes the role of peer relations for youth violent victimization and fighting/perpetration (Agnew 1991; Haynie et al. 2006; Rudatsikira et al. 2008). Moreover, the link between peer networks and

violence is not uni-directional. Violent adolescents may seek out violent friends, which could reinforce their own perpetration behaviors. These selection processes and subsequent bidirectional influence may confound the influence of peer networks with individual characteristics. However, Haynie and Payne (2006) found that an adolescent's peer affiliations significantly predicted adolescent perpetration, even after controlling for individual (i.e., sex, age, residential moves, bad temper, and prior deviance) and family characteristics (i.e., family structure and socioeconomic status). They further found that peers explained the link between ethnicity and perpetration. African Americans and Hispanics, who are disproportionately embedded in impoverished, low income neighborhoods, were not more likely than Caucasians and Asians to be involved with perpetration once peer affiliations were accounted for. These findings suggest that peers are a critical determinant of violent perpetration. The current analysis examines the relative influence of peer affiliations on violence compared to characteristics in contexts other than the peer group.

Neighborhood

Violence is not randomly distributed in geographical space, but rather is concentrated in neighborhoods that have particular structural attributes such as concentrated disadvantage (Markowitz 2003). The neighborhood-level crime rate has been linked to a higher probability of violent victimization (Valois et al. 2002). Adolescents embedded in these neighborhoods must cope not only with their own problems but also with the accompanying problems of the other families and adolescents near them (Jargowsky 1997; Wilson 1987). Haynie et al. (2006) found neighborhood disadvantage to be directly associated with adolescent violent victimization and perpetration, even after controlling for peer characteristics. We conceptualized poor neighborhoods as a potential indicator of violent victimization and perpetration over time.

Developmental Stage Dependent Ecological Models

Eichorn et al. (1981) conceptualized developmental transitions as periods of life in which there is a great deal of change, both within the individual as well as the social context. The movement from childhood to adolescence and the movement from adolescence to adulthood are both considered developmental transitions (Connell and Furman 1984). However, change has also been shown to occur within adolescence. For example, Clark-Lempers et al. (1991) defined three developmental stages within adolescence as early (between the ages of 11 and 13), middle (between the ages of 14 and 16), and late (between the ages of 17 and 19). Furthermore, the rate of violence generally

accelerates at a rapid pace during early adolescence (i.e., ages 11–13), often peaks during middle adolescence (i.e., ages 14–16), and decelerates during late adolescence (i.e., ages 17–19) (Loeber et al. 1991). They found that the meaning of relationships changes over adolescence. Based on the consistency in defining early, middle, and late adolescence in prior research, we will also operationalize the developmental stages within adolescence in the same manner (i.e., early, middle, and late).

The relative importance of families, peers, and neighborhoods has also been shown to vary across adolescence. Although early adolescence has been characterized as a time when individuals begin interacting more with their peers and less with their families (Elliott et al. 1996), parents still have a large influence over their adolescent's beliefs about violence during this period and can affect the probability their early adolescents will engage in violence. For example, Pardini et al. (2005) found that increased parent-adolescent conflict predicted changes in adolescent beliefs about violence during early, but not middle or late adolescence (Pardini et al. 2005). During middle adolescence, violent peers become more important in predicting adolescent beliefs about violence, particularly for boys (Pardini et al. 2005). Because the rate of exposure to violence and the influence of peers and neighborhoods have been shown to vary across early, middle and late adolescence, we also examined the influence of the ecological contexts on adolescent violent victimization and perpetration as a function of adolescent developmental stage.

Hypotheses

In sum, the current study used a nationally representative sample of adolescents to explore developmental stage dependent ecological models of violent victimization and perpetration. In line with Overstreet and Mazza's ecological-transactional model of violence (2003), we considered the relative influence of lagged individual, family, peer, and neighborhood factors (i.e., characteristics measured at Wave 1) to predict violent victimization or perpetration or both over the course of one year (change over Waves 1 and 2) for a group of adolescents with no reported exposure to violence at Wave 1. We focused on two waves of the Add Health data in order to understand the multiple ecological correlates of violent victimization and perpetration *within* adolescence. We hypothesized that more proximal ecological factors (i.e., individual characteristics, family, and peer factors) will be important in differentiating between varying experiences with violence. In addition, different ecological factors will significantly differentiate those who experience violent victimization, violent perpetration, or both. Given the developmental changes in the relevance of

peers and neighborhoods over the course of adolescence (Steinberg and Silverberg 1986), we hypothesized that the importance of peers in differentiating those reporting all types of violent experiences from those reporting no exposure will vary depending on whether one is in early, middle, or late adolescence. In addition, we expect that neighborhood characteristics will differentiate those reporting violent victimization and/or perpetration from those reporting no exposure, particularly for middle and late adolescents when they are more likely to spend unsupervised time within their neighborhoods. Few studies have explicitly considered multiple contexts simultaneously and whether there are developmental differences in the role that the social ecology plays in violent victimization and perpetration within adolescence (see Brookmeyer et al. 2006; Haynie et al. 2006 for exceptions).

Method

Sample

The *National Longitudinal Study of Adolescent Health (Add Health)* is a large, school-based study of adolescents and their schools and is designed to detect contextual factors that lead to healthy adolescent functioning. Because we were interested in developmental changes *within* adolescence, two waves of interview data were used and were comprised of respondents in early, middle, and late adolescence. The Wave 1 in-home interviews were conducted between April and December of 1995 and consisted of 20,745 respondents in grades 7–12 (total response rate was 78.9%). During Wave 1, nearly 18,000 parents completed the parent interview, which included questions about parent-child relations, family income, and spouses and other romantic partners. All adolescents who participated in the first wave of data collection, except those who were in twelfth grade at Wave 1, were eligible to participate in the Wave 2 in-home interviews. These interviews were conducted between April and August of 1996 and consisted of 14,736 respondents (total response rate was 88.2%). The in-home interviews included questions about violent victimization and perpetration, individual characteristics, as well as relationships with family and peer group members. The contextual data file included information on adolescents' neighborhoods, such as income, poverty rates, and unemployment rates.

The Add Health sample is representative of schools in the United States with respect to region of country, urbanicity, school type, ethnicity, and school size. In the analyses presented here, we have taken steps to ensure that the results are nationally representative with unbiased estimates by using sample weights and correcting for design

effects and unequal probability of selection according to the guidelines set forth by Add Health researchers Chantala and Tabor (1999).

For our study sample, we selected the portion of the in-home sample that included only those adolescents who participated in both waves of data collection, which automatically excluded all adolescents who were high school seniors at Wave 1. This exclusion allowed us to look at changes over time. Although this exclusion caused our sample to drop by 5,000 adolescents, oneway ANOVAs performed on all of the Wave 1 individual, family, peer, and neighborhood characteristics showed that the group of individuals that was excluded from the sample at Wave 2 did not significantly differ from those adolescents included in the study on any of the Wave 1 measures (except for age). In addition, we limited our sample to those who reported no experiences with violent victimization and perpetration at Wave 1 because they are a group that may be of particular interest for prevention efforts. Only adolescents who reported that: (a) no one pulled a knife or gun on them, (b) were not jumped, (c) were not stabbed or shot, (d) did not get into a physical fight, (e) did not pull a knife or gun on someone, (f) did not shoot or stab anyone, or (g) did not use a weapon to threaten someone were included ($N = 8,267$).

Measures

The Dependent Variable: Wave 2 Exposure to Violence

We characterized adolescent experiences with violence at Wave 2 into four categories: (a) no exposure, (b) violent victimization only, (c) violent perpetration only, and (d) violent victimization and perpetration. Figure 1 depicts these four Wave 2 exposure to violence groups.

Wave 2 No Exposure. Adolescents who reported that: (a) no one pulled a knife or gun on them, (b) were not jumped, (c) were not stabbed or shot, (d) did not get into a physical fight, (e) did not pull a knife or gun on someone, (f) did not shoot or stab anyone, or (g) did not use a weapon to threaten someone comprised the Wave 2 No Exposure group ($N = 7,267$).

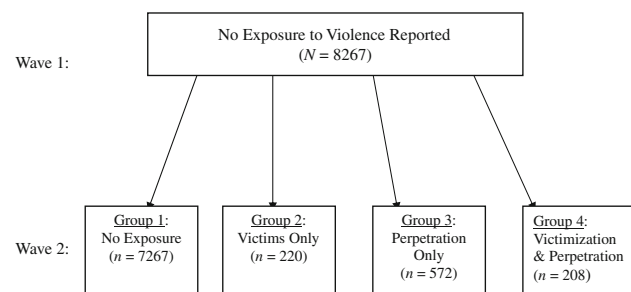


Fig. 1 The Wave 2 experiences with violent victimization, perpetration, and both for the Wave 1 no exposure to violence group

Wave 2 Violent Victimization Only. Adolescents who indicated that they had been victimized by one or more of the following acts at least once in the past 12 months (0 = no; 1 = yes) and reported no other experiences with violence comprised the Wave 2 Victimization Only group: someone pulled a knife or gun on you, you were jumped, someone stabbed you, and someone shot you ($N = 220$).

Wave 2 Violent Perpetration Only. Adolescents who perpetrated one or more of the following acts at least once in the past 12 months (0 = no; 1 = yes) and did not report any victimization experiences comprised the Wave 2 Perpetration Only group: you got into a physical fight, you pulled a knife or gun on someone, you shot or stabbed someone, and you used or threatened to use a weapon to get something from someone ($N = 572$). Because youth involved in physical fighting share many of the same characteristics as those reporting violent perpetration (Rudatsikira et al. 2008), the fighters were combined with the perpetrators. We refer to this outcome throughout the paper as “perpetration” but it should be interpreted on the basis of this characterization as fight/perpetration.

Wave 2 Violent Victimization and Perpetration. Based on the same set of questions used to form the Wave 2 Victimization Only and Perpetration Only groups, adolescents who reported both victimization and perpetration experiences at Wave 2 comprised the Wave 2 Victimization and Perpetration group ($N = 208$).

Independent Variables

Female. A dummy variable (1 = female; 50%) was created to control for sex-specific changes in exposure to violence over time.

Race/Ethnicity. Five dummy variables were created to control for race/ethnicity-specific changes in exposure to violence: (a) *White* identifies those respondents who indicated that they were both Caucasian and of non-Hispanic origin (59%); (b) *Black* identifies those who indicated that they were both African-American and of non-Hispanic origin (17%); (c) *Hispanic* identifies those who indicated that they were of Hispanic origin (14%); (c) *Asian* identifies those who reported being Asian and of non-Hispanic origin (7%); and (d) *other* identifies those who reported being Native American or those who reported more than one race (3%). *White* served as the reference group in the multivariate models.

Developmental Stage. In order to test for stage-specific changes in violent victimization and perpetration, three dummy variables were created using respondents’ age at Wave 1 based on prior research (Clark-Lempers et al. 1991): (a) *early adolescence* were those respondents between the ages of 11 and 13 (6%); (b) *middle adolescence* were those respondents between the ages of 14 and

16 (49%); and (c) *late adolescence* were those aged 17 or older (45%). *Late adolescence* served as the reference group in the multivariate models.

PVT Score. The Peabody Picture Vocabulary Test was used a measure of verbal ability taps receptive vocabulary skills and is commonly used as a screening device for verbal ability (Dunn and Dunn 1997; $M = 99.72$; $SD = 14.97$).

Parental Perceptions of Bad Temper. The measure of bad temper relied on parent responses to the question of whether their adolescents had a bad temper at Wave 1. Twenty-three percent of adolescents were identified as having bad tempers.

Public Assistance. Parents reported whether they received Aid to Families with Dependent Children (AFDC) at Wave 1. Six percent of the adolescents lived with families who reported receiving AFDC in the prior year.

Parent Education. Adolescents reported on the educational attainment of their mothers and fathers. Scores ranged from $I =$ below eighth grade to $II =$ doctorate. The parent with the highest level of education was used.

Parents Married or Cohabiting. Using the Wave 1 household roster, adolescents were given a “1” on the parents married variable if they indicated that both their biological mother and father were in the household (56% of all respondents).

Parent-Adolescent Conflict. Adolescents were assigned a “1” on the *parent-adolescent conflict* measure if they indicated that they had “a serious argument about their behavior with their mother and/or father in the past month (38% of respondents)”. This measure differs from the parental perceptions of bad temper in that it captures specific experiences of conflict from the adolescents’ perspectives.

Substance-Using Peers. A scale was created based on a factor analysis on the extent to which adolescents’ closest three friends smoked, drank, and used marijuana based on the adolescents’ report of the peers’ substance use at Wave 1 ($\alpha = 0.76$; $M = 0.02$; $SD = 0.89$).

Poor Neighborhood. Using the Wave 1 contextual data, a scale was created based on a factor analysis of census data on the neighborhoods’ income (reverse-scored), child poverty rate, and unemployment rate ($\alpha = 0.82$; $M = -0.03$; $SD = 0.88$).

Analytic Methods

First, to determine if there were significant differences between Wave 2 experiences of violence (violent victimization, perpetration, or both)—conditional on Wave 1 no exposure or Wave 1 exposure (victimization and perpetration)—oneway ANOVAs were performed with Bonferroni posthoc comparisons, which is a conservative posthoc test that adjusts for multiple comparisons. To account for

sampling design (i.e., adolescents clustered within schools and schools clustered by region), the Wave 2 longitudinal sampling weight was used in all analyses with STATA’s survey commands to calculate unbiased estimates of coefficients, standard errors, and difference tests. Additionally, because adolescents were nested within schools, and schools were nested within region of the country, we employed survey estimation techniques to account for such nesting and stratification. The use of survey weights is an alternative approach to multilevel modeling that accounts for the geographic clustering and non-independence of the observations and provides the correct variance estimates based on this stratification. For those with missing data, data were imputed using STATA’s multiple imputation program that uses maximum likelihood estimation procedures to impute the missing values (Royston 2005). In order to increase the precision of our estimates, we imputed 10 datasets and used the estimated coefficients from the combination of these 10 datasets. A total of 3,787 cases with partial data were imputed.

Weighted multinomial logistic regressions, correcting for the clustering and non-independence of the observations, were run to assess predictors of various experiences with violence across two waves. Multinomial logistic regression is appropriate here because we were interested in exploring the ecological factors that differentiated between different experiences with violence. This technique has the ability to analyze multiple contextual variables simultaneously and makes no assumptions about the ordering of the outcome variable (i.e., victimization, perpetration, or both). We estimated a lagged model for those adolescents who reported no exposure to violence at Wave 1. Multinomial logistic regression estimated the log odds of exposure-violent victimization, perpetration, or both—compared to a reference group as a function of Wave 1 individual, family, peer, neighborhood, and the interaction between developmental stage and context variables. In multinomial logistic regression, the coefficients are interpreted on the basis of their sign: a negative coefficient indicates that individuals with higher values are less likely whereas a positive coefficient signifies that those with higher values are more likely to be part of their respective group.

Results

Descriptive Results

Due to the exploratory nature of the study, we computed oneway analysis of variance with Bonferroni posthoc comparisons on all of the individual and ecological variables included in the multivariate models in order to see the

univariate relationships between the ecological variables and adolescent reports of victimization and perpetration. The descriptive results are presented in Tables 1 and 2. Most of the individual and ecological variables significantly differentiated Wave 2 experiences with exposure to violence (no exposure, violent victimization only, perpetration only, or both) and were in line with our hypothesis that different ecological factors would significantly differentiate between the groups. Females comprised a significantly greater proportion of the Wave 2 no exposure group and significantly less of the Wave 2 victims and perpetrators group. In terms of racial differences, Caucasian adolescents comprised a significantly greater proportion of the Wave 2 no exposure and the Wave 2 perpetrator only group while African-Americans and Hispanic adolescents comprised a significantly lower proportion of the Wave 2 no exposure group. Hispanics also comprised a significantly greater proportion of the Wave 2 victims only compared to the Wave 2 no exposure and the perpetrator only group.

There were also significant developmental stage differences between the Wave 2 no exposure group and the Wave 2 perpetrators only group. As research on the age-crime curve suggests, middle adolescents were disproportionately part of the Wave 2 perpetrator only group and comprised significantly less of the no exposure group. In contrast, the late adolescents were significantly less likely to be part of the perpetrator only group compared to both the Wave 2 no exposure and victim only groups.

The contextual differences that were found for the Wave 1 no exposure group also supported past research. The Wave 2 no exposure adolescents typically resided in families with both of their biological parents, were significantly less likely to receive AFDC, and affiliated with less substance-using peers compared to the violent victimization,

perpetration, or victimization and perpetration groups. The Wave 2 no exposure group also reported significantly less parent-adolescent conflict compared to the Wave 2 victim only and the Wave 2 victimization and perpetrator groups. Last, the victim only and the victim and perpetrator groups lived in significantly more disadvantaged neighborhoods compared to the no exposure group.

Multivariate Results

Table 3 contains the results for the lagged multinomial logistic regression model in which Wave 1 individual, family, peer, and neighborhood variables were used to differentiate between various experiences with violence at Wave 2. Multinomial logistic regression highlights the factors that significantly differentiate the Wave 2 exposure to violence groups from each other. To this end, each of the four Wave 2 exposure to violence groups were contrasted with each other. Below, we discuss the significant contrasts by each ecological context.

Individual-Level Variables

Controlling for other ecological contexts, gender, verbal ability, developmental stage, and parental perceptions of a bad temper significantly differentiated between different types of exposure to violence within adolescence. Specifically, females had a lower odds of transitioning to the victims only, perpetrators only, and the victims and perpetrators groups compared to males. For those who did report exposure to violence at Wave 2, females were less likely to report both victimization and perpetration compared to males. While a few significant race differences emerged, they should be interpreted with caution due to the

Table 1 Means and standard deviations of individual variables by Wave 2 exposure to violence group

W1 No exposure (N = 8,267)					
Variable	W2 no exposure M (SD)	W2 victim only M (SD)	W2 perp only M (SD)	W2 victim and perp M (SD)	F-value
Female	0.63 _a (0.48)	0.44 _b (0.50)	0.49 _b (0.50)	0.28 _c (0.45)	57.60***
White	0.62 _a (0.50)	0.46 _b (0.50)	0.59 _a (0.49)	0.48 _b (0.50)	12.86***
Black	0.17 _a (0.37)	0.24 _b (0.42)	0.21 _{ab} (0.41)	0.25 _b (0.44)	7.91***
Hispanic	0.14 _a (0.35)	0.24 _b (0.43)	0.15 _a (0.36)	0.17 _{ab} (0.38)	6.32***
Asian	0.08 _a (0.27)	0.07 _a (0.25)	0.06 _a (0.23)	0.07 _a (0.26)	1.15
Other	0.03 _a (0.17)	0.04 _a (0.19)	0.03 _a (0.18)	0.06 _a (0.24)	2.32
Early adolescents	0.05 _a (0.22)	0.02 _a (0.15)	0.05 _a (0.22)	0.07 _a (0.26)	1.85
Middle adolescents	0.49 _a (0.50)	0.46 _{ab} (0.50)	0.56 _b (0.50)	0.47 _{ab} (0.50)	4.09**
Late adolescents	0.46 _a (0.50)	0.52 _a (0.50)	0.37 _b (0.49)	0.46 _{ab} (0.50)	4.76**
PVT score	101.60 _a (15.06)	100.37 _{ab} (13.36)	98.61 _b (14.44)	97.10 _b (14.37)	12.15***
Bad temper	0.24 _a (0.43)	0.30 _{ab} (0.46)	0.34 _b (0.48)	0.33 _b (0.47)	11.28***

Note: If groups share a subscript, they are not different at the $p < .05$ level, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 2 Means and standard deviations of family, peer, and neighborhood variables by Wave 2 exposure to violence group

W1 No exposure (<i>N</i> = 8,267)					
Variable	W2 no exposure <i>M</i> (SD)	W2 victim only <i>M</i> (SD)	W2 perp only <i>M</i> (SD)	W2 victim and perp <i>M</i> (SD)	<i>F</i> -value
Public assistance	0.07 _a (0.26)	0.12 _b (0.33)	0.11 _b (0.32)	0.12 _{ab} (0.32)	7.27***
Parent education	6.65 _a (2.43)	6.36 _a (2.49)	6.45 _a (2.53)	6.22 _a (2.74)	2.66*
Parents married	0.63 _a (0.48)	0.51 _b (0.50)	0.52 _b (0.50)	0.51 _b (0.50)	13.97***
Parent-adol conflict	0.33 _a (0.47)	0.43 _b (0.50)	0.40 _b (0.49)	0.35 _{ab} (0.48)	6.94***
Negative peers	-0.21 _a (0.71)	0.06 _b (0.81)	0.04 _b (0.82)	0.08 _b (0.84)	36.17***
Poor neighborhood	-0.09 _a (0.85)	0.07 _b (0.88)	-0.02 _{ab} (0.85)	0.07 _b (0.94)	5.56***

Note: If groups share a subscript, they are *not* different at the $p < .05$ level, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 3 Multinomial logistic regression model of the relationship between individual, family, peer, and neighborhood variables and the log-odds of Wave 2 exposure to violence for adolescents reporting no exposure at Wave 1

Comparison group Variable	W2 no exposure			W2 victim only		W2 perpetrator only
	VO vs. NE	PO vs. NE	VP vs. NE	PO vs. VO	VP vs. VO	VP vs. PO
Female	-1.18***	-0.84***	-2.21***	0.36	-1.06**	-1.43***
Black	0.60	0.23	0.82	-0.36	0.26	0.62
Hispanic	0.75	0.12	0.36	-0.65	-0.42	0.23
Asian	0.49	-0.71	1.38*	-1.23	0.89	2.12*
Other	-0.15	0.33	1.40***	0.41	1.32	0.91
Early adolescents	0.72	-0.12	0.46	-0.73	-0.78	-0.05
Middle adolescents	0.49*	0.65***	0.49	0.28	-0.02	-0.30
PVT score	0.004	-0.01	-0.03**	-0.01	-0.04**	-0.02
Bad temper	-0.08	0.39*	0.80**	0.48	0.96*	0.48
Public assistance	-0.50	0.55	0.01	0.97	0.38	-0.59
Parent education	-0.06	-0.03	-0.07	0.03	-0.01	-0.03
Parents married	-0.65*	-0.37	0.03	0.27	0.69	0.42
Parent-adolescent conflict	0.42	0.57**	0.51	0.05	-0.07	-0.12
Negative peers	0.65***	0.45***	0.72***	-0.09	0.12	0.21
Bad neighborhood	0.29	-0.02	0.38	-0.31	0.07	0.37
Early × conflict	-0.52	-0.41	1.62	-0.02	2.33	2.35
Middle × conflict	-0.09	0.33	0.81	0.40	1.13	0.74
Early × peer	0.99	0.08	1.09	-0.92	0.32	1.25
Middle × peer	0.60	-0.17	-0.04	-0.82*	-0.39	0.42
Early × neighborhood	-0.50	0.29	0.80	0.70	1.38	0.68
Middle × neighborhood	0.17	0.18	0.46	-0.07	0.31	0.38
Constant	-3.23	-1.44	-0.22	1.82	3.11	1.29

Note: $N = 8,267$; $\chi^2 = 614.59$ *** $df = 45$; NE no exposure, VO victim only, PO perpetrator only, VP victim and perpetrator; * $p < .05$; ** $p < .01$, *** $p < .001$

low numbers of adolescents in the Asian and Other Race categories. Middle adolescents were also more likely to make the transition to the victims only or the perpetrators only groups compared to late adolescents. This supports research on the age-crime curve showing that involvement in delinquency and violence peaks during middle adolescence and declines thereafter.

In addition, verbal ability significantly differentiated those reporting both victimization and perpetration from those reporting no exposure and those reporting victimization only at Wave 2. In particular, adolescents making the transition to both victimization and perpetration scored significantly lower on the PVT compared to those who stayed in the no exposure group. Last, parental perceptions

of their adolescents' temper significantly differentiated those who made the transition to the perpetrator only or the victims and perpetrators groups from those who reported no exposure at Wave 2. That is, when parents reported that their adolescents had bad tempers at Wave 1, these adolescents were more likely to be in one of the perpetrator groups (perpetrators only or victims and perpetrators) over the Wave 2 no exposure group. Furthermore, these adolescents were also more likely to be in the victims and perpetrators group over the victims only group at Wave 2.

Family-Level Variables

Unlike the descriptive results, only two family-level variables were significant in the multivariate models that control for individual, peer, and neighborhood characteristics. Specifically, adolescents who lived with their married biological parents were less likely to make the transition to the victims only over the Wave 2 no exposure group. Furthermore, those adolescents reporting parent-adolescent conflict were more likely to be in the perpetrator only over the no exposure group at Wave 2. Contrary to our hypotheses, few family-level variables significantly differentiated between violent victimization, perpetration, and both victimization and perpetration.

Peer- and Neighborhood-Level Variables

While there was some evidence that more disadvantaged neighborhoods may have put adolescents at-risk for victimization in the descriptive analyses, the neighborhood was not significant in differentiating between violent victimization and perpetration in the multivariate models. However, substance-using peers did differentiate all of the exposure to violence groups from the no exposure group at Wave 2. Specifically, adolescents who reported more substance use among their closest three friends were more likely to be in the victims only, perpetrators only, and the victims and perpetrators group over the no exposure group at Wave 2. As hypothesized, peers (i.e., a more proximal context) significantly differentiated between violent victimization, perpetration, and both while neighborhoods (i.e., a more distal context) did not.

Developmental Stage Differences

We hypothesized that the relative influence of the peer and neighborhood contexts would vary depending on whether one is in early, middle, or late adolescence. We only found one developmental stage difference—the interaction between middle adolescence and substance-using peers. Middle adolescents with more substance-using peers were less likely than older adolescents with more substance-

using peers to be in the perpetrator only over the victim only at Wave 2. We did not hypothesize that we would find developmental stage differences between middle and late adolescence in the influence of peers.

Taken together, these results suggest that more proximal risk factors significantly differentiated between violent victimization, violent perpetration, and experience with both violent victimization and perpetration. Furthermore, there was some evidence that neighborhoods may put adolescents at risk for violent victimization—either alone or in concert with violent perpetration. However, the influence of the neighborhood context was no longer significant after controlling for individual-, family-, and peer-level variables. In addition, middle adolescents seemed to be particularly vulnerable to the influence of substance-using peers in becoming perpetrators only over victims only at Wave 2. We found no support for the hypothesized developmental differences in the influence of peers and neighborhoods.

Discussion

Past researchers have demonstrated that violent victimization and perpetration during adolescence is associated with multiple risks embedded within individuals and their contexts (e.g., Haynie et al. 2006). Less is known about the effect these risk factors have on the likelihood of violent victimization and perpetration within adolescence when multiple contexts are considered simultaneously. The current study is one of the few to explore the influence of multiple contexts in differentiating between different experiences with violence. Furthermore, it is the only one that has explored developmental stage differences in the salience of different ecological contexts *within* adolescence.

Ecological Correlates of Exposure to Violence

Our descriptive results revealed that several individual, family, peer, and neighborhood variables significantly differentiated between violent victimization and/or perpetration. In terms of individual differences, boys were more likely than girls to shift from not experiencing violence during the first wave of data collection to experiencing both perpetration and victimization during the second wave. Race, generally, did not differentiate between violent victimization and/or perpetration once family, peer, and neighborhood characteristics were controlled for. In a couple of instances, being Asian significantly differentiated the Wave 2 victims/perpetrators from other exposure groups. Because of the relatively low numbers of adolescents in the Asian and other race categories, the results for race should be interpreted with caution. Nevertheless,

given the lack of research on Asians and exposure to violence, it would be useful to explore the ecological correlates of exposure to violence for Asian adolescents. The findings regarding the other racial groups support the work of Haynie and Payne (2006), who found that race differences in violence were explained by differences in peer characteristics.

In terms of family factors, once individual, peer and neighborhood characteristics were controlled for, parent-adolescent conflict and family structure were the only family factors that significantly differentiated between Wave 2 violent victimization and/or perpetration for the Wave 1 no exposure group. These results support researchers who have contended that parent-adolescent closeness (i.e., relationship processes) is more important than family economic status in determining adolescent violent victimization and perpetration (Demuth and Brown 2004; Mack et al. 2007). Parent-adolescent conflict is generally more amenable to change over the course of one year than family economic circumstances and may be a more proximal family characteristic than family economic conditions. Similarly, the current study found that parent-adolescent conflict (i.e., a family process) was the more important determinant of shifting from one exposure to violence group to another compared to more structural characteristics of the family. As a proximal source of risk for engaging in violence, it may be that parent-adolescent conflict propelled adolescents away from their families and toward more risky peer and neighborhood contexts potentially explaining their involvement in victimization and perpetration over time.

We also found that substance using peers were significantly more common among those adolescents making the transition to violent victimization, perpetration, or both. These results persisted even after controlling for individual, family, and neighborhood characteristics. Multiple researchers have noted that peer acceptance is particularly important during adolescence (e.g., Steinberg and Silverberg 1986). Our results suggest that peers are important in explaining adolescent involvement with violent victimization and/or perpetration. According to Glaser (1956), associating with risky peers may offer adolescents a context in which violence is normative and may even be a place where peers perpetrate violence on each other. In the current study, this may especially be the case since physical fighting was included in the perpetration measure. Because of the relative importance of peers for developmental processes during adolescence, it is critical to provide contexts in which youth can develop positive identities, expose themselves to prosocial peers, and learn appropriate peer interaction skills. Mentoring programs and structured school-based activities are two possible intervention strategies that may reduce current and later adolescent exposure to violence (DuBois et al. 2002).

Developmental Dependent Models of Exposure to Violence

In the final part of the analysis, we found that the ecological factors that differentiated between violent victimization, perpetration, or both were different depending on the adolescent's developmental stage. We hypothesized that peers would differentiate between different violent victimization, perpetration, or both depending on whether one is in early, middle, or late adolescence. We found a unique effect of peers for middle adolescents compared to late adolescents. Middle adolescents who had more substance using peers were more likely to become victims only over perpetrators only at Wave 2 unlike older adolescents. These middle adolescents may be taken advantage of and victimized by violence, potentially from their substance using peers. Pardini et al. (2005) found that violent peers were more important in predicting adolescent beliefs about violence during middle adolescence. Since beliefs often translate into actions, it would be reasonable to expect that affiliating with risky peers would translate into a higher log-odds of middle adolescents reporting victimization only at Wave 2. Over time, however, this experience of victimization may turn into perpetration. If these middle adolescents continue to affiliate with risky peers, they may learn to retaliate when they are victimized. This potential learning process with violence may help to explain why there was a significant difference in the influence of peers between middle and late adolescence. Research that uses more than two waves of data during adolescence can reveal such changes and future work should investigate complex exposure to violence trajectories by developmental stage.

Because we found few developmental differences, we conducted exploratory analyses with a "high-risk" group of adolescents—those reporting both victimization and perpetration at Wave 1. These results are in Table 4. We found some support for our hypotheses for this group. First, early adolescents who had reported victimization and perpetration at Wave 1 were significantly influenced by their peers while late adolescents were not. When these early adolescents had substance using friends, they were significantly more likely to remain being victims and perpetrators or shift to being perpetrators only then to become victims only. It may be that these early adolescents are significantly affected by substance using peers because they are beginning to formulate their identities, experiment, and seek out social acceptance. Older adolescents, in contrast, may have already established their identities, making the negative and/or positive pull of peers less influential in determining their experiences with violent perpetration.

In addition, we found that middle adolescents were more vulnerable to disadvantaged neighborhoods relative to

Table 4 Multinomial logistic regression model of the relationship between individual, family, peer, and neighborhood variables and the log-odds of Wave 2 exposure to violence for adolescents reporting victimization and perpetration at Wave 1

Comparison group Variable	W2 victimization and perpetration			W2 no exposure		W2 victim only
	NE vs. VP	VO vs. VP	PO vs. VP	VO vs. NE	PO vs. NE	PO vs. VO
Female	0.97	0.20	0.66*	-0.67*	-0.31	0.38
Black	-0.20	0.20	-0.06	0.40	0.14	-0.26
Hispanic	-0.39	0.25	0.18	0.65	0.57	-0.07
Asian	0.92	2.08*	0.66	1.17	-0.25	-1.42
Other	0.16	0.11	-0.43	-0.05	-0.58	-0.53
Early adolescents	-2.32	-2.53*	-0.72	-0.21	1.60	1.82
Middle adolescents	0.21	-0.11	0.54	-0.31	0.33	0.64
PVT score	-0.02*	-0.02	-0.01	-0.001	0.01	0.01
Bad temper	0.09	-0.29	0.28	-0.38	0.20	0.57
Public assistance	0.16	0.39	0.31	0.23	0.14	-0.09
Parent education	-0.01	-0.03	-0.09*	-0.02	-0.08*	-0.06
Parents married	0.17	0.03	0.58	-0.15	0.41	0.56
Parent-adolescent conflict	-0.27	-0.44	-0.21	-0.17	0.05	0.22
Negative peers	-0.61***	-0.73***	-0.47**	-0.13	0.14	0.26
Bad neighborhood	0.03	-0.07	0.10	-0.11	0.06	0.17
Early × conflict	0.41	0.10	0.26	-0.32	-0.16	0.16
Middle × conflict	-0.15	-0.39	0.01	-0.24	0.16	0.40
Early × peer	-3.14	-3.99**	-0.84	-0.84	2.31	3.15*
Middle × peer	-0.15	-0.26	-0.33	-0.10	-0.17	-0.07
Early × neighborhood	0.77	1.32	0.01	0.55	-0.76	-1.31
Middle × neighborhood	-0.65*	0.18	-0.66	0.84**	-0.01	-0.84*
Constant	1.42	1.33	-0.12	-0.10	-1.55	-1.46

Note: $N = 2,682$; $\chi^2 = 111.83^{***}$ $df = 45$; NE no exposure, VO victim only, PO perpetrator only, VP victim and perpetrator; * $p < .05$, ** $p < .01$, *** $p < .0001$

older adolescents. In other words, middle adolescents who had been victims and perpetrators at Wave 1 were affected by the concentration of disadvantage in their neighborhoods and were more likely to remain in the victims and perpetrators group when they resided in bad neighborhoods. We did not hypothesize that we would find these developmental differences between middle and late adolescents. Again, these older adolescents may have already established their identities and their behaviors may be less influenced by their neighborhoods. Older adolescents may also be more mobile than middle adolescents, making it easier for them to escape disadvantage. Middle adolescents may be less mobile and they may also be spending unsupervised time within their neighborhoods making them more vulnerable to them. This is one of the first studies to explore such developmental nuances within adolescence. Future research should further explore these developmental differences.

Despite our nuanced findings of the ecological predictors of violent victimization and perpetration by context and age, our study has several limitations. We were limited by the constructs that were included in the Add Health dataset. It is limited in that it did not assess retrospective

reports of experiences, which makes it difficult to capture those who are just beginning their careers as victims or perpetrators or both. Nor did the dataset capture the important determinants of violent victimization and perpetration that has been found in past research (e.g., prior aggression). Future studies should measure experiences earlier in life (i.e., in childhood) and continue measuring experiences into adolescence and young adulthood in order to accurately gauge the precursors to exposure to violence during adolescence. Nevertheless, Add Health is one of the few data sets that assessed multiple contexts during adolescence making it the ideal source for the current study.

Another limitation of the Add Health data is that it only assessed extreme experiences with violence (e.g., getting shot or stabbed, getting jumped, etc.). Violent victimization and perpetration can range from relatively mild forms to more severe experiences with violent events. Although research suggests that extreme experiences carry the heaviest consequences for adolescent adjustment, it would be useful to measure the continuum of experiences as they have been shown to influence adolescent and adult functioning (Overstreet 2000). In addition, the perpetration

measure used in this study included the question “you got into a physical fight.” There are multiple reasons why adolescents engage in physical fighting—from initiating them to defending themselves from someone who initiated the fight. Although fighters have many of the same characteristics as violent perpetrators (Rudatsikira et al. 2008), the perpetration measure should be interpreted with this caveat in mind. Additional research is needed in order to understand more precisely how experiences with physical fighting are similar to and different from violent perpetration. Also, Add Health did not ask respondents where their experiences with violence occurred, which has been found to be an important determinant of adjustment to exposure (Muller et al. 2000). Future work should continue to use ecological models to determine the differential importance of diverse individual and contextual niches as a function of the ecological context in which the adolescents’ experiences the violence.

We did not explicitly examine the contextual and individual precursors of being a witness to violence due to the small number of adolescents who only witnessed violence—apart from victimization and perpetration—at both waves. Past studies have shown that witnessing violence alone can have a negative effect on adolescent well-being by disrupting their sense of safety (Schwab-Stone et al. 1995). Future studies should expound upon this work to determine those factors that put adolescents at risk for witnessing violence. In addition to the measures of violence, Add Health’s assessments of parental perceptions of bad tempers, parent-adolescent conflict, and negative peers are also not ideal. First, adolescents’ bad tempers were assessed by asking parents a “yes/no” question about whether they thought their adolescent had a bad temper. It would have been better to assess the multiple dimensions of adolescents’ dispositions that include general activity level, sleep patterns, approach-withdrawal, flexibility-rigidity, mood, eating, and daily habits (Windle and Lerner 1986). However, prior research has shown that even this basic measure of “bad temper” significantly explains some of the variation in adolescent experiences with violence (Haynie et al. 2006).

Second, the parent-adolescent conflict measure was also a dichotomous one capturing adolescents’ reports of having a serious argument with one or both of their parents in the previous month. It is not uncommon for parents and adolescents to experience conflict occasionally; however, frequent arguing is less common (Montemayor 1983). While it would be ideal for the parent-adolescent conflict measure to capture aspects of the conflictual interactions, the measure used in this study is likely to capture those relationships that are highly conflictual in nature. Also, it would be optimal to measure the extent to which adolescents’ peers are also involved in violent behavior from the peers’ perspective and not just their level of adolescent-reported

substance use. Such behavior would have a more direct consequence on the likelihood of an individual becoming involved with violence. Hence, future studies should include more comprehensive measures of individual temperaments, parent-adolescent relationships, and peer behavior. Last, multiple comparisons were made between the exposure groups and the ecological variables. Our analyses employed a conservative posthoc test that adjusted for these multiple comparisons. Furthermore, similar results were found in other studies (e.g., Demuth and Brown 2004; Haynie and Payne 2006) lending some support to our findings. Future work should replicate and expand on our results.

Despite these limitations, the current study is unique in that it is one of the few to explore the influence of multiple contexts simultaneously in models predicting violent victimization and perpetration. Furthermore, it is the only one that estimated developmental stage dependent models of exposure to violence over time using two waves of the *National Longitudinal Study of Adolescent Health*. We further differentiated between four violent experiences at Wave 2—no exposure to violence, victims only, perpetrators only, and victims and perpetrators. We found that substance using peers were more common among adolescents who made the transition to victimization, perpetration, or both. In exploratory analyses, we further found that early adolescents tended to be more susceptible to peer influences compared to older adolescents, while middle adolescents were more susceptible to neighborhood conditions compared to those in late adolescence. Future research should further explore developmental stage differences within adolescence so that practitioners and policymakers can target specific developmental contexts and certain age groups in order to maximize the effectiveness of any interventions aimed to curb youth’s violence involvement. Program and policy efforts may help adolescents avoid the psychological and academic difficulties that follow experiences with traumatic events (Overstreet 2000), thereby promoting a successful transition to adulthood.

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Disclaimer The findings and conclusions of this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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