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ORIGINAL PAPER

The Relationship Between Cumulative Risk and Promotive Factors and Violent Behavior Among Urban Adolescents

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Abstract Resiliency theory posits that some youth exposed to risk factors do not develop negative behaviors due to the influence of promotive factors. This study examines the effects of cumulative risk and promotive factors on adolescent violent behavior and tests two models of resilience—the compensatory model and the protective model—in a sample of adolescent patients (14–18 years old; n = 726) presenting to an urban emergency department who report violent behavior. Cumulative measures of risk and promotive factors consist of individual characteristics and peer, family, and community influences. Hierarchical multiple regression was used to test the two models of resilience (using cumulative measures of risk and promotive factors) for violent behavior within a sample of youth reporting violent behavior. Higher cumulative risk was associated with higher levels of violent behavior. Higher levels of promotive factors were associated with lower levels of violent behavior and moderated the association between risk and violent behaviors. Our results support the risk-protective model of resiliency and suggest that promotive factors can help reduce the burden of cumulative risk for youth violence.

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Introduction

Youth Violence

Youth violence is a significant social and public health problem. Youth who participate in violence are at risk for poor health and social outcomes (Herrenkohl et al. 2000; Centers for Disease Control 2009). Violence rates peak during the adolescent years, and adolescents disproportionately suffer the consequences of violence, including imprisonment, injury, and death (NAHIC 2007; CDC 2009). Members of specific demographic groups, especially males and African Americans, are at particular risk for involvement in serious forms of violence and related negative health and social sequelae (e.g., homicide, incarceration) (Herrenkohl et al. 2000; CDC 2009). Although death is the most severe consequence of violence, and homicide is the leading cause of death among African American adolescents (CDC 2009), nonfatal injuries are far more common. In 2007, more than 668,000 10–24 year olds in the United States were treated in emergency departments for injuries caused by violence (CDC 2009) and the ED is increasingly recognized as a important contact location for youth at risk for future violent injury (Cunningham et al. 2011). In addition, a recent study surveying all youth presenting to an urban emergency department for any reason found that three quarters of adolescents reported recent peer violence (Walton et al. 2009).

Violence involvement during adolescence is a potent risk factor for ongoing violence involvement into young

adulthood (Borowsky et al. 2008; Dahlberg and Potter 2001; Herrenkohl et al. 2000). For some youth, violent behavior progresses from physical fighting during early adolescence to more lethal forms, such as violence with a weapon, during later adolescence (Dahlberg and Potter 2001). In a review of violence and aggression, Loeber and Hay identified trends in the onset and progression of violence for boys (Loeber and Hay 1997). First, the cumulative onset of aggression generally increases. Second, while the prevalence of physical fighting tends to decrease, the prevalence of serious violence tends to increase. The stability of aggression tends to increase. Loeber and colleagues identified developmental pathways for aggression in males from childhood into adulthood (Loeber et al. 1993). The majority of males in their study were on a trajectory that starts with minor aggression, progressing to physical fighting, and later assaultive violence.

Resiliency

Resiliency theory posits that a variety of factors in childhood and adolescence influence the likelihood of an individual's participation in behaviors that can either positively or negatively affect their health and well-being. Risk factors are defined as those conditions that are associated with a higher likelihood of negative outcomes (Kazdin et al. 1997). Promotive factors operate to enhance healthy development (Fergus and Zimmerman 2005). Promotive factors play a role in helping youth overcome the negative effects risk pose on development and are important as they help compensate for or protect against the effects of risk on healthy development. Promotive factors may reduce the negative consequences of risk factors through direct effects (compensatory model) or through interaction effects (risk-protective model) (Fergus and Zimmerman 2005). The compensatory model of resilience implies that promotive factors can compensate for exposure to risk factors (Garmezy et al. 1984; Masten et al. 1988). The risk-protective model assumes that promotive factors buffer or moderate the negative influence of exposure to risk (Rutter 1985). In the risk-protective model, promotive factors interact with risks to reduce their negative effect on adolescent outcomes.

Risk and Promotive Factors for Youth Violence

Research on youth violence includes risk and promotive factors present within the individual, peers, family, school, and community that increase or decrease the likelihood that young people will engage in violence (Borowsky et al. 2008; Brookmeyer et al. 2005; Farrington 2007; Gorman-Smith et al. 2004; Resnick et al. 1997; 2004; Sampson et al. 1997; Valois et al. 2002). At the individual level, attention and learning problems, antisocial behavior, hopelessness, witnessing violence, violence victimization and alcohol and drug use have been associated with higher levels of aggression and violence (Bolland 2003; Bolland et al. 2001; Brookmeyer et al. 2006; Cedeno et al. 2010; Ferguson and Meehan 2010; Resnick et al. 2004). On the other hand, individual level factors such as social skills, school achievement, connections to school, self-efficacy for non-violence and a sense of hope and purpose have been deemed promotive (Borowsky et al. 2008; Cedeno et al. 2010; DuRant et al. 1994; Farrell et al. 2010; Farrell et al. 2010a, b; Stoddard et al. 2011a, b).

Parents and family can offer both risk and protection for youth violence (Farrell et al. 2010; Ferguson and Meehan 2010; Resnick et al. 2004; Youngblade et al. 2007; Zimmerman et al. 1998). Family aggression and parent and family attitudes and behaviors that are favorable to violence are a risk factor for youth violence (Herrenkohl et al. 2000; Youngblade et al. 2007), whereas, parental warmth, nurture and support is viewed as promotive (Farrell et al. 2010; Ferguson and Meehan 2010; Resnick et al. 2004; Youngblade et al. 2007; Zimmerman et al. 1998). In addition, parental presence and parental monitoring help youth avoid the negative consequences of risk for youth violence (Resnick et al. 2004).

Peer influences increase during adolescence. Peers can offer either negative influence or pro-social (positive) influence. Association with delinquent peers increases an adolescents' risk of serious delinquency, violence, and involvement in criminal activity (Dahlberg and Potter 2001; Ferguson and Meehan 2010; Hawkins et al. 1992). Peer influences that include strong pressures to engage in risk behaviors such as fighting and weapon carrying also place young people at risk of involvement in violence. Involvement with pro-social peers may offer positive support and role modeling for more positive behavior (Resnick et al. 2004). These peers may also help youth overcome the negative effects of risk exposure.

Factors within a community can play a role in youth violence (Bolland et al. 2005; Herrenkohl et al. 2000; Molnar et al. 2008; Sampson and Morenoff 1997). Poverty, community disorganization, and the availability of drugs and firearms place youth at risk for involvement in violence (Hawkins et al. 2000; Herrenkohl et al. 2000; Valois et al. 2002). Youth living in disadvantaged neighborhoods are exposed to more community violence, than their peers in more advantaged neighborhoods. In addition, neighborhoods with a culture and history of adult violence have elevated rates of youth violence (Borowsky et al. 2008; Herrenkohl et al. 2000; Valois et al. 2002). Youth living within disadvantaged neighborhoods may experience fewer opportunities for positive relationships and pro-social role models (Brooks-Gunn et al. 1997), whereas those

characterized by cohesion and opportunities for youth to interact with caring adults who reinforce pro-social behaviors appear to confer protection (Sampson et al. 1997; Resnick et al. 2004; 1997).

Our study provides a unique and significant contribution to the current literature on youth violence. First, our sample consisted of high risk youth already engaged in violent behaviors. Second, we examined the effects of cumulative risks and cumulative promotive factors in relation to violent behaviors in this sample of high risk youth. To date, most research on the effect of risk and promotive factors on youth violence has focused on single risk and promotive factors (DuRant et al. 1994; Herrenkohl et al. 2000; Resnick et al. 2004; Valois et al. 2002), or cumulative risk and promotive factors within specific ecologic domains (i.e., individual, family, school) (Van Der Laan et al. 2010). Little is known about the cumulative effects of these factors across domains among youth already involved in violence. The purpose of our study was to: 1) examine cumulative risks, cumulative promotive factors, and violent behaviors in sample of adolescents (14–18 years old) presenting to an urban emergency department (ED) who self-report past year violence, and 2) to test a compensatory model and a risk-protective model of resilience for violent behavior using a hierarchical multiple regression approach. For the compensatory model, we hypothesized that higher cumulative risk would be associated with more violent behavior. We also hypothesized that cumulative promotive factors would be associated with less violent behavior. For the risk-protective model, we hypothesized that promotive factors would reduce the effect of risk after accounting for the main effects of both cumulative risk and promotive factors.

Methods

Sample

Seven hundred-twenty-six adolescents (age 14–18) participated in the current study. Average age of the participants was 16.77 (SD = 1.33) and approximately half of the sample (56.5 %) was female. The sample was predominantly African American (56 %) and Caucasian (39 %). Seven percent of the sample was Hispanic/Latino. This study is based on baseline self-administered survey data collected as part of a randomized control trial (RCT) of an emergency department intervention for alcohol use and violent (aggressive) behaviors (see Cunningham et al. and Walton et al. for more information) (Cunningham et al. 2011; Walton et al. 2010). To be selected to complete the baseline survey (and be enrolled in the study), participants had to endorse both past year aggression and alcohol consumption. Aggression was defined as violent behaviors with peers, with a dating partner, or weapon carriage/use during the past year. Participants were asked 'In the past 12 months, have you had a drink of beer, wine or liquor more than two to three times' to measure past year alcohol consumption.

Data Collection

Over a 1 year period (September 2007 to September 2008), adolescent emergency department patients (age 14–18) who endorsed both past year aggression and any alcohol consumption during a 10 min computerized, self-administered screening survey were invited to complete a baseline survey. After parental consent (for participants under 18 years old) and participant assent/consent was obtained, participants completed a 20 min baseline survey. Participants received $20 for their participation in the baseline survey. Study procedures were approved and conducted in compliance with the University of Michigan's and Hurley Medical Center's Institutional Review Boards (IRB) for Human Subjects guidelines. A Certificate of Confidentiality was obtained for this study.

Measures

Violent Behavior

Violent behavior was assessed with 7 items from the Conflict Tactics Scale [CTS2] and 3 items from the Add Health survey (Sieving et al. 2001; Straus et al. 1996). Participants indicated how often they had engaged in each behavior during the preceding 3 months: pushed or shoved someone, punched or hit someone with something that could hurt, beat someone up, slammed someone against a wall, slapped someone, kicked someone, used a knife or gun on someone, serious physical fighting, group fighting, and caused someone to need medical care (Sieving et al. 2001; Straus et al. 1996). Response options for each of the violent behavior items included: 0 (never), 1 (1 time), 2 (2 times), 3 (3–5 times), 4 (6–10 times), 5 (11–20 times), and 6 (more than 20 times) (Straus et al. 1996). We computed a composite score (sum) across the 10 items (Cronbach's $\alpha = 0.89$). Summing the responses for the ten items yields a violence score with a possible range of 0–60, with higher scores indicating more violent behavior.

Promotive and Risk Factors

Promotive and risk factors include individual characteristics, peer influences, parental/familial influences, and community influences. Variables were assigned as either promotive or risk factors based on previous literature

assessing factors related to adolescent violence. Six variables were selected for study as promotive factors and eight variables as risk factors. Table 1 reports descriptive statistics (mean, standard deviation, and chronbach's alpha) and a sample item for each factor. Promotive factors included violence avoidance self-efficacy (ability to avoid violence) (Bosworth and Espelage 1995), attitudes about violence (Funk et al. 1999), religious involvement, positive peer behaviors, parental monitoring (Arthur et al. 2002), and living with a parent or guardian. Risk factors included failing grades/school dropout, alcohol use (Chung et al. 2002), marijuana use (Sieving et al. 2001), delinquency (Zimmerman et al. 2000), negative peer behavior (Doljanac and Zimmerman 1998), family conflict (Moos et al. 1974), gang involvement (Zun et al. 2005), and exposure to community violence (Richters and Martinez 1993).

Risk and Promotive Composite Indices

Using procedures similar to those by other researchers (Bowen and Flora 2002; DeWit et al. 1995; Newcomb and Felix-Ortiz 1992; Ostaszewski and Zimmerman 2006), we created risk and promotive composite factor indices. To create the composite factors, we first standardized the original items. The upper 16 % of the distribution of each of item (>1 standard deviation from the mean) was designated as high levels of either a promotive factor or a risk factor, depending on the items, the middle 68 % was identified as average levels of promotion or risk, and the lower 16 % (<1 standard deviation from the mean) identified as low or no promotion or risk. Each participant was given a score of 2 if their score on the variable is equal to or above the upper 16 % cut point, a 1 if their score was between the 17 percentile and the 84 percentile (in the middle 68 % of the distribution), and a zero if their score was equal to or less than the lower 16 % of the distribution. Two items (live with at least parent or guardian and gang involvement) were dichotomous variables. For these items, participants who reported yes were scored a 1 and participants who reported no received a 0. Cumulative indices were computed by summing the promotive and risk factors, respectively, for each individual. The range for the

Table 1 Descriptive statistics and individual measures for cumulative risk and promotive factors

Variable (number of items)	M	SD	α	Sample item (type of scale)
Promotive				
Violence self-efficacy (5)	2.38	0.85	0.79	How sure are you that you can stay out of fights? (5-pt Likert scale, 0 = not at all, 4 = extremely)
Violence attitudes (6) (reverse coded)	2.86	0.82	0.75	If a person hits you, you should hit them back. (5-pt Likert scale, 1 = strongly disagree, 5 = strongly agree)
Religious involvement (1)	2.09	2.10	NA	In the last year, how often did you take part in religious services or participate in activities offered by a hourse of workship, church, temple, mosque or synagogue? (7-pt Likert scale. 0 = not at all, 6 = more than once a week
Positive peer behavior (4)	1.54	0.80	0.69	How many of your friends take part in school clubs, athletics or school council? (5-pt Likert scale, 0 = none, 4 = all)
Live with Parent or Guardian (1)	0.80	0.40	NA	Do you live with a parent or guardian? (0 = no, 1 = yes)
Parent monitoring (7)	2.94	0.66	0.78	When I am not at home, one of them [parents] knows where I am and who I am with. (4-pt Likert scale, 0 = Definitely NO!, 4 = Definitely YES!)
Risk				
Alcohol (1)	1.69	0.90	NA	In the past 12 months, how often did you have a drink that containing alcohol? (0 = Never, 4 = Daily or almost daily)
Marijuana use (1)	2.47	2.39	NA	In the past 12 months, how many days did you use marijuana? (0 = Never, 6 = Everyday or almost every day)
Delinquency (11)	0.35	0.46	0.86	During the past 12 months, how often have you damaged property on purpose? (5-pt Likert scale, 0 = never, 4 = more than once a week)
Failing grades/dropped out (1)	4.83	2.33	NA	What kind of grades do you usually get? (1 = Mostly A's, 9 = Mostly F's)
Gang involvement (1)	0.07	0.26	NA	Are you in a gang? (0 = no, 1 = yes)
Negative peer behavior (8)	1.17	0.71	0.81	How many of your friends get into fights? (5-pt Likert scale, 0 = none, 4 = all)
Family conflict (2)	1.66	0.82		Family members get so angry they throw things. (4-pt Likert scale, 1 = hardly ever, 4 = often)
Exposure to community violence (5)	0.85	0.61	0.70	In the past 12 months how often has this happened: I saw gangs in my neighborhood? (4-pt Likert scale, 0 = never, 3 = many times)

cumulative promotive factor is 0–11, and the range for the cumulative risk factors is 0–15.

Demographic Characteristics

We controlled for the following demographic characteristics: age, sex, race, ethnicity and receipt of public assistance. Participants were asked to report their age in years, and sex (male = 1, female = 0). Participants were asked to report their race (Black or African American = 1, White or Caucasian = 2, Asian = 3, American Indian/Alaskan Native = 4, Native Hawaiian or Pacific Islander = 5, Unknown/Other = 6) and whether they were of Hispanic/Latino ethnicity (yes = 1, no = 0, unknown = 2). As a marker of socioeconomic status, participants were asked, "Do your parents, or the most important person raising you, receive public assistance?" Response options were Yes (1) or No (0).

Data Analysis Plan

Our hypotheses were tested using a four step hierarchical multiple regression analysis with violent behavior as the dependent variable. The first step included demographic variables (age, sex, race, SES), the cumulative risk factor index was entered in the second step, the cumulative promotive factor index was entered in the third step (to test the compensatory model), and the forth step included the cumulative risk by cumulative promotive interaction term (to test the risk-protection model). The cumulative risk and cumulative promotive factor variables were centered prior to creating the multiplicative interaction term (Aiken et al. 1991). Prior to our multiple regression analyses, our dependent variable (violent behavior) was assessed for normality.

Results

Descriptive Findings

Overall, participants reported moderate levels of cumulative risk (M = 7.30, range 0–15), moderate levels of cumulative promotive factors (M = 6.06, range 0–11) and moderate levels of violent behavior (M = 5.81, SD = 6.73, skew 1.83, range 0–44). Twenty percent of participants reported no violent behaviors in the past 3 months. Fifty percent of participants reported between 1 and 7 acts of violent behavior, 25 % of participants reported between 8 and 19 acts of violence, and 5 % reported 20 or more acts of violence in the past 3 months.

Multivariate Models

Violent Behavior

Results for each model of violent behavior are shown in Table 2. Model 1 examined the relationship between the demographic covariates and violent behavior. Older age was associated with less violent behavior ($b = -0.82$, $p < 0.001$). Violent behavior was not associated with gender, race or SES.

Risk Effects

Model 2 examined the effect of cumulative risk on violent behavior through the addition of the cumulative risk factor index. Cumulative risk was related to higher levels of violent behavior ($b = 1.30$, $p < 0.001$) after controlling for demographic characteristics.

Compensatory Model

Model 3 tested the compensatory or direct effects of the cumulative promotive factor index by examining the main effect of this factor after the cumulative risk factor index and demographics were entered into the equation. The cumulative promotive factor index was related to less violent behavior ($b = -0.63$, $p < 0.001$) after adjusting for cumulative risk and demographic variables.

Risk-Protective Model

Model 4 tested the protective effects of the cumulative promotive factor index by examining the cumulative risk by cumulative promotive interaction term after the cumulative risk factors index, the cumulative promotive factor index, and demographics were entered into the equation. The cumulative risk by cumulative promotive interaction term was associated with less violent behavior ($b = -0.19$, $p < 0.001$). Figure 1 decomposes the interaction effect. The graph depicts the relationship between the risk factors and violent behavior for the mean, and one standard deviation above and below the mean for the cumulative promotive factor index. High risk is associated with higher levels of violent behavior, but violent behaviors are lower for youth reporting more promotive factors. At low levels of risk, however, the promotive factors do not distinguish groups.

Discussion

This study adds to our understanding of adolescent resiliency in unique and significant ways. First, we examined

Table 2 Violence in past 3 months multivariate regression models (n = 726)

Variable	Model 1			Model 2 risk model			Model 3 risk and promotive model[a]			Model 4 risk/protective model[b]		
	b	SE	95 % CI	b	SE	95 % CI	b	SE	95 % CI	b	SE	95 % CI
Gender	0.50	0.50	[−0.49, 1.49]	−0.67	0.47	[−1.59, 0.25]	−0.68	0.46	[−1.59, 0.23]	−0.66	0.46	[−1.57, 0.24]
African American	0.86	0.52	[−00.16, 1.89]	0.52	0.47	[−00.41, 1.45]	0.63	0.47	[−0.29, 1.55]	0.84	0.47	[−0.09, 1.76]
Age	−0.82***	0.19	[−1.20, −0.45]	−1.05***	0.17	[−1.40, −0.71]	−1.06***	0.17	[−1.40, −0.73]	−1.07***	0.17	[−1.40, −0.73]
Public assistance	0.08	0.51	[−0.93, 1.09]	−0.35	0.47	[−1.27, 0.57]	−0.46	0.47	[−1.37, 0.46]	−0.46	0.46	[−1.36, 0.45]
Risk				1.30***	0.11	[1.10, 1.51]	1.08***	0.12	[0.85, 1.32]	1.01***	0.12	[.77, 1.24]
Promotive							−0.63***	0.16	[−0.94, −0.32]	−0.63***	0.16	[−0.94, −0.32]
Risk/promotive Interaction										−0.19**	0.06	[−0.31, −0.08]
R^2	0.03			0.19			0.21			0.22		
R^2 Δ				0.17***			0.02***			0.01***		

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

[a] Promotive effects/compensatory or direct effects model

[b] Indirect effects model

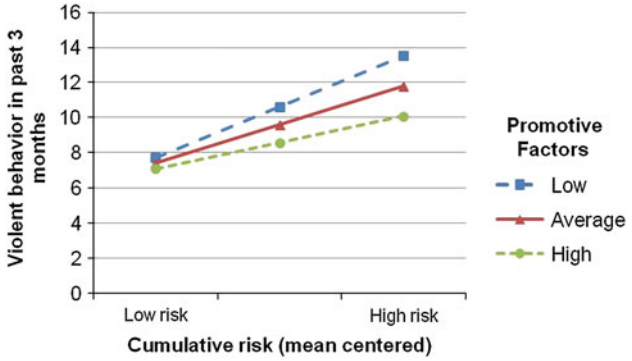

Fig. 1 Risk/protective model: risk/protective interaction for violent behavior in the past 3 months

the relationship between cumulative risk and promotive factors and violent behavior. This strategy is novel in youth violence prevention literature as most research on the effect of risk and promotive factors on youth violence has focused either on single risk and promotive factors (DuRant et al. 1994; Herrenkohl et al. 2000; Resnick et al. 2004; Valois et al. 2002), or cumulative risk and promotive factors within specific ecologic domains (i.e., individual, family, school) (NAHIC 2007). We know of no studies that have assessed cumulative risk and cumulative promotive factors across multiple ecologic domains focused on adolescent violent behavior. By modeling cumulative risk and promotive factors across multiple domains, we are able to better understand the relationship between risk and promotive factors and violent behavior. Our results suggest that promotive factors can help reduce the burden of cumulative risk for youth violence.

Our findings support the risk-protective factor model of resiliency. We found higher levels of cumulative risk were associated with higher levels of violent behaviors and that higher levels of cumulative promotive factors were associated with less violent behaviors. Yet, after accounting for the main effects of cumulative risks and promotive factors, we also found that cumulative promotive factors moderated the negative effects of cumulative risks on youth violent behavior. Higher levels of cumulative promotive factors appeared to attenuate the relationship between cumulative risks and violent behavior. In the presence of lower levels of cumulative risks, however, level of cumulative promotive factors did not appear related to violent behavior. These results suggest that particularly for adolescents with more risk factors, it is important to examine or assess promotive factors to better understand factors related to violent behavior, and that involvement with promotive factors likely can reduce the negative consequences of risks.

Our model accounted for 22 % of the variance in youth violence, and a substantial amount of variance remains

unexplained. While our cumulative measures included risk and promotive factors across several ecological domains, we may have missed additional risk and promotive factors that could help explain youth violence. For example, at the individual level, future orientation and a sense of hopefulness for the future have been linked to lower levels of violence involvement for youth living in at-risk environments (Stoddard et al. 2011a, 2011); however, we were unable to include these factors in our cumulative index of promotive factors. Future research that includes additional risk and promotive factors may help explain more variation in violent behavior and provide more detailed and nuanced analysis of the effects of risk and promotive factors for violent behavior.

While this is one of the first studies to assess cumulative risk and promotive factors across multiple ecologic domains for adolescent violent behavior, other models of youth violence point to the effect of the accumulation of risk factors over time. For example, Dodge et al. (2008) present empirical support for the dynamic cascade model of youth violence in which specific individual, family, and peer risk factors operate sequentially across childhood and early adolescence to increase risk for youth violence. Academic failure, negative peer behavior, and parental monitoring were important risk factors for later violence. This is consistent with factors included in our measure of cumulative risk. However, their model tests only a limited selection of risk factors. A model that is inclusive of additional risk factors across multiple domains and uses a cumulative approach across the lifespan could advance our understanding of factors that place youth at risk for violence. More importantly, a dynamic cascading model that also includes promotive factors across childhood and early adolescence could substantially advance our understanding of resiliency across the lifespan and the prevention of youth violence.

Limitations of this study should be noted. First, our study was based in a city identified as one of the most violent in the U.S. and surpasses both state and national rates for murder, rape, robbery, and aggravated assaults (FBI 2009; Morgan et al. 2009). In addition, our sample was composed of urban youth who presented to an urban emergency department and reported a history of physical fighting in the past year, thus our findings may not be generalizable to all urban youth. While all youth in this study acknowledged violent behaviors during the past year, variation did exist in more recent violent behavior. Twenty percent of the sample reported no violent behaviors in the past 3 months and half the sample reported a small number of violent behaviors. Of most concern is the remainder of the sample that reported greater involvement with violent behaviors (25 % of participants reported between 8 and 19 acts of violence and 5 % reported 20 or more acts of violence in the past 3 months). During adolescence, violent and aggressive behaviors are not unusual in general, (e.g., fighting); however, as these behaviors get more severe they become more disruptive for healthy development. These high levels of involvement with violent behaviors place this group of youth at extreme risk of the negative emotional and physical effects of violence (i.e., injury, PTSD, disability, and death). Our results may be especially relevant for youth who may be at particularly high risk for negative outcomes.

Second, our study is based on data collected at a single time point, thus we cannot assume causality. Future research needs to examine these relationships over time to better understand the potential effect of cumulative risks and promotive factors on violent behavior. Third, our cumulative indices for risk and promotive factors were created with all items/sub-scales receiving equal weight. It may be that different risk or promotive factors, or specific ecologic domains, may offer varying levels of risk or protection. The results of our study suggest that a more in-depth examination of this issue may be warranted as our unweighted aggregated approach supported our hypotheses and produced theoretically meaningful results. Future research that includes additional risk and promotive factors may also help explain more variation in violent behavior over time and provide more detailed and nuanced analysis of the effects of risk and promotive factors for violent behavior and other problems behaviors.

Our results suggest that prevention efforts to enhance promotive factors may help youth overcome the debilitating effects of risk. The results suggest, for example, that an ecological perspective that includes promotive influence across social domains may be necessary to overcome the relentless negative influences of risks on healthy adolescent development. Thus, strategies that engage youth in positive social activities with other positive peers may help them envision a more hopeful future for themselves, expose them to positive role models, and increase their chances to overcome the negative consequences of the risks they will inevitably face. Recently a brief intervention (Walton et al. 2010) based on motivational interviewing showed promise for reducing violent behaviors among at risk youth in the ED; this intervention focused both on reducing risk behaviors and increase promotive factors including referrals to community programs (e.g., mentoring, youth activities, psychological services). Such approaches may be appropriate for all youth as a first step, or for youth with low to moderate risk/promotive factors, or high risk and high promotive factors. Alternatively, for youth with higher levels or risk and lower levels of promotive factors, approaches may need to be more intensive. For example, these youth may benefit from multi-session case management or mentoring approaches similar to hospital and ED

interventions delivered to youth presenting with violent injury (Cheng et al. 2008; Cooper et al. 2006; Zun et al. 2006). Future research is needed to develop and test the efficacy of interventions tailored to levels of cumulative youth risk and promotive factors.

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