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**The Power of Developmental Assets in Building Behavioral Adjustment
Among Youth Exposed to Community Violence:
A Multidisciplinary Longitudinal Study of Resilience**

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ABSTRACT

Researchers and practitioners have repeatedly noted substantial variation in the behavioral functioning of youth exposed to community violence. Several studies across fields have documented the detrimental effects of exposure to violence, while other studies have considered how developmental assets promote positive youth development. However, few have examined the lives of the many youth who demonstrate resilience (that is, positive adjustment despite risk) and hardly any have examined how developmental assets may shape resilient trajectories into adulthood for youth exposed to violence. What resources and relationships can high-risk youth leverage to tip the balance from vulnerability in favor of resilience?

We used generalized estimating equations, a multivariable technique appropriate for longitudinal and clustered data, to examine multilevel longitudinal data from 1,114 youth ages 11-16 from the Project on Human Development in Chicago Neighborhoods (PHDCN). We considered whether baseline family, peer and neighborhood-level protective factors predicted behavioral adjustment 3-7 years later, among youth who were victims of, witnesses of, or unexposed to violence, controlling for individual and neighborhood-level risks.

Behavioral adjustment varied across waves and by exposure to violence. In the short-term, being a victim was associated with increased aggression and delinquency. In the long-term, though, both victims and witnesses to violence had higher odds of behavioral adjustment. Family support, friend support and neighborhood support, family boundaries and collective efficacy had protective effects, and family support, positive peers, and meaningful opportunities modified the effect of exposure to violence to increase the odds of behavioral adjustment over time. Policies, systems and programs across sectors that help nurture these specific supports and opportunities

can promote positive behavioral trajectories and resilience into adulthood among urban youth exposed to community violence.

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EXECUTIVE SUMMARY

Introduction

Adolescents living in urban neighborhoods regularly witness or are victims of community violence. Nationally representative estimates range from one-third of girls and one-half of boys witnessing community violence to 70% experiencing violent crime in adolescence (Aisenberg & Herrenkohl, 2008). Exposure to violence affects the behavioral adjustment of individuals over the course of their lives (Bacchini, Miranda, & Affuso, 2011; Cooley-Strickland et al., 2009; McDonald & Richmond, 2008; Wilson et al., 2009), but youth functioning varies substantially among those exposed to violence (Margolin, 2005), with a substantial portion of youth successfully adapting over time in spite of adversities (Benard, 2004; Garmezy, Masten, & Tellegen, 1984; Masten et al., 1999; Werner & Smith, 2001). A resilience perspective suggests that youth may bounce back, cope and recover constructively towards ‘normal’ health in a few years (Luthar, Doernberger, & Zigler, 1993).

Individual, family, peer, and neighborhood factors appear to each modify the effect of exposure to violence on positive adjustment (Aisenberg & Herrenkohl, 2008). This is illustrative of the ecological-transactional framework (Cicchetti & Lynch, 1993; Dawes & Donald, 2000), which nests the developing child within the dynamic social context of family, community, and society. The developmental assets framework (Benson, Leffert, Scales, & Blyth, 1998; Leffert et al., 1998; Benson, 2002) also discusses assets at multiple levels as they relate to key developmental processes. For example, the Search Institute highlights four external developmental assets, including supportive relationships, empowerment, boundaries and expectations, and constructive use of time. The developmental assets framework suggests that meaningful opportunities and relationships with adults are positive experiences that, when

reinforced by systems and policies, can protect youth from high-risk behaviors and enhance positive developmental outcomes. The developmental assets and ecological-transactional frameworks complement, strengthen and expand existing resilience research and practice.

However, much of the research has focused on factors at only one level, thereby limiting our understanding of how individuals nested within families within communities may be comprehensively protected and nurtured (Fergus & Zimmerman, 2005; Ungar, 2011). Additionally, numerous longitudinal studies have considered resilience among children exposed to other adversities like chronic poverty (Garmezy, 1985), parental psychopathology (Rutter, 1985; Werner & Smith, 1992), and child abuse and neglect (Garbarino et al., 1992), but surprisingly little research has documented resilience among youth exposed to community violence. This is especially important to do given that these adverse exposures are often clustered (e.g., family and community violence frequently overlap (Margolin et al., 2009)). More research must be done to understand how these diverse, clustered factors can combine to promote positive adjustment among youth who have been exposed to violence.

Methods

We utilized data from the Project on Human Development in Chicago Neighborhoods (PHDCN), which collects both community- and individual-level data over three waves during adolescence and young adulthood. In particular, our sample of 1,114 youth is composed of all youth with non-missing data at baseline in cohorts 12 and 15 from the PHDCN's Longitudinal Cohort Study of Adolescents, neighborhood data from community-based surveys, and Census and Police homicide data for additional neighborhood variables. The Longitudinal Cohort Study is a random sample of 6,226 children and youth within six months of ages 0 (in utero), 3, 6, 9, 12, 15, and 18 years who were selected from a random sample of 80 neighborhood clusters at

baseline using a multistage probability design. About 25 youth per neighborhood cluster were interviewed three times.

The neighborhood-level data were aggregated from the first wave's community survey, which assessed 8,872 randomly selected residents' perceptions of their neighborhood quality, safety and sense of community (all residents surveyed were 18 and older and came from 343 total Chicago neighborhood clusters). Neighborhood clusters were geographically sensible and homogenous in terms of race/ethnicity, socioeconomic status, family structure and housing density. The 1990 Census and Police homicide data from 1995 provided information about the crime rate and neighborhood structural variables. A detailed description of the sampling procedures used in the PHDCN has been reported elsewhere (Earls & Buka, 1997).

This analysis considers the moderating effect of caring relationships and support on the association between exposure to community violence—which was measured based on the My Exposure To Violence (My ETV) scale (Selner-O'Hagan et al., 1998)—and behavioral adjustment. Subjects' exposure to 18 different violent events in the community in the past year was measured using the My ETV scale (Buka, Selner-O'Hagan, Kindlon, & Earls, 1997; Kindlon, Wright, Raudenbush, & Earls, 1996; Selner-O'Hagan, Buka, Kindlon, Raudenbush, & Earls, 1998) at wave 2, the earliest wave for which exposure to violence is available. It is also worth noting that the My ETV scale only measures community violence, not any violence in the home. The outcome variable of interest was behavioral adjustment, which was operationalized as an externalizing problem score calculated by summing 14 items from a reduced version of Achenbach's (1991) Youth or Young Adult Self-Report scale. This instrument was composed of nine items on aggression and five items on delinquency.

Socio-demographic variables of the youth that were controlled for in our analyses were age, gender, family socioeconomic position (a composite of parental income, education and occupational code), family structure, and race/ethnicity. Neighborhood-level factors that were controlled in the analyses included concentrated poverty and perceived violence in the community.

The protective factors of interest were both interpersonal and neighborhood-based. Interpersonal items from the PHDCN that corroborated with the Search Institute's external assets of support, opportunities, boundaries, and expectations, and empowerment (Benson & Leffert, 1999) and WestEd's California Healthy Kids Survey Resilience module were identified at all waves, and scales were developed accordingly. Neighborhood-level protective factors that were identified included social cohesion, neighborhood social capital, and collective efficacy (Sampson, Raudenbush, & Earls, 1997), as well as an index of organizations and services in the neighborhood.

Using SAS version 9.0 (SAS Institute, 1999), the final sample of 1,114 youth was studied for differences in protective factors by the exposure to community violence group using chi-square tests and t-tests. Bivariate Pearson correlations were examined to assess the magnitude and significance of the correlations between the primary outcome, risk of exposure to violence, and protective factors. Systematic differences between respondents and non-respondents were also examined.

Next, generalized estimating equations (GEE) with a logit function were estimated regressing intercept at wave 2 and slope from wave 2 to wave 3 onto individual and neighborhood-level predictors at baseline (Liang & Zeger, 1986; Bryk & Raudenbush, 1987; Subramanian, Jones, & Duncan, 2003). GEE was the preferred method of analysis because this

technique provides a statistically robust model that adequately accounts for variation in the outcome that exists at multiple levels and adjusts for expected autocorrelation across time (within-subjects) and space (between subjects within neighborhoods) (Fitzmaurice, Laird, & James, 2004). Multilevel models were sequentially built starting with a null model that included no predictors, then adding time (age), the primary risk variable (exposure to violence group), level 2 controls (sex, race, socioeconomic position, family structure), and level 3 controls (neighborhood perceived violence and concentrated poverty).

Results

We first consider the individual and neighborhood characteristics at baseline of 1,114 youth in 78 Chicago neighborhoods, stratified by the exposure to violence group. The unexposed (n=238; 21.4%) were the smallest group; witnesses (n=499, 44.8%) were the plurality, and victims composed just over one-third of the study population (n=377, 33.8%). The average age of subjects at baseline was 13.5 years (range: 11-16), 15.5 years (range: 12-20) at wave 2, and 18.1 years (range: 15-22) at wave 3. Blacks were overrepresented in the witness and victim groups, as compared to the unexposed (37% and 41% vs. 20%, $p<0.05$); Whites were underrepresented among witnesses and victims ($p<0.05$); and Hispanics were more evenly represented in each group ($p>.05$). Victims were more likely to be male (55%) and living in single-parent households (33%) than witnesses and those unexposed to violence. Witnesses and victims lived in neighborhoods of higher mean concentrated poverty than the unexposed group ($p<0.05$).

In terms of the distribution of protective factors, the unexposed group had significantly higher levels of family support and positive peers compared to the other two groups; and victims reported significantly lower positive peer influence, family boundaries, and friend support than

other exposure to violence groups. Hours in structured activities, other adult support, neighborhood cohesion, and neighborhood control were similar across all exposure to violence groups ($p > .05$).

Resilience or behavioral adjustment varied by wave and level of risk exposure, ranging from 42% to 95%. As expected, victims were least likely to be behaviorally resilient at all 3 waves (37%), followed by witnesses (64%), and the unexposed (83%). Behavioral adjustment increased significantly for witnesses and victims by wave 3.

Multilevel factors generally had more of a protective effect for youth unexposed to violence than for those who had been exposed. Among the support variables, family ($p < 0.05$) and friend support ($p < 0.10$ borderline) had main positive effects on adjustment at wave 2 and change over time from wave 2 to 3, even after controlling for individual and neighborhood risks (perceived violence and concentrated poverty), frequency of violence exposure and wave 1 adjustment. Baseline family support positively influenced the unexposed group's (by 50%) and victims' (33%) wave 2 functioning more so than for witnesses (0.5%); however, baseline family support was associated with a greater increase in behavioral resilience for witnesses (15%) over time, as compared to victims.

Having positive peers at baseline (under the domain of boundaries and expectations) increased the odds of behavioral adjustment 7 years later, for the unexposed by 42%, witnesses by 13%, and victims by 9% by wave 3. Each unit increase in hours spent in structured opportunities (meaningful opportunities domain) at baseline increased the odds of behavioral adjustment for the unexposed group by 2.7 times at wave 2, and slightly increased odds for behavioral adjustment for victims and witnesses.

Neighborhood-level support or cohesion significantly and negatively influenced the rate of change from wave 2 to 3; that is, each unit increase in neighborhood cohesion at wave 1 decreased odds of behavioral adjustment for all youth from wave 2 to 3. The effect of collective efficacy on the slope was robust and significant even after the inclusion of individual assets and exposure to violence group, suggesting that the effect on building resilience was the same for all exposure to violence groups over time.

Discussion

This longitudinal, strengths-based study explored whether multilevel protective factors deemed fundamental for positive youth development for all youth build behavioral resilience among an ethnically diverse sample of urban at-risk youth. Specifically, we examined whether developmental assets were protective for adolescents exposed to various levels of community violence, above and beyond individual and neighborhood-level confounders. We found strong evidence that specific developmental assets were associated with behavioral adjustment at wave 2 and rate of change until wave 3. Both main and interactive effects have implications for informing interventions and policies, and were examined accordingly. Family support, friend support, neighborhood support, and family boundaries had main effects, reducing aggression and delinquency for all youth, including those exposed to violence. The influence of family support, other adult support, positive peers and meaningful participation at baseline on wave 2 functioning or rate of change depended upon the youth's exposure to violence. Family support was most protective for victims by wave 3, whereas family support and positive peers influenced rate of change mostly for witnesses. Collective efficacy had a main effect on the rate of change for all youth.

This resilience study had several limitations, including availability of reliable and valid measures at all time points, such that protective factors were measured at wave 1 and risk was measured at wave 2. Also, the data are only from one city (Chicago) and thus, are illustrative but may not be generalizable to all populations. Both of these limitations could be overcome in future prospective cohort studies. The study's primary strength is its multidisciplinary, multilevel theory-based investigation of various developmental assets for youth exposed to violence that controls for objective and perceptive measures of community violence and other neighborhood factors.

Implications for research

Future resilience studies should continue to build upon multidisciplinary fields including conducting a broader review of criminology, youth development, and public health literatures. We recommend employing both quantitative and qualitative youth-driven approaches to operationalizing and measuring positive stage-salient outcomes and domain-specific resilience, as well as accounting for changes in protective factors, communities, and within individual lives. Stratifying analyses by race and gender to account for population-specific exposures and competencies, and examining how schools, peers and neighborhoods might interact with each other and with individual assets (recognizing that resilient youth is also an active agent) along developmental pathways is greatly needed. Finally, rigorously evaluating strength-based programs, systems and policies to identify effective best practices is critical.

Implications for policy and practice

Much of the media and research on urban youth tends to disproportionately focus on the few individuals that get caught up in the juvenile and adult justice systems, which contributes to negative stereotypes of urban youth. Evidence documenting the strengths and successes of urban

high-risk youth provides insights into what works, and hopefully will lead to positive changes in societal perceptions of urban youth, and better inform the ways policies and programs are practiced. Primary prevention of violence in urban neighborhoods should continue to be the ultimate goal. However, in addition to prevention of underlying root causes of violence, this study suggests that policies and programs should focus on recognizing, marshalling, and building upon specific developmental assets at home, among peers, and in urban neighborhoods. Thus, in partnership with public health programs, mental health systems (e.g., Becker, Hall, Ursic, Jain, & Calhoun, 2004; O'Donnell et al., 1999), schools (e.g., Telleen, Kim, & Pesce, 2009), and non-traditional community partners (e.g., Randall et al., 1999), juvenile justice systems should work collaboratively to build youth and community capacity utilizing a strengths-based, interdisciplinary approach to data collection, service delivery, capacity building and systems change. Resources and efforts need to be tailored towards securing support, positive peers and meaningful opportunities at home, among peers and in the community to ensure lasting positive change for youth exposed to violence.

INTRODUCTION

Young people are the most likely to be witnesses and victims of violence (Finkelhor, Turner, Ormrod, Hamby, and Kracke, 2009), making it necessary for them to negotiate and adapt to interpersonal violence as part of their development (Ozer & Weinstein, 2004). In 2001, the U.S. Surgeon General recognized violence as the greatest threat to the lives of children and adolescents (Office of the Surgeon General, 2001). This is especially common in urban neighborhoods: nationally representative estimates suggest that one-third of girls and one-half of boys living in urban neighborhoods have witnessed high levels of community violence¹ (Aisenberg & Herrenkohl, 2008; Gorman-Smith & Tolan, 1998; Buka, Stitchick, Birdthistle, & Earls, 2001). For example, a survey of 10-19 year olds in Chicago suggested that 75% of predominantly African American students had witnessed a robbery, shooting, stabbing and/or killings in their lifetime (Jenkins & Bell, 1994).

Over the last three decades, a substantial body of research has shown that children exposed to community violence are at increased risk for externalizing problem behaviors, including having higher rates of aggression, deviant behaviors and substance abuse (DuRant, Cadenhead, Pendergast, Slavens, & Linder, 1994; Kleiwer et al., 2004; Lambert et al., 2004). They are also more likely to experience heightened internalizing psychosocial problems including Post-Traumatic Stress Disorder, depression and suicidal ideation (McDonald & Richmond, 2008; Lambert et al., 2008), as well as academic difficulties such as dropping out of school or having lower academic attainment (Osofsky, 2003; Sampson et al., 1997). However, there is compelling evidence that youth functioning varies substantially among those exposed to

¹Community violence in this report is defined broadly and is all-compassing as exposure to acts of interpersonal violence committed by individuals who are not intimately related to the victim. These include acts of sexual assault, burglary, fighting, use of weapons including guns and knives, muggings, the sounds of bullet shots, as well as social disorder issues such as the presence of teen gangs and drugs (National Center for Children Exposed to Violence).

violence (Margolin, 2005; Ozer & Weinstein, 2004). This suggests that not all children exposed to violence succumb to adversity, and that many are able to bounce back and recover, manifesting resilience and successful adaptation across domains over time. For example, some studies have found that half to three-fourths of youth exposed to violence have no violent behaviors (DuRant, Cadenhead, Pendergast, Slavens, & Linder, 1994; Osofsky, Wewers, Hann, & Fick, 1993). Among 225 Black youth, ages 11-19, living in low income housing and previously exposed to violence, DuRant et al. (1994) found that more than half did not report current violent behavior. In fact, growing evidence suggests that the majority (estimated at 50-70%) of youth witnesses and victims of violence subsequently develop into healthy, caring and confident adults (Benard, 2004; Masten et al, 1999; Werner & Smith, 2001). The impetus of this multidisciplinary study was to identify developmentally appropriate protective factors that youth and communities may be able to utilize to help tip the balance from vulnerability in favor of resilience. Although numerous studies have documented the detrimental effects among youth exposed to violence using a deficit-based model, few longitudinal studies have empirically examined the relevance of developmental assets (stage-salient protective factors that have shown to be fundamental for positive youth development) in building resilience among high-risk and at-risk youth (Taylor et al., 2002; Werner, 2005).

Need for Resilience Perspective to Combat Violence Exposure

Given that violence, especially in urban neighborhoods, is an enduring problem of epidemic proportions (Thornberry, Huizinga, & Loeber, 1995), it is imperative to not only focus on prevention of risk factors but to understand more about the processes that promote positive development among adolescents exposed to violence. This requires a necessary shift in the perspective of researchers and practitioners towards a strengths-based approach - to identify what

works in the face of violence. Resilience is defined as a dynamic process of positive development that may change over time in response to risk and protection (Garmezy, Masten, & Tellegen, 1984; Masten, 2001). Resilience research and practice capitalizes on individual and community strengths without undermining the importance of preventing risk factors. It offers a promising area of research to discover dynamic developmental processes and multilevel factors that may only be apparent under high-risk circumstances. In fact, experts argue that understanding positive factors are essential for preventing and treating psychological disorders (Cicchetti & Hinshaw, 2003; Masten & Curtis, 2000).

Gaps in Previous Studies

Although numerous longitudinal studies have been undertaken in the last 30 years to better understand resilience among children exposed to chronic poverty (Garmezy, 1985), parental psychopathology (Rutter, 1985; Werner & Smith, 1992), and child abuse and neglect (Garbarino et al., 1992), surprisingly little research has been done to document successes of youth exposed to community violence, despite the high prevalence of community violence in many urban communities.

The studies that have been conducted (Gorman-Smith & Tolan, 2004; Hammack et al, 2004; Ozer & Weinstein, 2004; Proctor, 2006), though informative, have been limited by a small sample size, cross-sectional or short-term longitudinal study design, a focus on pre-adolescent years (thereby preventing us from finding effective ways to intervene in later years), do not account for other neighborhood adversities including neighborhood violence and fail to document positive outcomes that are fundamental to measuring ‘success’ in accordance with developmental tasks. We, too, were limited by the data on positive outcomes across waves and variables for protective factors that were available in the Project on Human Development in

Chicago Neighborhoods (PHDCN); however, the PHDCN data allows for a longitudinal analysis of both multilevel and multifactorial analysis of exposures during adolescence and post-adolescence.

This study builds upon prior literature in a number of ways: 1) by examining neighborhood adversities and objective and subjective measures of community violence (perception and crime rate); 2) by providing clear criteria for measuring behavioral adjustment over time and at more than one time point, which is critical per Luthar and Zelano (2003) to capture the dynamic process of resilience; and 3) by using a multidisciplinary theory and methods to select the most robust protective factors within a developmental assets framework.

Developmental Assets Framework: Conceptual and Empirical Basis for this Study

This strengths-based study is guided by several interdisciplinary, ecological- and individual-level frameworks. Many researchers concur that to fully examine the issues related to youth exposure to violence, an ecological-transactional framework is required (Cicchetti & Lynch, 1993; Dawes & Donald, 2000). Such a framework places the developing child within the nested and ever-changing contexts of their families, communities and societies.

In concert, the developmental assets framework (Benson, Leffert, Scales, & Blyth, 1998; Leffert et al, 1998; Benson, 2002), which originated in the youth development literature, offers a promising conceptual framework for the study of resilience. Developmental assets are defined as those factors that are fundamental for positive development for all youth to meet the stage-salient milestones, including high-risk youth (Scales & Leffert, 1999). It is based on the ecological-transactional framework and is further enhanced by focusing on strengths and assets within and beyond the individual. Going beyond the prevention of high-risk behaviors and into enhancement of competence and thriving, these assets reflect core developmental processes

operating at multiple levels (Lerner & Galambos, 1998; Pittman, Wilson-Ahlstrom, & Yohalem, 2003; Scales & Leffert, 1999). This perspective highlights four external or environmental-level developmental asset domains, which are the focus of this study: supportive relationships, empowerment, boundaries and expectations, and constructive use of time (Scales & Leffert, 1999). It suggests that having meaningful opportunities, a caring relationship with an adult and/or boundaries, and high expectations at home, school or community can protect all youth, including and especially those from the highest-risk backgrounds from engaging in risky behaviors and promoting positive behaviors/attitudes and outcomes. At-risk youth themselves have voiced the importance of having positive forces such as educational and job opportunities, connections with adults and meaningful uses of their time—and not just the absence of risk factors in their lives (Ungar, 2004; Benson, 2002)—as keys for countering “the draw of the streets” (Ginsberg et al., 2002). The developmental assets framework complements the ecological-transactional framework, and collectively, both have the potential to strengthen and expand existing resilience research and practice.

Literature documenting the salience of developmental assets for an array of outcomes is slowly accumulating (Benard, 1991, 2004; Benson, Leffert, Scales and Blyth, 1998; Benson, 2002). However, to our knowledge, the relevance of developmental assets for high-risk youth has rarely been tested, especially for urban American youth exposed to violence. For example, a study by Taylor et al. (2002) found a positive association between the number of assets and competencies among gang members. Considering only the numbers of assets (e.g., 0-10, 11-20), however, and not the specific association of each asset to an outcome (Price, Dake, & Ruthie, 2001) could undermine the importance of each of the few assets that are available to the highest-risk individuals. Moreover, asset studies have not methodologically accounted for the context of

violence or other risks that assets inevitably interact with. Low reliability and validity of the Search Institute's assets instrument among ethnically diverse inner-city youth have also hindered such investigations (Price et al., 2001; Price, Spence, Sheffield, & Donovan, 2002).

Selection of Protective Factors within the Context of Developmental Assets

This study required a multidisciplinary review of literature including public health, youth development, criminology, education, and psychology to better understand how protective factors and developmental assets have been examined across fields for youth exposed to violence. Risk factors are defined as characteristics or conditions that have been shown to lead to negative outcomes (Shader, 1998). These factors tend to be cumulative and interact with one another. Protective factors are conditions or characteristics that tend to buffer the effects of risk and promote positive outcomes (Rutter, 1990). Our review attempts to merge developmental assets theory with empirical evidence to create domains of protective factors that can then be examined in the PHDCN dataset.

There are many sources of protective factors for at-risk youth, including family, peers, and schools, that have been identified by criminologists (e.g., Thornberry, Huizinga, & Loeber, 1995; Bernat, 2009), social workers (e.g., Minnard, 2002), psychologists (e.g., Masten et al., 1999), public health practitioners, and more. For example, several investigators have examined protective dimensions of family structure and functioning that are relevant to emotional and behavioral health in the face of community violence (Gorman-Smith & Tolan, 2004; Hammack et al., 2004; Kliwer et al., 2004; Lynch & Cicchetti, 1998). These studies have found that parents may not be able to compensate for the negative effects of exposure to violence beyond a certain threshold-level of risk (Hammack et al., 2004; Kliwer et al., 2004; Luthar & Goldstein, 2004), partly because family functioning may also be compromised due to community violence

(Osofsky, 1995; Krenichyn, 2001; Richters & Martinez, 1993). Others have noted that parent-adolescent relationships are generally at their worst during the teen years, and that parents have less influence on behavior as children develop into adolescents (O'Donnell, 2002). This implies that sources of support and resources outside the home, such as in schools, peers, and neighborhoods may be important protective factors. However, scarce evidence exists to document the potential of communities, schools and peers to mitigate the effects of exposure to violence. In fact, very few studies to date have examined what the neighborhood-level determinants of resilience are (Youngblade et al., 2007), and how to sustain those over time. Hence, in this study, we are most interested in identifying neighborhood-level factors that are amenable to change through broad public health and urban policy interventions.

Individual, family, peer, and neighborhood factors each appear to modify the effect of exposure to violence on behavioral adjustment (Aisenberg & Herrenkohl, 2008), but much of the research has focused on factors at only one level, thereby limiting our understanding of how individuals nested within families and within communities may be comprehensively protected and nurtured (Fergus & Zimmerman, 2005; Ungar, 2011). This is especially important to do given that these exposures are often clustered (e.g., family and community violence frequently overlap (Margolin et al., 2009)). More research must be done to understand how these diverse, clustered factors can combine to promote adjustment among youth who have been exposed to violence.

Individual-level protective factors:

Several individual-level protective factors have shown to influence positive adjustment and resilience among adolescents who have been exposed to various levels of violence, including educational attainment, intelligence and aspirations (Krohn et al., 2010), gender (Adkins et al.,

2009; Hanson et al., 2008), race/ethnicity (Fowler et al., 2008), religious affiliation (Fowler et al., 2008), socioeconomic status (Foster & Brooks-Gunn, 2009), and urbanicity (Campbell & Schwarz, 1996). In this study, we were explicitly interested in extrapolating ecological-level factors that are amenable to community-level interventions, so we included individual-level protective factors as covariates in our models but did not focus our attention upon them.

Family-level protective factors:

Different dimensions of family structure and functioning are associated with reduced problem behaviors or externalizing scores among youth exposed to violence (Gorman-Smith & Tolan, 2004; Hammack et al., 2004; Kliewer et al., 2004; Lynch & Cicchetti, 1998). Family cohesion and lack of family conflict appear to reduce aggression from childhood to emerging adulthood for individuals who are otherwise prone (Andreas & Watson, 2009; Gorman-Smith & Tolan, 2004). Parental monitoring (Beyers, Bates, Pettit, & Dodge, 2003), parental attachment (Lynch & Cicchetti, 1998), positive parental involvement (Yang et al., 2007) and support (Kliewer et al., 2004) or simply having a parent around have been associated with less frequent externalizing behaviors among adolescents and with fewer behavioral problems for youth exposed to violence (Herrenkohl et al., 2006; Pajer et al., 2008).

Growing evidence suggests that parents may be able to partially compensate for the negative effects of exposure to violence up to a certain threshold-level of exposure (Hammack et al., 2004; Kliewer et al., 2004; Luthar & Goldstein, 2004). However, families also become less important as children develop into adolescents (O'Donnell et al., 2002), and family support may not be present especially for highest-risk children and youth. Along these lines, studies have found that parenting may not mediate the relationship between perceived neighborhood danger and aggression among children (Colder, Mott, Levy, & Flay, 2000). This suggests that other

external sources of support and resources such as in schools, peer groups and neighborhoods in parallel deserve greater consideration (Schwartz & Proctor, 2000).

Peer-level protective factors:

Having a number of pro-social peers appears to significantly protect against aggression for boys but not girls (Molnar et al., 2008). Being in caring relationships or receiving social support from friends is another significant protective factor (Molnar et al., 2008). Community violence affects the types of friends that adolescents make, leading boys and girls to befriend people at other schools, and for boys to also befriend those who are no longer in school (Harding, 2008). Peer relationships also serve as a form of protection and survival for youth living in violent neighborhoods (Harding, 2009). In addition to protecting against neighborhood adversity, peer acceptance and friendship can also protect against negative family experiences (Criss, Pettit, Bates, Dodge, & Lapp, 2002).

Non-parental mentors have received less attention in the literature, though a number of promising and the Office of Juvenile Justice and Delinquency Prevention (OJJDP)'s model programs such as Boys and Girls Clubs of America have shown the significant impact of adult and peer mentors on improving a number of behavioral outcomes for youth exposed to violence (ETV), including serious offenders. Having a mentor has shown to lower the risk of aggressive behavior among adolescent males, but not females, and it is unknown if this protective factor modifies the relationship between exposure to violence and these behaviors (Molnar et al., 2008).

Neighborhood-level protective factors:

Growing evidence suggests that neighborhoods matter for adolescent development, though most studies have focused on examining the negative effects of living in poor neighborhoods (Leventhal & Brooks-Gunn, 2000), rather than exploring what works for positive

growth (Garbarino, 1995). Hardly any studies have explored how communities may come together to build resilience. If neighborhoods, via institutional and social conditions, can have negative effects, they likely also have the power to influence positive development (Connell & Aber, 1995). This is in alignment with others who have recognized the importance of positive social processes, like collective efficacy, within disordered neighborhoods (Sampson et al., 1997; Molnar et al., 2004; Jain, Buka, Subramanian & Molnar, 2010).

Longitudinal studies are the most informative for understanding these trajectories, given the high potential for bidirectional causality in cross-sectional studies of risk and resilience (because we can elicit temporality), even if causality cannot be confirmed. Fortunately, several longitudinal studies have been conducted in recent years that help inform our understanding of how neighborhoods affect youth development and resilience. Higher neighborhood residential instability (a measure of both proportion of renters and proportion of people who had moved there recently), as well as higher neighborhood disadvantage (a composite measure of poverty, public assistance, unemployment, and female-headed households) and less affluence (a composite measure of income, educational attainment, and occupational status), were each associated with increased externalizing behavioral issues among adolescents, but the effects were all indirect (Beyers, Bates, Pettit, & Dodge, 2003). This may imply that neighborhoods with higher affluence (more educated, higher income, employment rates) and higher residential stability protect against and reduce externalizing problems among adolescents. Similar measures have also been shown to affect the urban youths' manifestations of aggression from childhood to adolescence (Vanfossen et al., 2010). Several of these articles note that neighborhood factors may have differential effects by gender and/or by race/ethnicity, and may modify the effect of more proximal assets (like family support) differentially.

From a strengths-based perspective, however, the literature is relatively sparse, though a few studies have been done. For example, neighborhood social cohesion and informal social control are predictive of resilience among children who experienced maltreatment (Jaffee et al., 2007). Sense of community is another protective factor (Greenfield & Marks, 2010). More specifically, the concentration of youth services and more general social services organizations has shown to protect against aggressive behaviors (Molnar et al., 2008). Neighborhoods with higher rates of services and organizations seem to lower the percent of youth with aggressive behaviors. However, little research has examined if the effects of such assets and programs are modified by exposure to violence.

The Present Study

This strengths-based study capitalizes upon the multilevel, multiwave data available from the Project on Human Development in Chicago Neighborhood (PHDCN) to document the successful behavioral adjustment of urban youth into young adulthood and assess the contributions of developmental assets at home, among peers, and in the community to their behavioral adjustment over time. This sample is uniquely suited for this proposed study, given the longitudinal nature of the PHDCN data, the variation in the primary risk factor, exposure to violence, and resilient outcomes, and the availability of reliable and valid measures of protective factors in multiple domains (e.g. in schools, neighborhoods, families and individuals). Although observational data such as these limit our ability to infer causation, correlational analyses are appropriate for exploratory work.

Guided primarily by the developmental assets and ecological-transactional and theoretical frameworks, our study aims are two-fold: 1) to assess the main effects of protective factors (caring relationships, expectations, and opportunities) and the interactive effects of protective

factors with exposure to violence upon behavioral adjustment among youth exposed to violence longitudinally, accounting for individual and neighborhood-level risks; and 2) to examine the impact of neighborhood collective efficacy on behavioral adjustment over time among youth exposed to violence.

METHODS

Study Design and the Sample

This study utilizes data from Project on Human Development in Chicago Neighborhoods (PHDCN), which collects both community- and individual-level data over multiple time points during adolescence and young adulthood. In particular, our sample of 1,114 youth is composed of all youth with non-missing data at baseline in cohorts 12 and 15 from the PHDCN's Longitudinal Cohort Study of Adolescents. Cohort 18 (as was originally proposed) could not be used, because the My Exposure to Violence (My ETV) scale was not collected at wave 2 for cohort 18. The Longitudinal Cohort Study contained a random sample of 6,226 children and youth within six months of ages 0 (in utero), 3, 6, 9, 12, 15, and 18 years who were selected from a random sample of 80 neighborhood clusters at baseline using a multistage probability design. About 25 youth per neighborhood cluster were interviewed three times.

The neighborhood-level data were aggregated from the wave 1 community survey, which assessed residents' perceptions of their neighborhood quality, safety and sense of community. Approximately 8,872 residents ages 18 and older were randomly selected to be surveyed from 343 total Chicago neighborhood clusters. Neighborhood clusters were geographically sensible and homogenous in terms of race/ethnicity, socioeconomic status, family structure, and housing density: 847 Census tracts in the city of Chicago were collapsed to form 343 neighborhood

clusters, which were ecological units of about 8,000 people, large enough to approximate local neighborhoods and respectful of geographical boundaries and knowledge of Chicago's neighborhoods. The 1990 Census and Police Homicide data from 1995 provided information about the crime rate and neighborhood structural variables. A detailed description of the sampling procedures used in the PHDCN has been reported elsewhere (Earls & Buka, 1997).

The final sample included subjects with non-missing data at baseline. Assuming that data were missing at random, the longitudinal models estimated values for the missing responses in subsequent waves. Values were imputed only if one wave was missing data. If more than one wave was missing data, then no imputation was done. Of the total 1,517 youth who participated in cohorts 12 and 15 at wave 1, 1,238 had complete data on exposure to violence at wave 2, 100 had missing data on outcome at either wave 2 or 3, and 39 were missing data on at least one covariate. Thus, the final sample included 1,114 youth in 78 neighborhoods for analysis. Compared to respondents included in the final analytic sample, subjects dropped from the analysis were more likely to be Black, from single parent families, and having fewer assets (e.g., family boundaries, collective efficacy, or other adult support), but they had similar externalizing problem scores and exposure to violence.

Measures

Behavioral Adjustment (Primary Outcome at Waves 1, 2 and 3)

The outcome variable of interest, behavioral adjustment (resilience), was operationalized from the externalizing problem score over 3 waves from Achenbach's (1991) Youth or Young Adult Self-Report Scale. To reduce burden on participants, the PHDCN used shortened versions of the study instruments at waves 2 and 3. To ensure consistency across waves, a reduced 14-item externalizing problem score at all three waves was created with 9 items on aggression and 5

items on delinquency. For the purposes of this study, a binary outcome variable was created to identify youth operating within a “normal or lower” range of externalizing problems: individuals less than 0.50 standard deviation above the gender-specific median were classified as “behaviorally adjusted or resilient”. Those with a high externalizing problem score (above the 0.50 standard deviation of median) were coded as “not adjusted”. We purposely did not use the clinical cut-offs (T-scores above >65 for externalizing problem score) to classify resilience because these scores were more extreme and there is greater potential for differential misclassification in our sample (i.e., more youth who are not well-adjusted behaviorally would have been categorized as such). We opted to use average or better behavioral externalizing scores to define our outcome to reflect that non-exceptional functioning was still worth acknowledging, given the significant adversity such people face (Luthar & Zelano, 2003; Owens et al., 2003; Zucker, Wong, Puttler, & Fitzgerald, 2003).

Measure of Risk Exposure (Wave 2):

Exposure to community violence: A subject’s exposure to 18 different violent events in the community in the past year was measured using the My Exposure to Violence scale (Buka, Selner-O’Hagan, Kindlon, & Earls, 1997; Selner-O’Hagan, Buka, Kindlon, Raudenbush, & Earls, 1998; Kindlon, Wright, Raudenbush, & Earls, 1996) at wave 2. These included: seeing someone shoved, kicked, or punched, seeing someone attacked with a knife, hearing a gunshot, and seeing someone shot. It did not account for any violence the adolescent might be experiencing at home. Two subscales of *witnessing* (7 items; alpha=0.74) and *victimization* (7 items; alpha=0.57) were developed, as a sum of yes/no responses (Brennan, Molnar, & Earls, 2007). The psychometric properties of these scales have been tested in diverse populations using item-response theory and Rasch modeling (Selner-O’Hagan et al., 1998; Brennan et al., 2007).

Based on the continuous scales, a categorical *exposure to violence group* variable was also created to allow group-specific comparisons with 0=*non exposed* group who scored 0 on the witnessing and victimization scale; 1=*witness* group had witnessed at least one act of violence in the past year but had not been victim to any, 2=*victim* group that had been a victim of at least 1 act of violence (and may or may not have witnessed additional events). Both continuous and categorical variables were tested to account for the frequency and severity of violence (Buka, Stitchick, Birdthistle, & Earls, 2001).

Measures of Protective Factors (Wave 1):

Items from the Project on Human Development in Chicago Neighborhoods (PHDCN) that corroborated with the Search Institute's four external developmental assets domains (Benson & Leffert, 1999) and WestEd's California Healthy Kids Survey Resilience module—caring relationships/support, boundaries and expectations, and meaningful opportunities—were identified at all waves. Since only portions of reliable scales were available at waves 2 and 3, complete data from wave 1 were used. Building upon prior theory and empirical research, the protective factors were coded during previous research (see for example, Jain, Buka, Subramanian, & Molnar, 2012), for which extensive exploratory and confirmatory factor analysis (using the second half of the sample), item deletion reliability tests, other psychometric analyses and theory were conducted (psychometrics unpublished to date). Table 4 presents descriptions and items used for each of the protective factors in this study.

We use four measures of caring relationships and support factors. Previously validated and reliable scales were used as much as possible and placed within the developmental assets theoretical domains. *Family support* (6 items; $\alpha=0.73$), *friend support* (8 items; $\alpha=0.71$), and *other adult support* (4 items, $\alpha=0.53$) emerged from the Provision of Social Relations

instrument (Turner, Frankel, & Levin, 1983) through exploratory factor analysis and item deletion reliability tests. If more than half of the items were not missing, an average score was calculated based on very/somewhat/ not true responses (if more than half of the items were missing, the score was considered missing). *Neighborhood support* was coded as Sampson's social cohesion subscale (Sampson, Raudenbush, & Earls, 1997; alpha=0.80), a sum of 5 scaled items from the community survey (strongly disagree to strongly agree) about residents' willingness to help, trust each other, get along, share the same values, and perceive the community as close-knit.

We also measured peer, family, and neighborhood expectations and boundaries. *Positive peer influence* (10 items from Deviance of Peers (Huizinga, Esbenson & Weiher, 1991); alpha=0.62) captured whether friends model responsible behavior: e.g. the number who are involved in sports/community/religious/family/after-school activities and/or who are considered good students or good citizens. *Family boundaries and expectations scale* (13 items from Home (Caldwell & Bradley, 1984; alpha=0.63) captured items on parental monitoring, and having clear rules and consequences at home. *Neighborhood social control* (5 items from community survey; alpha=0.80; Sampson, Raudenbush, & Earls, 1997) captured perception of neighborhood boundaries: for example, if neighbors will intervene if children are skipping school, hanging out on a street corner, or spray-painting graffiti.

Under opportunities, the sum of *time spent in structured activities or meaningful participation* per week in school or after-school was calculated based on 3 items from the school questionnaire (Youth Interview Schedule, 1990). An *organizations and services* index included 8 items regarding the presence of various local organizations and programs such as parks, block group, neighborhood watch group, and a mental health center, and 6 items on youth services

such as recreational programs, after-school programs, and mentoring/counseling services. The former captures actual youth participation in meaningful opportunities and the latter provides insight into actual opportunities offered in the neighborhood. All scales were individually standardized to have a mean of zero and standard deviation of one.

Neighborhood-level collective efficacy (Sampson et al., 1997) was a sum of the two subscales mentioned above (cohesion and social control) based on aggregated independent resident responses from the community survey. Internal consistency of the scale was high, with Cronbach's coefficient alpha of 0.89; higher scores represent greater collective efficacy in a neighborhood.

Neighborhood-level Covariates: Concentrated poverty was calculated using the first principal component of three U.S. Census items: percent of persons unemployed, receiving public assistance, and living below the federal poverty line in 1990. Perceived violence in the community was a sum of 5 items on the community survey assessing how often the respondent had witnessed a robbery or mugging, a fight among neighbors, a fight with a weapon, sexual assault or rape, or a gang fight in the last six months. The responses ranged from often (1) to never (4); higher scores represent greater perceived violence at baseline.

Individual and Family-level Covariates: Socio-demographics of youth included age (centered at the mean), gender (female=reference group), family socioeconomic position (a composite measure of parental income, education, and occupational code; for each of these variables, the maximum of either parent was used), family structure (2 biological parents=reference, biological/1 non-biological, 1 biological, and other/2 non-biological), and race/ethnicity (White, Asian/Pacific Islander and Other Race were combined to serve as the reference group, versus Black and Hispanic groups). Continuous measures at individual and

neighborhood-levels were grand-mean centered for ease of interpretation. For missing responses to these covariates, the mean value was imputed and a variable indicating imputation was added to all models.

Data Analyses

All analyses were done using SAS version 9.0 (SAS Institute, 1999). First, a person-period dataset was created in which each person had three records, one for each wave (Singer & Willett, 2003). Next, data were structured with 2,228 repeated observations at level 1 nested within 1,114 individuals at level 2, nested within 78 neighborhoods at level 3. Depending on the covariates included in the model, the analytic sample varied.

First, among the final complete case analysis sample of 1,114 youth, differences in protective factors, individual, and neighborhood-level characteristics were examined by the exposure to violence group. Chi-square tests and t-tests were used to assess whether differences in categorical and continuous covariates between the three exposure to violence groups were significant. Bivariate Pearson correlations were examined to assess the magnitude and significance of the correlations between outcome, risk of exposure to violence, and protective factors. Systematic differences between respondents and non-respondents were also examined.

Next, generalized estimating equations (GEE) with a logit function were estimated by regressing intercept at wave 2 and slope from waves 2 to 3, onto individual and neighborhood-level predictors at baseline (Liang & Zeger, 1986; Bryk & Raudenbush, 1987; Subramanian, Jones, & Duncan, 2003). Unstructured within-subject correlations of binary response at wave 2 were modeled, partly to account for the temporal association between predictors and outcome, and to adjust for clustering. Since the exposure to violence risk variable was only available at

wave 2, it was not advisable to do trajectories or growth curves to model outcome from waves 1-3, as we had originally proposed.

GEE was the preferred method of analysis because this technique provides a statistically robust model that adequately accounts for variation in an outcome that exists at multiple levels and adjusts for expected autocorrelation across time (within-subjects) and space (between subjects within neighborhoods) (Fitzmaurice, Laird, & James, 2004). GEE further: 1) accommodates missing data at various time points; 2) does not assume comparable growth across all subjects; 3) allows for inconsistent timing of data collection; and 4) in comparison to nlmixed models, estimates group-specific parameters, not subject-specific parameters in relation to prototypical neighborhoods (Hanley, Negassa, Edwardes, & Forrester, 2003; SAS Institute, 1999; Wolfinger & Chang, 1998). Furthermore, as Hubbard et al (2010) discuss, GEE is preferable to mixed models because it provides population average estimates that require fewer assumptions to be made.

To test specific hypotheses, multilevel models were sequentially built starting with the null model with no predictors, adding time (as measured by age), the primary risk variable (exposure to violence group), individual-level controls (sex, race, socioeconomic position, and family structure), and neighborhood-level controls (neighborhood perceived violence and concentrated poverty). Frequency of witnessing violence and victimization (both continuous) was also kept in the models since it was a theoretical and empirical confounder: it changed the coefficient of the exposure to violence group significantly, and remained significant ($p < 0.05$) even after inclusion of assets.

The aims of this study were: 1) to test the main and interactive effects of protective factors, within the domains of support, expectations/boundaries, and opportunities, on behavioral

adjustment at waves 2 and 3, accounting for individual and neighborhood-level risks; and 2) to examine the impact of neighborhood collective efficacy on behavioral adjustment over time among youth exposed to community violence.

To test for the main effects of assets on the log odds of behavioral adjustment at wave 2 (intercept; aim 1), individual assets were added to the fully conditional model; for the main effect of an asset on the rate of change between wave 2 and 3 (i.e., the slope), a two-way interaction signified by asset*age was included in the above model. To test for the interactive effect of each asset with exposure to violence (aim 1), a 2-way interaction term between an asset and exposure to violence was included in the intercept model above, and a 3-way interaction term was included in the slope model above to assess the differential effects of assets on slopes by the exposure to violence groups. Interactive slope models also controlled for age*exposure to violence term but not age*sex, as slope did not vary by sex ($p>0.05$). Exposure to violence was coded as two dummy variables, with witness vs. not and victim vs. not, to allow for comparisons across groups. Separate models were run for each asset. Age was centered at wave 2, so the intercept terms in the models estimate the log odds of behavioral adjustment at wave 2 associated with a one standard deviation increase in the asset, controlling for covariates. Slope terms estimate the change in the log odds of behavioral adjustment between waves 2 and 3 for each standard deviation increase in an asset, controlling for covariates. Finally, the main and interactive effects of neighborhood-level collective efficacy and organizational services, separately with exposure to violence and each asset, were also tested on behavioral adjustment (aim 2).

RESULTS

Sample Characteristics

Table 1 presents the individual and neighborhood characteristics at baseline of 1,114 youth in 78 Chicago neighborhoods, stratified by exposure to violence group. The total sample was evenly divided between females and males, and was highly ethnically diverse (35% Black, 48% Hispanic, 15% White, 3% Other) and socioeconomically diverse, with 1 out of 3 youth from a single parent household. Of the total sample, 238 youth (21.4%) had been unexposed to any act of violence in the past year, 499 (44.8%) had witnessed some form of violence (e.g., saw someone get shot, killed, shoved), and 377 (33.8%) were victims (who had also witnessed community violence). The average age of subjects at baseline was about 13.5 years (range: 11-16 years), 15.5 years (range: 12-20 years) at wave 2, and 18.1 years (range: 15-22 years) at wave 3. Victims were more likely to be male (55%, versus 48% and 40%) and living in single-parent households (33%, versus 29% and 21%) than witnesses and those unexposed. Blacks were overrepresented in the witness and victim groups compared to the unexposed (37% and 41% versus 20%, $p < 0.05$). Witnesses and victims lived in poorer neighborhoods than the unexposed group ($p < 0.05$).

In terms of the distribution of protective factors (Table 2), the unexposed group had significantly higher levels of family support and positive peers compared to those exposed to violence (as witnesses or victims). Victims reported lower positive peer influence, family boundaries, and friend support than witnesses or those who were unexposed to violence. Hours in structured activities, other adult support, neighborhood cohesion, and neighborhood control were similar across all three groups ($p > .05$).

Prevalence of Behavioral Adjustment Across Exposure to Violence Groups

Table 3 displays the proportion of youth who met the criteria for behavioral adjustment at each wave, showing patterns separately for youth by exposure to violence category. At all waves over time, the unexposed group had the lowest levels of aggression and delinquency problems (83.0%), as expected, followed by witnesses (63.7%) and victims (36.6%). Behavioral adjustment varied by wave and by exposure to violence, ranging from 42% to 95% across all groups, providing evidence that resilience varies by time (it is dynamic) and is risk-specific. By wave 2, behavioral adjustment dropped significantly for victims and slightly for witnesses, and increased significantly by wave 3 for all three groups, including almost doubling for victims (42% at wave 2 to 80% at wave 3, $p < 0.01$). This suggests that being a victim was associated with both a short-term increase in aggression and delinquency, but also long-term recovery and resilience. Group comparisons of these proportions showed that the differences were statistically significant (chi-square $p < 0.01$). Follow-up comparisons of pairs of groups using Chi-square tests showed that the proportion of unexposed youth who manifested behavioral adjustment was statistically significantly different from the proportion of adjusted witnesses and the proportion of adjusted victims. The proportion of witness youth who manifested behavioral adjustment was also statistically significantly different from the proportion of adjusted victims ($p < .001$) at each wave. When we used the wave 1 median and standard deviation as the cut-off for defining behavioral adjustment at each of the waves, similar results and percentages were obtained.

We also defined different adjustment groups during young adulthood, based on group-specific terminology used by Zucker, Wong, Puttler and Fitzgerald (2003). Based on this group analysis, we would consider 21% as “non-challenged” (low risk and normal externalizing problems), 0.001% as “troubled” (low risk and high externalizing problems), 67% as “resilient”

