

## Estimating the Effects of September 11th and Other Forms of Violence on the Mental Health and Social Development of New York City's Youth: A Matter of Context

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*This longitudinal study examines the effects of exposure to the terrorist attack of September 11th as well as exposure to other forms of community violence on change in the mental health and social attitudes of youths in New York City. Three quarters of the youths reported some form of direct exposure to the events of September 11th, and 80% reported a lot of exposure to at least 1 form of media coverage of September 11th; these rates were comparable with the citywide survey of public school students in New York City conducted by the New York City Department of Education. Results of a structural equation model that included controls for previous levels of mental health and social attitudes, as well as a range of demographic factors, indicated that direct exposure and family exposure to the event did not predict change in any mental health outcomes, but did predict change in levels of social mistrust; media exposure did predict posttraumatic stress disorder symptoms. In contrast, victimization by other forms of violence was strongly associated with change in or current levels of all of the examined mental health symptoms, whereas witnessing other forms of violence was associated with change in or levels of 3 of 4 mental health symptoms and with increased hostile attribution bias and levels of social mistrust. Implications of the results for applied developmental and public mental health strategies in response to traumatic events are discussed.*

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The events of September 11, 2001—the terrorist attacks on the World Trade Center (WTC), the Pentagon, and civilian aircraft—were so catastrophic on so many levels that it is difficult to put them in context. Their effects include those on the United States and local economies, on U.S. foreign policy and domestic security policy and practice, and on the health and attitudes of individuals and communities. In this study, we examine the effects of exposure to the events of September 11th on the mental health and social attitudes of youths in New York City in a developmental and community context.

In the time since the event, knowledge has grown quickly on the nature of exposure to the events of September 11th, on variation in exposure both within and between populations, and on the mental health and psychosocial correlates and sequelae of exposure (Galea et al., 2002; Schlenger et al., 2002; Silver, Holman, McIntosh, Poulin, & Gil-Rivas, 2002). Although no definitive taxonomy of types of exposure to September 11th exists, theorists and researchers, drawing from important previous work on exposure to the Oklahoma City bombing (Pfefferbaum et al., 1999, 2001), have

distinguished among direct exposure (e.g., immediate personal physical proximity and danger), indirect exposure (e.g., witnessing the events on television), family exposure (e.g., family members killed or injured by the events), and other forms of exposure (e.g., events led to parent's job loss or a residential move; e.g., Hoven et al., 2004; Schlenger et al., 2002; Silver et al., 2002). Just as children and youths in areas of armed conflict are exposed to a variety of war-related experiences (Macksoud & Aber, 1996; Macksoud, Aber, & Cohn, 1996), the children and youths of New York City also have experienced great variation in their exposure to the events of September 11th. Indeed, in the definitive epidemiologic study of a large and highly representative sample of New York City children and youths in 4th through 12th grades, Hoven et al. (2004) found that 76% of New York City public school students experienced at least one form of direct exposure, 67% spent "a lot" of time learning about the attacks from

television, and 7% had a family member who was in the WTC on the day of the attack but escaped unhurt (see right-hand columns of Tables 1–3). Further, rates of some types of exposure varied by geography within the city, whereas rates of other types did not. Although children and youths attending school in the immediate proximity of Ground Zero experienced more direct exposure (80% reporting at least 1 type of direct exposure), a smaller but still substantial number of children and youths in the rest of New York City also reported at least one type of direct exposure (24%). In contrast, rates of family exposure did not differ for children and youths at Ground Zero and for those in the rest of the city (9% vs. 13%; Hoven et al., 2004).

Prior studies of the effects of exposure to life-threatening events such as natural disasters (La Greca, Silverman, Vernberg, & Prinstein, 1996; Rubonis & Bickman, 1991), war (Macksoud & Aber, 1996), and terrorist-type attacks (Pfefferbaum et al., 1999, 2001,

**Table 1.** *Adolescents' Direct Exposure to the September 11th Attack on the World Trade Center*

Type of Direct Exposure	This Study: NYC Adolescents in RCCP Follow-Up Study <sup>a</sup>	Population Comparison: Weighted Sample of NYC Public School Students <sup>b</sup>
Smelled the smoke from the WTC buildings after the attack	51%	43%
Had difficulty getting home that day	37%	37%
Had to leave the location where they were at for safety reasons	28%	26%
Know anyone killed in the attack	22%	21%
Were in or near the cloud of smoke or dust caused by the attack	20%	11%
Saw the planes crash or the towers collapse with their own eyes	12%	9%
Had to attend another school because own school was closed because of the attack	1%	2%
Were physically hurt during the attack	< 1%	3%
Had to move out of their home because of the attack	< 1%	< 1%
Any one of the above	73%	76%

Note: NYC = New York City; RCCP = Resolved Conflict Creativity Program; WTC = World Trade Center. <sup>a</sup>N = 768. <sup>b</sup>N = 465,986.

**Table 2.** *Adolescents' Media Exposure to the September 11th Attack on the World Trade Center*

"After the WTC Attack, How Much Time Did You Spend Learning About the Attack From ..."	This Study: NYC Adolescents in RCCP Follow-Up Study <sup>a</sup>	Population Comparison: Weighted Sample of NYC Public School Students <sup>b</sup>
TV		
A lot	67%	67%
Some	28%	30%
None	5%	3%
Radio, newspapers, or magazines		
A lot	54%	33%
Some	38%	54%
None	9%	13%
Web sites		
A lot	12%	6%
Some	25%	36%
None	63%	58%
Percentage reporting "a lot" to at least one type of media	80%	71%

Note: NYC = New York City; RCCP = Resolved Conflict Creativity Program; WTC = World Trade Center. <sup>a</sup>N = 768. <sup>b</sup>N = 465,986.

**Table 3.** *Adolescents' Reports of Family Members' Exposure to the September 11th Attack on the World Trade Center*

Questions	This Study: NYC Adolescents in RCCP Follow-Up Study <sup>a</sup>	Population Comparison: Weighted Sample of NYC Public School Students <sup>b</sup>
Was anyone in your family in the WTC on the day of the attack but escaped without being hurt?	7%	14%
Was anyone in your family physically hurt in the WTC attack but not killed?	1%	3%
Was anyone in your family killed in the WTC attack?	1%	3%
Any one of the above	9%	17%

Note: NYC = New York City; RCCP = Resolved Conflict Creativity Program; WTC = World Trade Center.  
<sup>a</sup>N = 768. <sup>b</sup>N = 465,986.

2003) have hypothesized both nonspecific and specific effects of exposure to disaster, war, and terror on the mental health and psychosocial development of children, youths, and adults. For instance, Macksoud and Aber hypothesized that some war-related experiences (such as loss of a family member) would be associated with youth depression, whereas other experiences (such as traumatically injured or directly exposed to bombing and shelling) would be associated with posttraumatic stress disorder (PTSD). Still other experiences (witnessing killings) were hypothesized to increase the risk for more than one type of mental health problem. In studies of children and youths 10 to 15 years old in Lebanon (Macksoud & Aber, 1996) and Kuwait (Macksoud, Nazar, & Aber, 1994), data supported the idea of both specific and nonspecific effects of war-related events on mental health.

In research more directly comparable to this study, Hoven et al. (2004) found that each major form of exposure to the events of September 11th (direct, family or friend, and media exposure) was associated with increased odds of a variety of mental health problems ranging from internalizing problems (major depressive disorder), to anxiety disorders (separation anxiety disorder, agoraphobia, panic disorder), to externalizing disorders (conduct disorder). More important, these associations between exposure to the events of September 11th and mental health problems controlled for the effects of demographic factors and exposure to other forms of violence pre-September 11th that could place youths at risk for mental health problems.

Not all of the effects of exposure to war and events like September 11th are on mental health problems. Social attitudes (like prejudice toward immigrants and social mistrust) and social cognitions (like hostile attributions bias) could also be affected. For instance, civil liberties groups were very concerned that September 11th may provoke a xenophobic response to Arab Americans and, especially among White Americans, to people of color more generally. In addition, political leaders and human and health service officials worried that the events of September 11th may create among youths a generalized mistrust of others

and a more specific misattribution of hostile intent in certain situations.

Both the Macksoud and Aber (1996) and Hoven et al. (2004) studies were only able to assess children's mental health and social development at one point in time. Hence, they were unable to examine (a) how prior level of mental health and social development influenced the impact of war and violence on children and youths, or (b) how the effects of violence on children and youths change as time elapses from the experience of the events.

Because of the unpredictable and hard-to-manage nature of war, terror, and other forms of catastrophic community violence, there are very few studies of children and youths that have been able to collect a rich history of quantitative data on the mental health and social attitudes of a large sample of children before a catastrophic event and then re-evaluate them after the catastrophic event. There are those that have reported that children with preexisting psychiatric symptoms, particularly anxiety, were more likely to report PTSD symptoms in response to natural disasters (Earls, Smith, Reich, & Jung, 1988; La Greca, Silverman, & Wasserstein, 1998; Vogel & Vernberg, 1993). Some studies of September 11th, already in the field, were able to compare symptom levels of participants interviewed before or after September 11th (Ford, Udry, Gleiter, & Chantala, 2003; Costello, Erkanli, Keeler, & Angold, in press; Gould, Munfakh, Kleinman, Lubell, & Provenzano, this issue). Others asked participants to recall pre-September 11th symptom levels or exposure to other traumatic events when assessing the impact of September 11th (Ford et al., 2003; Hoven et al., 2004; Silver et al., 2002). However, few, if any, studies of the effects of September 11th have done so in a developmental or longitudinal framework. Such research designs are needed to help move the field beyond cross-sectional associations or longitudinal associations that cannot control for selection processes to develop less biased estimates of the effects of community catastrophes on the mental health and psychosocial development of youths. This study addresses several of the limits to earlier studies.

Finally, as catastrophic as events like the Oklahoma City bombing, the wars in Lebanon and Kuwait, and the September 11th attacks are, they are not the only experiences of violence in the lives of many children and youths. Other forms of family and (noncatastrophic) community violence can also influence the exact same set of mental health and social attitudinal outcomes. Until studies measure exposure to nonwar, noncommunity catastrophic forms of violence as well as community catastrophic forms of violence, we are not able to put the effects of events like September 11th in context. Both developmental theory (Cicchetti & Lynch, 1993; Davies & Flannery, 1998) and prior studies (Shahinfar, Kupersmidt, & Matza, 2001) suggest that chronic (enduring) exposure would leave a more profound effect on the mental health and social attitudinal development of children than would episodic (fleeting) exposure.

**This Study**

The unexpected nature of events like the September 11th terrorist attacks means that no research study can plan *a priori* an ideal research design and measurement protocol to understand the effects of the events on children, youths, and families. Consequently, to overcome the serious limits of purely post-event data collection, the field is reliant on such strategies as “piggy backing” onto longitudinal studies of affected populations that are already in the field to answer other (ideally related) questions (Gershoff & Aber, this issue). This study re-

lies on exactly this strategy. It is the result of an amendment to a planned long-term follow up of children in an evaluation of one of the largest school-based violence prevention programs in the country, the Resolving Conflict Creatively Program (RCCP). The influence of the RCCP on the social-cognitive, behavioral, and academic development of elementary school children has been reported previously by Aber and colleagues (Aber, Brown, & Jones, 2003; Aber, Jones, Brown, Chaudry, & Samples, 1998; Brown, Roderick, Lantieri, & Aber, 2004).

This article reports data collected from adolescents as part of a planned 6- to 7-year follow up of a stratified, representative subsample of the original sample of children. Data collection began 4 months after September 11th and ended 2 years later. During the 4 months between September 11th and the start of the follow-up data collection, a set of measures were added to the protocol to assess variation in children’s exposure to the events of September 11th and to measure both parent and child processes that could mediate or moderate the influence of these events on youth development. (Although we include measures of exposure to the RCCP intervention as controls in these analyses, the long-term impact of earlier intervention on adolescent development is not examined here but will be reported in depth in a future article.)

The analyses we present were designed to address a set of questions graphically displayed in Figure 1. This figure presents a heuristic model of the separate and combined effects of (a) exposure to the events of Sep-

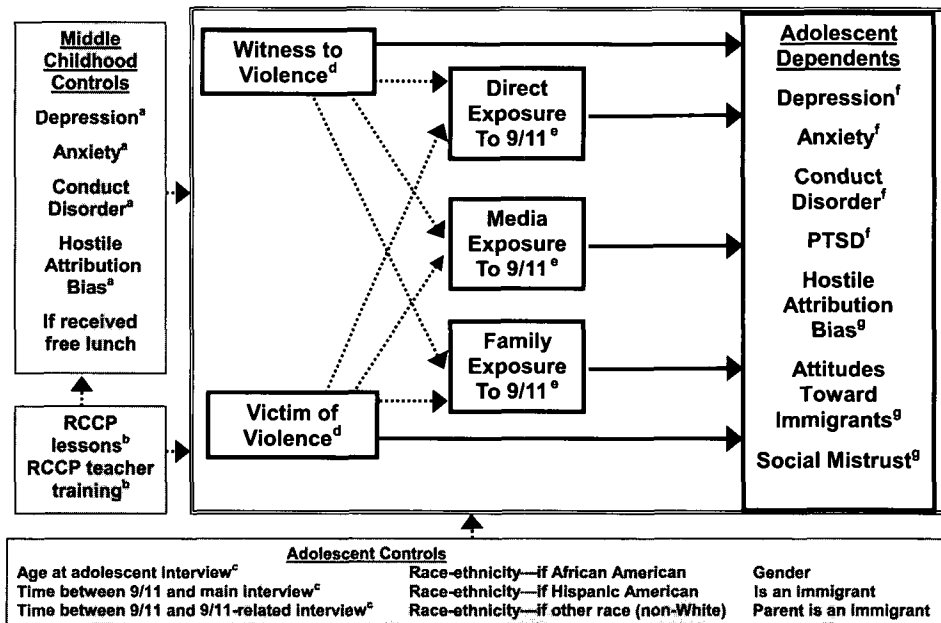


Figure 1. Dotted paths denote paths of control variables. All variables listed as Middle Childhood Controls and Adolescent Controls were used as control predictors of adolescent exposure, mental health, and social attitudes. Variables sharing superscripts were covaried in structural equation modeling analyses. Note: RCCP = Resolving Conflict Creatively Program.

tember 11th and (b) witnessing and being a victim of other forms of violence on the mental health and social development of New York City youths. Because we were about to launch a 6-year longitudinal follow up of a large and diverse sample of New York City children whom we originally studied in elementary school, we are able to estimate the impact of both exposure to the events of September 11th and to other forms of violence on change in adolescents' mental health and social development.

Specifically, we set out to address three sets of questions in the study. First, is there any evidence of "selection" into exposure to violence, both to the events of September 11th and to noncommunity catastrophe witnessing and victimization? Are some children and youths more vulnerable to exposure than others? In studies of children's exposure to war-related events in Lebanon, boys, older adolescents, and youths from lower socioeconomic status (SES) families reported more exposure than girls, younger adolescents, and youths from higher SES families (Macksoud & Aber, 1996). However, in a study of elementary school children's exposure to violence in Chicago (Guerra, Huesmann, & Spindler, 2003), older children (Grades 4-6) and children who fantasized aggression reported less exposure to community violence than younger children (Grades 1-3) and children who scored lower in fantasy aggression. To estimate the effects of exposure *per se*, it is necessary to control for factors that influence children's levels of exposure.

Second, controlling for demographic predictors of exposure and prior levels of mental health problems and social attitudes in middle childhood, what are the relative effects of various forms of exposure to the events of September 11th and of non-September 11th witnessing of and exposure to violence on New York City youths? Is there evidence of both specific and nonspecific effects of exposure to the events of September 11th? Is there evidence that witnessing and being victimized by community violence (which are likely to be more chronic) have greater impact on the mental health and social development of New York City youths than exposure to the events of September 11th (which are likely to be more episodic)? Given that an early experience of extreme psychological distress can place individuals at increased vulnerability to subsequent stressors (Bremner, Southwick, & Charney, 1995), are the effects of exposure to the events of September 11th and of witnessing and victimization better described as an additive or multiplicative model?

Third, and finally, do prior problems in mental health and psychosocial development in middle childhood or recent witnessing of or being the victim of violence make children more vulnerable to the events of September 11th? Previous research findings that individuals with early exposure to violence and adversity experience sensitization to later stressful events

through heightened mental health problems (Hammen, Risha, & Daley, 2000; King, King, Foy, Keane, & Fairbank, 1999) suggest that the effects of September 11th on youth mental health and social attitudes could be especially strong for children with prior mental health problems or chronic violence exposure. On the other hand, different studies have shown that children exposed to chronic community violence exhibit habituation or defensive responding to it (Phelps, McCart, & Davies, 2002), which suggests that high-risk youths may prove less sensitive to the effects of September 11th. We sought to determine whether prior mental health problems and exposure to chronic community violence served to either sensitize or habituate youths to the traumatic events of September 11th.

Together, answers to these questions will constitute a significant advance in our understanding of the effects of September 11th and other forms of violence on youth development. In addition, the findings of the study have implications for the conceptualization and implementation of applied developmental and public mental health strategies to address the increasingly complex challenges facing youth exposure to violence.

## Method

### Participants

The sample consisted of 768 adolescents residing in New York City and included 52% girls, 37% Hispanic Americans, 31% African Americans, 13% European Americans, and 19% of another race (e.g., Asian, Native American, or biracial). Slightly more than one half of the adolescents reported that their parents were married (53%); the majority of the adolescents reported the United States (86%) as their country of origin, but two thirds of the sample reported that one or both of their parents were born outside the United States. At the last assessment in middle childhood, 84% of the sample received a free school lunch, a marker of low family income. The religion of the adolescents varied widely: 39% identified themselves as Catholic, 22% as Protestant (e.g., Baptist, Seventh Day Adventist, Pentecostal, Lutheran, Methodist, and Presbyterian), 3% as Jewish, 3% as Muslim, 13% as "other" (included Buddhist, Mormon, and Jehovah's Witness), and 20% reported that they did not have a religion. In the last data collection period of the original study (spring 1996), students ranged in age from 6 to 14 years ( $M = 9.0$ ,  $SD = 1.64$ ); in the follow up, adolescents' ages ranged from 12 to 20 years ( $M = 16.5$ ,  $SD = 1.71$ ). In the follow up, 31% of the participants were in 7th to 9th grades, 54% were in 10th to 12th grades, 5% were in general equivalency diploma or vocational programs, 6% were in college, 2% were working and not in school, and 2% were not working or not in school. Of

the students in school, 26% reported that they worked part time or full time as well. Most adolescents indicated that they attended or had attended a public junior or senior high school (91%) in New York City.

## Procedure

### Middle Childhood Assessment

Middle childhood data for this article come from the last wave of data collection of the original study (spring of 1996) that included Grade 2 through Grade 6 students from 15 schools participating in the evaluation. Twelve of the schools were in Brooklyn, with the remaining 3 in upper Manhattan. Students who were severely mentally or physically challenged, as identified by school principals, were excluded from the study. Otherwise, all students in each of the 15 participating schools were included in the study unless a "refusal to participate" form was returned by a parent or signed by a student, or if the student was discharged from the school. (This passive consent procedure, approved by both the Office of Educational Research at the New York City Board of Education and the Institutional Review Board of Columbia University, was voluntarily implemented following a waiver of active consent based on a Single Project Assurance submitted to the Office for Protection from Research Risks of the National Institutes of Health, Department of Health and Human Services.) Child report data were collected by a multiracial field research team using classroom-based group administration procedures during classroom periods, whereas teacher report data on children were collected from individual teachers at the end of each data collection wave. A total of 11,160 children participated in this study in at least one wave across the two evaluation years. (See Aber et al., 1998 for a full description of the design and rationale of the evaluation; see Aber et al., 2003, and Brown et al., 2004, for summaries of the results from the middle childhood evaluation.)

### Adolescent Follow-Up Assessment

For the follow-up study, we aimed to interview 900 youths out of the original 11,160 (although we did achieve this number, only 768 of the interviews were completed in time for inclusion in the analyses presented here). The 6- to 7-year lag between the last middle childhood assessment and this adolescent assessment posed significant challenges to recruitment. Contact information was obtained from the New York City Department of Education using identification numbers that uniquely identify the academic and personal records (such as residential address and phone number) of each student within the New York City public school system. Twelve percent of the adolescents we set out to contact no longer had records in the

Department of Education computer system. At the start of the study, we attempted to contact 3,323 families by mail, requesting that they mail back a consent form or call us on a toll-free number; 10% of the adolescents contacted in this way agreed to participate in the study. In light of this very low response rate, we sought and obtained approval from our Institutional Review Board and from the Department of Education to obtain phone numbers for the families; again, some families did not have current phone numbers in the department's records, but 45% of the 1,470 adolescents whom we attempted to contact by a combination of phone and mail were eventually recruited into the follow-up study. When we were able to speak with adolescents and parents by phone, 78% of these adolescents participated in the study; however, because of the low response to the original mailing, our overall response rate is 20%. The follow-up sample was matched to the demographic characteristics of the original sample; the follow-up sample was quite similar to the original sample with regard to gender (52% girls vs. 48% girls) and race and ethnicity (37% Hispanic American and 31% African American vs. 39% Hispanic American and 38% African American); but participants were more likely to have received free lunch in middle school (84% vs. 72%). Gender, race and ethnicity, and free-lunch status were included as controls in each of the analyses discussed later.

If the adolescents expressed a willingness to participate, the project staff requested that their parent or legal guardian review and sign the consent form allowing their child's participation. Parental consent was not necessary for those who were 18 years of age or older at the time of the interview. All of the adolescents also provided active written assent before participating in the interview. Trained research assistants interviewed each of the 768 adolescent participants for 2 to 3 hr using a semistructured format. To minimize any intimidation adolescents might feel, we selected a research staff that was diverse (over one half of the interviewers were racial minorities), primarily female, and entirely young adults. Based on how comfortable the individual adolescents felt reading the interview on a computer (determined informally by the interviewer through observations of how long the adolescent took to read the consent form and to complete initial demographic questions on the laptop), the interviews were either administered entirely by the interviewers in which the interviewer read the protocol questions aloud to the adolescents and entered their responses onto a laptop computer, or the students read the questions to themselves and entered their responses into the laptop. However, in the case of interviews read aloud, the interviewers did ask the adolescents to enter their answers to sensitive questions directly into the laptop (e.g., questions about sexual activity and drug use), both to protect the adolescents' privacy during inter-

views conducted in public settings and to increase the likelihood of honest responses. Furthermore, we obtained a Certificate of Confidentiality for this study and explained to the participants (and their parents) in the consent and assent forms that this certificate protected us from having to reveal any illegal activities to authorities. Each interviewer carried a copy of the certificate to show to participants if asked. The interviews primarily took place after school or during weekends at locations that included public spaces such as community libraries or local parks; commercial establishments such as coffee shops; and, less frequently, adolescents' homes. The students were compensated \$50 for their time.

## Measures

### Predictors From Middle Childhood

**School lunch eligibility status.** Eligibility for a free, reduced-price, or full-price lunch was obtained for the 1996 school year from New York City Department of Education records.

**Levels of RCCP intervention.** Exposure to the intervention in middle childhood was operationalized using data on two primary RCCP components. Classroom Instruction in RCCP is composed of the total number of lessons given by trained teachers to children in their classrooms across the 2 years of the evaluation (Aber et al., 2003). Teacher Training and Coaching is a count of the number of contacts a teacher had with the RCCP and consists of training sessions attended, one-on-one meetings with an RCCP staff developer, and classroom visits by the staff developer (Aber et al., 1998). As stated earlier, we included these two aspects of the RCCP intervention in the analyses as controls only and did not explore their associations with adolescent outcomes here.

**Mental health.** Symptoms of depression, anxiety, and conduct problems were assessed using the Seattle Personality Questionnaire (SPQ; Greenberg, 1994; Kusche, Greenberg, & Beilke, 1988). Students responded to each item using a yes–no scale: 1 (*no*) and 2 (*yes*). In the fourth wave of data collection in the original RCCP sample, internal consistencies were good: depression,  $\alpha = .76$ ; anxiety,  $\alpha = .74$ ; and conduct problems,  $\alpha = .76$ . Correlations among the scales were as follows: anxiety with depression,  $r = .48, p < .0001$ ; depression with conduct disorder,  $r = .37, p < .0001$ ; and anxiety with conduct problems,  $r = .14, p < .05$ .

**Hostile attribution bias.** The Home Interview: Hostile Attribution Biases Subscale (adapted for this study from Dodge, 1980; see also Dahlberg, Toal, & Behrens, 1996) was used to measure children's tenden-

cies to attribute hostile or benign intent to a provocateur in several hypothetical vignettes. The internal consistency of this measure was  $\alpha = .72$  during the fourth wave of the RCCP evaluation.

### Demographics From Adolescence

Several demographic characteristics of the adolescents obtained through the in-person interviews were used as control or predictor variables in the structural equation modeling (SEM) analyses. Adolescents self-identified their gender, their date of birth, and their race or ethnicity. Age at the date of the adolescent interview was calculated from their date of birth; race and ethnicity was coded into three indicator variables with European American as the reference category, namely, if African American, if Hispanic American, or if of another race or ethnicity.

### Exposure to September 11th in Adolescence

Exposure to the terrorist attacks on New York City on September 11th, 2001 and the aftermath was assessed through sections of an instrument created by Hoven et al. (2002) through collaboration with the New York City Department of Education and the Centers for Disease Control and Prevention. Exposure was categorized as follows:

1. *Direct exposure*, which was a count of nine potential experiences with the event (e.g., seeing the planes crash into the towers or the towers fall down, having to leave where they were for safety concerns, breathing the smoke after the event; see Table 1 for all items).

2. *Media exposure*, which was an average of three items asking how much the adolescents reported learning about the event from (a) TV; (b) newspapers, radio, or magazines; or (c) the Internet, on a scale ranging from 1 (*none*), 2 (*some*), to 3 (*a lot*). See Table 2.

3. *Family exposure*, which was a count of three ways family members may have been affected (e.g., someone in their family escaped the WTC unharmed, someone in their family was killed in the attack; see Table 3).

### Exposure to Community Violence in Adolescence

The extent to which the adolescents have witnessed or been victimized by violence in their communities was assessed using the Survey of Exposure to Community Violence (Richters & Saltzman, 1990). To assess the witnessing of violence, youths were asked whether they have seen any of 12 different events; to assess their experiences as a victim of violence, youths were asked if any of the same events have ever happened to them (see Table 4 for a list of all items). For this study,

**Table 4.** Adolescent Reports of Violence Experienced as Witness or Victim, in Descending Order of Prevalence

Variables	<i>n</i>	Percentage Reporting
Witnessed violent event		
Seen someone being slapped, punched, or hit	662	86%
Seen someone being picked up, arrested, or taken away by the police	654	85%
Seen someone offering, selling, buying, or using illegal drugs	541	71%
Seen someone being chased by a gang or individual	484	63%
Seen someone carrying or holding a gun or knife	427	56%
Seen someone being beaten up or mugged	397	52%
Seen someone being threatened with serious physical harm	367	48%
Seen someone being attacked or stabbed with a knife	135	18%
Seen someone being shot at with a gun	99	13%
Seen someone else killed	94	12%
Seen someone's house or apartment being broken into by anyone other than the police	83	11%
Seen someone being sexually assaulted, molested, or raped	26	3%
Witnessed at least one of these forms of violence	753	98%
Violent victimization		
Heard the sound of gunfire	543	71%
Have been slapped, punched, or hit	403	53%
Have been asked to sell, buy, or use illegal drugs	276	36%
Have been threatened with serious physical harm	159	21%
Own house or apartment has been broken into by anyone other than the police	142	19%
Have been picked up, arrested, or taken away by the police	123	16%
Have been chased by a gang or individual	114	15%
Have been beaten up or mugged	100	13%
Have been threatened with death	73	10%
Have been sexually assaulted, molested, or raped	42	6%
Have been attacked or stabbed with a knife	30	4%
Have been shot at with a gun	12	2%
Been a victim of at least one of these forms of violence	668	87%

counts of the number of types of violence were summed as measures of violence exposure. With this sample, both subscales were internally consistent (witnessing,  $\alpha = .76$ ; victimization,  $\alpha = .68$ ) and strongly correlated ( $r = .59, p < .0001$ ).

### Mental Health in Adolescence

**The Computer Diagnostic Interview Schedule for Children-IV.** The Computer Diagnostic Interview Schedule for Children-IV (C-DISC-IV; C-DISC Development Group, 2000) is a highly structured interview designed to assess the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; American Psychiatric Association, 1994) psychiatric disorders and symptoms in children and adolescents aged 9 to 17 years through self-report. (Although a young adult version for 18- to 25-year-olds is currently under development, the C-DISC-IV has been used successfully with an 18- to 24-year-old population; Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000). The adolescents were asked if they had experienced symptoms of major depression, generalized anxiety disorder, conduct disorder, oppositional defiant disorder (ODD), and PTSD during the past year. Previous research has found that the C-DISC-IV is answered

more consistently than any other psychiatric diagnostic interview that has been prepared for either children or adults, and it has established reliability (C-DISC Development Group, 2000; Shaffer et al., 2000). For these analyses, continuous counts of symptoms, rather than cutoff scores, were used in the analyses to capture the full range of symptomatology. Conduct disorder symptoms and ODD symptoms were strongly correlated ( $r = .55, p < .0001$ ) and combined as a composite for the bivariate analyses and used as individual indicators of a single latent factor of conduct disorder in the structural equation model. It is also important to note that the PTSD symptoms reported by adolescents could be about any traumatic life event, not necessarily the events of September 11th; only 22 of the adolescents reported September 11th as their major traumatic life event.

**SPQ.** For cross-time consistency, the SPQ measure was again used in adolescence, with the wording of a few items changed for appropriateness with an adolescent sample. In adolescence, reliabilities were good (anxiety subscale,  $\alpha = .74$ ; conduct problems subscale,  $\alpha = .63$ ; depression subscale,  $\alpha = .74$ ). Across the 6- to 7-year time lag, children's scores on the SPQ subscales demonstrated modest cross-time re-

liability: depression,  $r(768) = .29, p < .001$ ; anxiety,  $r(768) = .19, p < .001$ ; and conduct disorder,  $r(768) = .23, p < .001$ .

#### Correspondence between the two measures.

The C-DISC-IV and SPQ subscales were used together as indicators of latent factors in the SEM analyses (except for PTSD, which was not assessed by the SPQ). Within the adolescent assessment, the C-DISC-IV and SPQ subscales were strongly correlated for depression,  $r(768) = .54, p < .001$ ; for anxiety,  $r(768) = .47, p < .001$ ; and for conduct disorder,  $r(768) = .49, p < .001$ . In addition, the SPQ subscale for conduct disorder was also correlated with the C-DISC-IV subscale for ODD,  $r(768) = .40, p < .001$ .

#### Social Attitudes in Adolescence

**Hostile attribution bias.** The measure used in middle childhood to assess hostile attribution bias was again used in the adolescent assessment with only small wording changes to make the questions more appropriate for this age group. The internal consistency of this measure in adolescence was not quite as high in adolescence ( $\alpha = .57$ ) as it was in middle childhood ( $\alpha = .74-.78$ ; Aber et al., 2003), but the measure was retained as a repeated measure. This scale showed modest cross-time reliability across the 6- to 7-year lag ( $r = .26, p < .001$ ).

**Prejudice toward immigrants.** To assess the adolescents' current perceptions of intergroup relations, this study used the Intergroup Understanding/Bias Questionnaire (Flanagan, Gill, & Gallay, 1998; Flanagan, Ingram, Gallay, & Gallay, 1997). This measure taps into the adolescents' perceptions of their own, their parents', and their friends' beliefs and biases (e.g., immigrants pose a threat to our society, immigrants enrich our society, and immigrants should blend into our culture). The internal consistency of this subscale was  $\alpha = .78$ . We decided to ask youths about parent and friend beliefs and biases to reduce the possibility of suppressed scores due to social desirability factors.

**Social mistrust.** Adolescents' feelings of social vigilance or mistrust were tapped by four items concerning parents' and four items concerning friends' warnings to them about others (e.g., "... have warned me that you can't always trust people"), also from the Intergroup Understanding/Bias Questionnaire (Flanagan et al., 1998; Flanagan et al., 1997). The internal consistency of both parent and friend subscales was high:  $\alpha = .83$  for social mistrust from parents and  $\alpha = .85$  for social mistrust from friends; the correlation between the parent and friend subscales was  $r(768) = .52,$

$p < .001$ . These subscales were used as indicators of a single factor of social mistrust in the SEM analyses.

#### Analyses

A structural equation model based on the heuristic model depicted in Figure 1 was estimated in AMOS 4.0. All paths were modeled simultaneously, and four of the seven adolescent outcomes were estimated as latent factors identified by two or more indicators. Related variables or factors were covaried; see Figure 1 for notation of covariances. Middle childhood mental health, hostile attribution bias, and child demographic characteristics were all used to predict exposure to September 11th and exposure to community violence, as well as to predict the adolescent mental health and social attitudes outcomes. The mental health and hostile attribution bias variables from middle childhood included substantial missing data because students had moved, were absent the day of the fourth assessment, or had graduated to another school. In these cases, missing data was adjusted for in the model using the Full Information Maximum Likelihood algorithm in AMOS 4.0.

#### Results

First, a set of descriptive analyses concerning youth exposure to the events of September 11th and to other forms of community violence are reported. In these descriptive analyses, we characterize the levels of and variation in exposure to the events of September 11th, with special reference to how exposure of this sample compares to the highly representative stratified random sample studied by Hoven et al. (2004). Second, we report the bivariate relations among exposure to violence (September 11th, witnessing, victimization) and adolescent mental health and social attitudes. We report these simple relations so that the results of this study can be compared to studies that do not have the rich set of demographic and earlier mental health and social attitudes variables to use as controls as we have in this study. Finally, we report the results of the overall structural equation model and follow-up regression analyses to test the three sets of questions that are the focus of this study.

#### Levels of Exposure

##### Exposure to the September 11th Terrorist Attack

The number of days that had elapsed between September 11th, 2001 and the date of adolescents' interviews ranged from 134 to 722, with a mean of 450 days ( $SD = 156$ ) or 15 months. To check if longer delays between September 11th and study participation affected

recall of the attack on the WTC, we correlated the number of elapsed days with the September 11th exposure variables. Although time since September 11th was not associated with the number of direct exposures adolescents reported or the amount of time they spent viewing media reports about September 11th, time lapse from September 11th was positively related to adolescents' reports of family exposure, perhaps due to learning more about family exposure with time. To account for this potential impact of time lapse on recall, we included time since September 11th as a control in the SEM analyses.

For 6% of the sample, the questions related to September 11th were not asked on the same day as the rest of the interview. This was primarily due to the fact that some of the earliest participants were interviewed before we had New York City Department of Education approval to use the September 11th questions; in a handful of cases, the interview was ended prematurely (e.g., the library at which the interview was being conducted closed) and was thus completed over the phone at a later point. In this 6% of cases, the time between the main interview and the September 11th interview was not significantly related to recall of the attack on the WTC. However, to be certain that this had no effect, we included this variable in the SEM analyses as a control.

**Direct exposure.** Nearly one in every eight (12%) of the adolescents in the study reported seeing with their own eyes either the planes crash into one of the WTC towers or the towers collapse (see Table 1). One in five of the adolescents were close enough to the attack to be in or near the cloud of smoke and dust that was the immediate aftermath of the collapse of the towers. Over one fourth of the sample had to leave where they were for safety reasons, and one third had difficulty getting home on September 11th. Twenty-two percent of the sample reported knowing someone who was killed in the attack. In the days following the attack, one half of the sample smelled the smoke emanating from the towers. In general, the rates of direct exposure reported by the adolescents in this study were quite comparable with the rates reported in the citywide population survey. Seventy-three percent of the sample (564 adolescents) reported one or more of these direct exposures to the attack on the WTC, as did 76% of those in the citywide survey.

**Media exposure.** The majority of adolescents reported watching "a lot" of television coverage about the attack (67%), and an additional 28% reported watching "some" television coverage (see Table 2). Slightly more than one half of the adolescents (54%) reported listening to or reading a lot of radio, newspaper, or magazine coverage, with an additional 38% reporting some time spent in this activity. Web sites were the least used source of information on the attack; with

only 12% reporting using the Web a lot to get information, 25% some, and 63% never. Compared with their peers in the citywide survey, the adolescents in this study were as likely to report TV exposure and somewhat more likely to report Web site, radio, newspaper, or magazine exposure. A majority of adolescents in both studies (RCCP: 80%; citywide: 71%) reported viewing, searching for, reading about, or listening to media coverage of September 11th a lot in at least one category of exposure.

**Family exposure.** Few of the adolescents in this sample had family members directly affected by the September 11th attack. Fifty-five adolescents reported that a family member escaped unhurt from the WTC, 8 reported that a family member had been hurt in the attack, and 9 that a family member had died in the attack. Overall, 68 (9%) of the adolescents reported some form of family exposure to September 11th. As can be seen in Table 3, these rates are less in all cases than those reported by participants in the citywide survey.

### Exposure to Community Violence

**Witnessed events.** The amount of violence witnessed in their own communities by this sample is summarized in Table 4. Most of the adolescents (86%) had seen physical violence (slapping, hitting, punching) or had seen someone being arrested, approximately two thirds had seen drug selling or use or seen people being chased. Twelve percent of the adolescents had seen someone killed. In total, 98% of the adolescents had witnessed at least one form of violence.

**Victimization.** The adolescents in this study also reported high rates of victimization by violence in their communities: 87% of the sample had been a victim of at least one form of violence. Over one half had been slapped, punched, or hit themselves; one third had been asked to sell, buy, or use drugs; and one fifth had been threatened with serious physical harm. Thirteen percent had been beaten up or mugged; and 6% had been sexually assaulted, molested, or raped.

### Bivariate Associations

We first examined the bivariate associations of exposure to September 11th and exposure to community violence with the seven adolescent outcomes of interest (see Table 5; C-DISC-IV scales were used as indicators of the mental health variables). Direct exposure to September 11th was significantly associated with adolescents' levels of depressive and PTSD symptoms as well as with levels of adolescents' social mistrust. Media exposure was significantly associated with increased symptoms of anxiety and PTSD and with increased social mistrust. Family exposure to September

**Table 5.** *Correlations of Exposure to the September 11th Attack and to Community Violence With Adolescent Outcomes*

Adolescent Outcome	September 11th Exposure			Violence Exposure	
	Direct Exposure to September 11th	Media Exposure to September 11th	Family Exposure to September 11th	Exposure to Community Violence as Witness	Exposure to Community Violence as Victim
<b>Mental health</b>					
Depression	.08*	.05	.03	.25***	.32***
Anxiety	.06	.08*	.01	.14***	.17***
Conduct disorder composite	.05	-.04	.02	.41***	.51***
Posttraumatic stress disorder	.08*	.11**	.02	.26***	.27***
<b>Social attitudes</b>					
Hostile attribution bias	-.03	-.02	.01	.15***	.08*
Prejudice against immigrants	-.06	-.03	-.07	.04	.05
Social mistrust	.09*	.07*	.08*	.10**	.03

\* $p = .05$ . \*\* $p = .01$ . \*\*\* $p = .001$ .

11th was significantly associated only with increased social mistrust. In total, one third of the examined associations were significant at the  $p < .05$  level.

The last two columns of Table 5 display bivariate correlations of exposure to community violence with adolescent outcomes. Being a witness to violence and being a victim of violence were both strongly associated with increased levels of each of the four mental health outcomes as well as with increased levels of hostile attribution bias. Witnessing violence was also associated with increased social mistrust; neither type of community violence exposure was associated with increased prejudice toward immigrants.

### SEM Results

The complex model in Figure 1 provided an adequate fit to the data (comparative fit index [CFI] = .93, root mean square error of approximation [RMSEA] = .13), although its fit indexes do not meet recent recommendations for a CFI = .95 and a RMSEA = .06 (Hu & Bentler, 1999). Standardized coefficients for each of the estimated paths are listed in Table 6.

### Predicting Exposure

The first section of the table summarizes how well characteristics about the children, either from middle childhood or from adolescence, predicted their reported levels of exposure to the events of September 11th and to community violence. With regard to September 11th exposure, girls reported more direct and media exposure than did boys. Middle childhood depressive symptoms predicted slightly less media exposure and slightly more family exposure in adolescence (both at the level of a trend); anxiety in middle childhood predicted slightly increased media exposure (at the level of a trend). African American and Hispanic American students were less likely to report direct and family exposure to September 11th than European American students; students of another race or ethnic-

ity were less likely than European Americans to report direct exposure but more likely to report media exposure. Older students reported more direct exposure but less family exposure. Time since September 11th did impact reports of exposure, with increased time associated with lower reports of direct exposure and with increased reports of media and family exposure.

With regard to community violence, the more anxious symptoms adolescents had reported in middle childhood, the less victimization they reported in adolescence. Girls reported less of both witnessing and victimization than boys. African Americans, Hispanic Americans, and those of another race or ethnicity each reported more witnessed violence, whereas African Americans also reported less victimization compared with European American adolescents. First-generation immigrant children reported less of both types of violence; second-generation immigrants reported less victimization. With increasing age, adolescents reported more of both witnessed violence and violence victimization.

Although few consistent patterns emerged in predicting September 11th and violence exposure, this section of the model did confirm that child demographic characteristics and previous mental health do predict both types of exposure to some extent. These findings illustrate the importance of including these paths in the full model to account for differential exposure.

### Predicting Adolescent Mental Health and Social Attitudes

The second half of Table 6 summarizes the extent to which exposure to September 11th and exposure to violence predict adolescent mental health and social attitudes over and above demographic characteristics and previous levels of mental health and attitudes. By regressing adolescent mental health symptoms on symptoms in middle childhood, we in essence are predicting relative change in mental health across the time period.

**Table 6.** Summary of results of simultaneously estimated paths from a structural equation model regressing adolescent mental health and social attitudes on exposure to September 11th, exposure to violence, demographic characteristics, and previous levels of mental health in middle childhood

Paths in Model of Child-Level	Exposure to September 11th			Exposure to Community and Personal Violence			
	Direct Exposure	Media Exposure	Family Exposure	Witnessed Violence	Victim of Violence		
<b>Middle childhood predictor variables</b>							
Received free lunch	-.05	.04	-.00	.05	.05		
Depressive symptoms	-.03	-.10*	.11*	.03	.08		
Anxiety symptoms	.05	.10*	-.06	-.07	-.12**		
Conduct disorder symptoms	-.02	-.01	-.01	-.01	.00		
Hostile attribution bias	-.01	.00	-.00	.02	.01		
<b>Adolescent Predictor Variables</b>							
Gender <sup>a</sup>	.07**	.08**	.03	-.13****	-.27****		
Is African American <sup>b</sup>	-.18****	-.02	-.11***	.15****	-.07*		
Is Hispanic American <sup>b</sup>	-.10***	-.01	-.13****	.06*	.01		
Is of Another Race or Ethnicity <sup>b</sup>	-.20****	.16****	.04	.25****	.02		
Is a first-generation immigrant	-.06	.02	-.03	-.07**	-.07**		
Is a second-generation immigrant	-.01	.00	-.00	.03	-.10***		
Age at current assessment	.10***	.00	-.08**	.11***	.17****		
Time between September 11 <sup>th</sup> 2001 and September 11th-related interview	-.10**	.10**	.14****	.02	.02		
Time between main interview and September 11th-related interview	-.08**	.06*	.01	-.00	.01		
<b>Adolescent Mental Health</b>							
Paths in Model Predicting	Depression Symptoms	Anxiety Symptoms	Conduct Disorder Symptoms	PTSD Symptoms	<b>Adolescent Social Attitudes</b>		
					Hostile Attribution Bias	Prejudice Toward Immigrants	Social Mistrust
<b>Middle childhood predictor variables</b>							
Received free lunch	-.10**	-.02	-.03	.03	-.00	.05	.03
Depressive symptoms	.16****	—	—	.10*	—	—	—
Anxiety symptoms	—	.14***	—	-.04	—	—	—
Conduct disorder symptoms	—	—	.28****	.05	—	—	—
Hostile attribution bias	—	—	—	—	.19****	.10**	-.02
<b>Adolescent predictor variables</b>							
Gender <sup>a</sup>	.31****	.26****	.02	.13****	.03	-.04	.18****
Is African American <sup>b</sup>	-.08**	.05	-.13****	.03	.21****	.05	.16****
Is Hispanic American <sup>b</sup>	-.12***	-.04	-.12****	.06*	.15****	-.09**	.24****
Is of Another Race or Ethnicity <sup>b</sup>	-.09**	.11**	-.23****	.14****	.31****	-.09**	.32****
Is a first-generation immigrant	-.10***	-.01	-.07**	-.04	-.05*	-.03	-.01
Is a second-generation immigrant	.09**	.10**	-.04	-.00	.00	-.14****	-.05
Age at current assessment	.03	-.09**	-.05	.08**	-.18****	-.01	.02
Time between September 11th 2001 and September 11th-related interview	-.08*	-.02	-.01	-.10***	.06**	.14****	-.04
Time between main interview and September 11th-related interview	-.02	.02	.04	-.01	.01	.09**	-.04
Direct exposure to September 11th	.01	.03	.00	.04	.00	-.04	.08**
Media exposure to September 11th	.03	.05	-.04	.11***	-.01	-.02	.06
Family exposure to September 11th	-.06	-.04	-.04	-.00	-.01	-.09**	.08**
Violence exposure—witness	.11**	.00	.21****	.14****	.11****	.00	.12**
Violence exposure—victim	.40****	.31****	.44****	.21****	.03	.02	-.02

Note: N = 768. Exposure to the Resolved Conflict Creativity Program intervention was included as controls but is not reported here. Standardized coefficients are displayed. PTSD = posttraumatic stress disorder. Comparative Fit Index = .93, root mean square error of approximation = .12, ( $\chi^2 = 291$ ) = 3,532.

<sup>a</sup>1 = male, 2 = female. <sup>b</sup>For the race and ethnicity indicator variables, European Americans were the reference group.

\*p = .10. \*\*p = .05. \*\*\*p = .01. \*\*\*\*p = .001.

The first striking pattern of these standardized coefficients is the *lack* of findings regarding the impact of September 11th. None of the types of exposure to the events of September 11th exerted a strong or consistent effect on the adolescent outcomes. The more adolescents reported media exposure, the more PTSD symptoms they reported. Both direct and family exposure were associated with more feelings of social mistrust, and family exposure was associated with less prejudice toward immigrants.

The second striking finding is the strength and consistency with which exposure to violence as either a witness or a victim was significantly associated with adolescent mental health. Both types of violence exposure were associated with more depressive symptoms, more conduct disorder symptoms, and more PTSD symptoms; in addition, victimization was associated with more anxiety symptoms. The size of the coefficients, particularly given the number of controls included in these analyses, are also noteworthy.

Several other patterns emerged. Reported mental health symptoms in middle childhood predicted the same type of symptomatology in adolescence, and hostile attribution bias in middle childhood predicted the same construct in adolescence as well as prejudice toward immigrants in adolescence. Girls were more likely than boys to report depressive, anxious, and PTSD symptoms, and to report more social mistrust. Adolescents in each of the race and ethnic minority groups reported fewer conduct disorder symptoms but more hostile attribution bias and more social mistrust than did European American youths. Hispanic American adolescents and those of another race or ethnicity reported less prejudice toward immigrants than European American adolescents.

### Tests of Moderation

We sought to answer two sets of questions regarding potential moderation of the effects of September 11th and violence exposure on adolescents:

1a. Did previous levels of mental health symptoms sensitize youths to the events of September 11th, such that they evidenced higher mental health symptoms and negative social attitudes in adolescence?

1b. Similarly, did previous mental health symptoms sensitize youths to the experience of violence witnessing or victimization, yielding greater negative outcomes?

2. Did exposure to chronic violence habituate youths to the events of September 11th, resulting in fewer mental health symptoms or negative social attitudes?

Because testing this large number of interactions would have proven unwieldy at best in an SEM frame-

work, we resolved to test for moderation using interactive effects in separate hierarchical regressions for each adolescent outcome.

Main effects included all of the variables used in the SEM analyses. Variables from the middle childhood assessment included whether the adolescent received a free lunch, levels of the RCCP intervention, and the Wave 4 variables that most closely approximate the outcome in each analysis. Depression, anxiety, and conduct problems at Wave 4 were used for the same outcomes in adolescence. Conduct problems at Wave 4 were also used for ODD in adolescence; hostile attribution bias at Wave 4 was used for hostile attribution bias, prejudice against immigrants, and social mistrust in adolescence. Depression, anxiety, conduct problems, and hostile attribution bias at Wave 4 were all used as controls for PTSD. Demographic variables from adolescence were included (namely gender, age at Wave 5, whether the adolescent was Hispanic American, whether the adolescent was African American, whether the adolescent was of another non-White racial group, and the immigrant status of the adolescent and of his or her parents). Also included were the September 11th-related main effects (specifically direct exposure, media exposure, and family exposure), as well as time between September 11th and the date of the September 11th interview, as well as the time between the September 11th interview and the mental health symptoms interview. Finally, the main effects for witnessed violence and for violence victimization were entered.

In the next step, the interaction terms were included. For Question 1 stated earlier, the interaction terms were depressive symptoms, anxiety symptoms, conduct problem symptoms, hostile attribution bias by direct exposure to September 11th, media exposure, and family exposure (as well as by witnessing or victimization). For Question 2 stated earlier, the interaction terms were witnessing or victimization by direct exposure to September 11th, media exposure, and family exposure (as well as by witnessing or victimization).

### Test of the sensitization moderation hypothesis.

Moderation in these analyses would be established through a significant change in  $R^2$  with the introduction of the interaction terms in the last step. Although the interaction step was not significant for five of the seven adolescent outcomes (depressive symptoms, anxiety symptoms, PTSD symptoms, hostile attribution bias, and social mistrust), it was significant for the outcomes of adolescent conduct problem symptoms,  $F(5, 744) = 3.757, p < .01$ , and for prejudice against immigrants,  $F(5, 744) = 3.08, p < .001$ . In the case of conduct disorder, the effect was entirely driven by a significant interaction between previous levels of conduct problems and victimization by violence ( $\beta = .14, p < .0001$ ). In other words, children with conduct disorder

der symptoms in middle childhood reacted to violence victimization with even greater levels of conduct disorder in adolescence. In the case of prejudice against immigrants, the only significant interaction was between hostile attribution bias in middle childhood and victimization in adolescence ( $\beta = .13, p < .01$ ). Therefore, children disposed to make hostile attributions in middle childhood tended to react to the experience of being a victim of violence with an increase in prejudice toward immigrants. None of the interactions between middle childhood mental health and attitudes and exposure to September 11th were significant.

**Test of the habituation moderation hypothesis.** No moderation of exposure to September 11th by experience of victimization or witnessing was found for the outcomes of adolescent depressive symptoms, anxiety symptoms, conduct disorder symptoms, hostile attribution bias, or social mistrust.

However, moderation was indicated for the outcomes of adolescent PTSD symptoms,  $F(6, 741) = 2.11, p < .05$ ; and, to a lesser extent, of prejudice toward immigrants,  $F(6, 743) = 1.79, p < .10$ . Regarding PTSD, adolescents who had been victims of community violence reacted to family exposure to September 11th with more PTSD symptoms ( $\beta = .11, p < .05$ ) but to media exposure with fewer PTSD symptoms ( $\beta = -.08, p < .05$ ). Adolescents who had witnessed violence were slightly more likely to react to media exposure to September 11th with increased PTSD symptoms ( $\beta = .07, p < .10$ ). In predicting prejudice toward immigrants, having witnessed community violence disposed adolescents to react to family exposure to September 11th with increased prejudice toward immigrants ( $\beta = .09, p < .07$ ).

## Discussion

In this study, we examined the effects of exposure to the events of September 11th as well as exposure to other forms of community violence on the mental health and social attitudes of youths in New York City. Because the mental health and social development of the youths had been assessed 7 years earlier and because we were scheduled to begin the follow up in the late fall of 2001, this study was able to estimate the effects of exposure to violence on change in mental health and social development from middle childhood to adolescence.

### Types of Exposure

As the data in Tables 1 through 3 clearly reveal, this sample of youths experienced the events of September 11th in nearly identical ways to a highly representative random sample of youths independently drawn for the

major epidemiologic study of child and adolescent exposure to the events of September 11th in New York City (Hoven et al., 2004). The most common forms of direct exposure (smelled smoke from the buildings: 51%; had to leave the location for safety reasons: 28%) were less serious than the least common forms of direct exposure (physically hurt in the attack: < 1%; had to move out of home because of the attack: < 1%). Watching TV a lot to learn about the attack was very common (67%) but having a family member physically hurt (1%) or killed (1%) in the attack was, thankfully, a rare event.

In addition to being exposed to the events of September 11th, this sample of urban youths reported very high rates of witnessing and being victimized by some violent events (seen someone slapped, hit, or punched: 86%; seen someone chased by a gang or individual: 63%; been slapped, hit, or punched: 53%). They reported relatively lower (but still alarmingly high) rates of some of the most extreme forms of both witnessed violence (seen someone attacked or stabbed with a knife: 18%; seen someone shot at with a gun: 13%; seen someone killed: 12%; seen someone sexually assaulted, molested, or raped: 3%) and violence victimization (been attacked or stabbed with a knife: 4%; been shot at with a gun: 2%; been sexually assaulted, molested, or raped: 6%). Despite growth in the economy and improvements in many New York neighborhoods over the last decade, these rates are quite similar to those reported 1 decade earlier by low-income, minority youths in New York City (Allen, Jones, Seidman, & Aber, 1998) and in other more recent studies of urban youths (Schwab-Stone et al., 1999).

Most important for the purposes of this study, New York City youths varied considerably in their exposure to the events of September 11th and to other forms of community violence. It was the impact of variation in exposure on youth mental health and social development that we wished to focus on. However, first it was necessary to examine whether any of the demographic and developmental characteristics of children during their elementary school years forecasted differential exposure to the events of September 11th or to witnessing of and victimization by other forms of community violence in adolescence.

### Selection Into Exposure

Children's mental health (depression, anxiety, conduct disorder) symptoms, tendency to attribute hostile intent to others in an ambiguous situation, and free-lunch status during elementary school did not forecast adolescents' exposure to the events of September 11th or their exposure to witnessing or victimization in high school. Only 1 out of 25 associations tested (see top panel of Table 6) was significant, and the size of the association was very small,  $r(768) = -.12$ , be-

tween anxiety in middle childhood and being victim of violence in adolescence.

In contrast, there were numerous and meaningful associations between demographic characteristics of youths and their exposure to September 11th, witnessing, and victimization (see second panel of Table 6). Compared with White youths, African American, Hispanic American, and youths of other ethnicities were less exposed to the events of September 11th but more exposed to witnessing violence. Girls reported more direct exposure to September 11th yet less exposure to both witnessing and victimization; in contrast, older youths were more likely to report increased direct exposure to September 11th, witnessing, and victimization but less likely to report family exposure to September 11th. These findings of differences in exposure by race and ethnicity, gender, and age are very consistent with prior studies of exposure to September 11th (Hoven et al., 2004) and to community violence (Allen et al., 1998). Unique to this study, we were able to estimate the effects of immigrant status on youth exposure to violence. Although we found no effect of immigrant status on exposure to the events of September 11th, we did find protective effects of first-generation immigration status on witnessing violence and of second-generation immigration status on both witnessing and victimization. Future studies should explore what accounts for the protective effect of immigration status, whether it be family management techniques, peer cultures, neighborhood contexts, or other factors.

We are uncertain what to conclude about the effects of time between September 11th and the interview on adolescent reports of direct, family, and media exposure to the terrorist attacks. Specifically, in the SEM analyses, we found that the time lag between September 11th and the interview was associated with decreased reports of direct exposure, and increased reports of media and family exposure. With regard to direct exposure, as they heard more and more accounts of traumatic exposure to the attacks in the media, adolescents may have put their exposure into context and downplayed their own direct exposure. Increased media exposure is likely a result of having more opportunities to see, read, and learn about the attacks over time. Reports of family exposure may have increased with time as adolescents were provided with more opportunities to hear family members recount their experiences of the attack, thus increasing the number of family members they considered directly affected by the event. Although this study cannot confirm any of these speculations, it does imply that selection into exposure should be incorporated into all future studies of the impacts of traumatic events at the very least as controls in analyses examining the impact of exposure.

Taken together, these descriptive findings suggest that adolescents' social address but not their mental health status in childhood affect the types of exposure

they experience. It is clear that to develop unbiased estimates of the impact of exposure to violence on change in mental health and social attitudinal development in youths, this systematic variation in youth exposure to violence by their social address must be accounted for, both in our study and in future studies of exposure to violence.

### **The Differential Effects of Exposure to September 11th and Other Forms of Violence on Youths**

The primary objective of this study was to estimate the effects of exposure both to the events of September 11th and to other forms of violence on change in the mental health and social development of New York City youths over the transition from middle childhood to adolescence. The transition from childhood to adolescence is fraught with numerous challenges for all children, but for those exposed to violence, it may be especially problematic. Previous studies of the effects of exposure to September 11th or to other events associated with war and terrorism on child and adolescent mental health have rarely been able to include both pre-event and post-event measures of children's mental health and social attitudinal development. Consequently, they could not examine the effects of exposure to the types of violence on *change* in mental health and social development.

Perhaps most important, few studies of the impact of September 11th have been able to include a detailed assessment of exposure to other forms of violence that could also influence mental health and social development. Without such measures of exposure to other forms of violence, it is difficult to put the effects of September 11th in the proper context. This study represents the most rigorous test to date of the effects of September 11th on youth mental health and social development.

Similar to studies by Hoven et al. (2004) and Ford et al. (2003), this study found simple associations between exposure to the events of September 11th and adolescent mental health outcomes. As reported in the top panel of Table 5, direct exposure to September 11th was associated with more symptoms of depression and PTSD; media exposure was associated with more anxiety and more PTSD symptoms but with fewer conduct disorder symptoms. Surprisingly, family exposure was unrelated to adolescent mental health outcomes. The more adolescents reported any of the three types of exposure to September 11th, the more they reported social mistrust. There were no associations between exposure to September 11th and the extent to which adolescents make hostile attribution biases or expressed prejudice toward immigrants.

In contrast to exposure to the events of September 11th, exposure to both witnessing violence and being

victimized by community violence were moderately or strongly associated with all four mental health outcomes as well as with hostile attribution bias and with social mistrust to a lesser degree.

However, these simple associations can be misleading. As the results of the structural equation model in Table 6 demonstrate, once prior levels of mental health symptoms and hostile bias as well as exposure to other forms of violence (witnessing and victimization) are accounted for, only one association between exposure to September 11th and adolescent mental health remains, namely that between media exposure and PTSD symptoms. With regard to social attitudes, both direct exposure and family exposure continue to predict higher levels of social mistrust. It is interesting to note that higher levels of family exposure to September 11th predict lower levels of prejudice toward immigrants, perhaps because fully two thirds of the youths have at least one immigrant parent.

The results of the structural model indicate that witnessing violence and especially victimization by violence predict adolescent mental health outcomes even after controlling for mental health symptoms in middle childhood and all of the demographic factors that both predict greater exposure to the violence and place youths at risk for negative mental health outcomes. Witnessing violence predicts depressive, conduct problem, and PTSD symptoms as well as hostile attribution bias and social mistrust. Victimization predicts all four types of mental health symptoms (including anxiety) but none of the social attitude factors.

Stated another way, the pattern of findings from Table 6 suggests that exposure to the events of September 11th affects social attitudes of youths, in particular their social mistrust, but not their mental health. Victimization affects the mental health of youths, but not their social attitudes. Witnessing violence affects both the mental health (although not as strongly as victimization) and social attitudes of New York City youths. From this, we tentatively conclude that some forms of exposure have specific effects (September 11th on social attitudes; victimization on mental health), whereas others have nonspecific effects (witnessing on both mental health and social attitudes). Most important, we conclude that for the mental health of New York City youths, chronic and enduring forms of violence are much more important than episodic and fleeting forms; even community catastrophic ones, such as the terrorist attack of September 11th.

### Models of Influence

A final set of questions addressed by this study concerned the broader issues of models of influence. Based on prior theorizing, we examined whether mental health problems in middle childhood sensitized children to the negative effects of various forms of vio-

lence in adolescence. Similarly, we wished to test whether exposure to community violence might dampen the effects of exposure to the events of September 11th on adolescent mental health and social attitudes via processes like habituation. In a series of regression analyses as follow up to the structural equation model, we created interaction terms of middle childhood mental health problems by violence exposure as well as interaction terms of exposure to September 11th by exposure to other forms of violence and used these interaction terms to predict adolescent mental health and social attitudes.

Only 4 of the 14 regressions described earlier indicated significant moderation. Some support was found for the sensitization hypothesis, such that children who in elementary school had more mental health symptoms were indeed sensitized to the experience of victimization in adolescence, reacting with more conduct problems and prejudice toward immigrants in adolescence. We did not find much support for the habituation hypothesis but rather found more evidence of sensitization: Victims of violence had higher PTSD symptoms in response to family exposure to September 11th, whereas witnesses to violence reacted to media exposure with greater PTSD symptoms and to family exposure with greater prejudice toward immigrants.

Based on these follow-up analyses, we conclude that middle childhood mental health problems sensitize adolescents to victimization by violence and that exposure to violence interacts with specific forms of exposure to September 11th in predicting levels of PTSD. Future studies should examine why children with mental health problems respond to victimization with more conduct disorder and prejudice. Also in need of more research is the possibility of domain specificity of effects, such that witnessing violence and witnessing September 11th through the media had interactive effects, as did being a victim of violence and having a family member who was a victim of September 11th. More research is needed to explain why exposure to community violence (either witnessing or victimization) sensitizes children and youths to September 11th for some outcomes (e.g., PTSD) and not others (e.g., depression).

### Limitations and Strengths

This study does have some limitations. One is the long lapse between the middle childhood and adolescent assessments. Although we have examined the effects of exposure to September 11th and to witnessed violence and victimization on change in mental health from middle childhood to adolescence, the period of 6 to 7 years between assessments leaves open the question of whether other unexamined "third variables" might predict mental health in adolescence better than the examined variables. We have reduced but not elimi-

nated this possibility by including a range of demographic factors as predictors of exposure to September 11th and exposure to community violence as well as to the adolescent outcomes.

This study also did not include a middle childhood assessment of a key dependent measure, namely that of PTSD, and thus cannot draw conclusions about the effects of September 11th exposure or violence exposure on change in PTSD symptoms *per se*. Although we did include middle childhood depression, anxiety, and conduct problems symptoms as predictors of PTSD in adolescence, earlier depressive symptoms only slightly predicted PTSD symptoms in adolescence. This suggests that PTSD symptoms are indeed a unique set of symptoms that need to be assessed independently of other internalizing mental health problems.

With regard to the social attitudes examined here, the measures of prejudice toward immigrants and social mistrust used in this study more accurately reflect the attitudes of adolescents' parents and peers rather than their own attitudes specifically. These measures were chosen to minimize the potential effects of social desirability on adolescents' responses. Although parents' attitudes and values are key sources of, and strongly correlated with, adolescents' own attitudes and values (Flanagan & Tucker, 1999), better measures would have been ones that tapped adolescents' own attitudes directly.

Given the dependence of this study on adolescent self-reports primarily entered into a computer, it is unfortunate that we did not include a screening measure of reading ability in our study. We are in the process of obtaining the adolescents' most recent standardized reading scores from the New York City Department of Education. In future analyses, it will be possible for us to use such scores as markers of and perhaps controls for the reliability of the adolescent's self-reports.

Despite these limitations, this study has several unique aspects. It is the only study of the effects of September 11th on a longitudinal sample of New York City children or adolescents that was sanctioned by the New York City Department of Education and which used the identical measure to that used by the Department of Education in its large and representative, yet cross-sectional, epidemiologic assessment of the effects of September 11th on New York City public school children. By comparing rates of exposure among our sample with exposure among the weighted population data from the Department of Education, we confirmed that rates of exposure were largely the same and thus established the generalizability of our findings for all New York City youths.

This study is one of very few longitudinal studies that were able to include pre-September 11th data in analyses to determine the impact of September 11th on change in mental health and social attitudes. Further, this appears to be the only study that compared the im-

pact of exposure to the one-time violent event of September 11th with the impact of exposure to chronic violence as witnesses or victims.

### **Implications for Applied Developmental Science and Public Mental Health Strategies**

This study yielded several insights for the field of applied developmental science, particularly with regard to understanding the impacts of a single traumatic event on child and youth development. The findings of this study confirm the utility of enlisting ongoing longitudinal studies of child and youth development to assess the impact of a single traumatic event. We found both that adolescents' previous levels of mental health and social-cognitive functioning determined their reactions to the events of September 11th, and that their previous functioning played a role in the extent of their exposure to the attacks. This study also emphasizes the importance of viewing the developmental impact of such acute traumatic events within the broader context of daily lives of youths. Appreciating both developmental and contextual contributions to children and youths adaptation to traumatic events is crucial for identifying appropriate interventions and treatments for affected children and youths.

We also see implications of this study for public mental health practice and policy. Primarily, they indicate that mental health services need to be made available to children throughout urban areas, such as New York City, who have been exposed to varying levels and types of community violence. Although the events of September 11th were undoubtedly impactful for many of the students in our sample, the violence they are repeatedly exposed to in their daily lives has had a much greater impact on their levels of symptomatology and functioning. The efforts and services directed at students in the wake of September 11th were laudatory and needed, but greater efforts are clearly necessary on an ongoing basis to assist students in dealing with "everyday" violence.

The findings also suggest that a complete understanding of the impact of a traumatic event such as the attack on the WTC on youths requires an appreciation of the overall context in which they live and develop. Although we did not find support for a role of previous violence exposure in sensitizing youths to the events of September 11th, we were able to put exposure to September 11th in the context of chronic levels of violence in the lives of these youths. Treatment or interventions, drawn either from applied developmental science or public health, aimed at helping youths deal with catastrophic episodes may be ineffective if they ignore other types of trauma experienced on an ongoing basis.

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