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African-American adolescents' stress responses after the 9/11/01 terrorist attacks

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Abstract

Purpose—To examine the impact of indirect exposure to the 9/11/01 attacks upon physical and emotional stress-related responses in a community sample of African-American (AA) adolescents.

Methods—Three months after the 9/11/01 terrorist attacks, 406 AA adolescents (mean age [SD] of 16.1 ± 1.3 years) from an inner-city high school in Augusta, GA were evaluated with a 12-item 5-point Likert scale measuring loss of psychosocial resources (PRS) such as control, hope, optimism, and perceived support, a 17-item 5-point Likert scale measuring post-traumatic stress symptomatology (PCL), and measures of state and trait anger, anger expression, and hostility. Given the observational nature of the study, statistical differences and correlations were evaluated for effect size before statistical testing (5% minimum variance explained). Bootstrapping was used for testing mean differences and differences between correlations.

Results—PCL scores indicated that approximately 10% of the sample was experiencing probable clinically significant levels of post-traumatic distress (PCL score > 50). The PCL and PRS were moderately correlated with a $r = .59$. Gender differences for the PCL and PRS were small, accounting for 1% of the total variance. Higher PCL scores were associated with higher state anger ($r = .47$), as well as measures of anger-out ($r = .32$) and trait anger ($r = .34$). Higher PRS scores were associated only with higher state anger ($r = .27$). Scores on the two 9/11/01-related scales were not statistically associated (i.e., less than 5% of the variance explained) with traits of anger control, anger-in, or hostility.

Conclusions—The majority of students were not overly stressed by indirect exposure to the events of 9/11/01, perhaps owing to the temporal, social, and/or geographical distance from the event. Those who reported greater negative impact appeared to also be experiencing higher levels of current anger and exhibited a characterologic style of higher overt anger expression.

Keywords

Adolescents; Post-traumatic stress; September 11, 2001 attacks; African-American; Anger; Hostility

The September 11, 2001 terrorist attacks inflicted profound, unprecedented psychological and physiological effects on many U.S. adults [1–3]. Immediate stress-related outcomes of direct exposure to such disasters including horror, panic, anxiety and life threat are predictive of long-term adverse consequences on future mental and physical health

problems, including post-traumatic stress disorder (PTSD) [4–6]. Greater distress was associated with female gender, nonwhite ethnicity, and presence of previous psychological problems in adults 3–5 days after the attacks [2]. Lifestyle habits in adults who were directly exposed were substantially altered 3 weeks to 4 months after the 9/11/01 attacks, including increased smoking and alcohol consumption [7] and drug usage [8], and decreased sleeping, socializing, and physical activity [9]. The traumatic impact created by the 9/11/01 attacks was not limited to those directly exposed [1]. Adults living in remote U.S. locales also experienced sub-clinical symptoms of physical and psychological distress [10].

Research on similar large-scale disasters has shown that such effects extend to youth [11]. Little information is available about the range and severity of post-traumatic distress in youth resulting from indirect exposure to the 9/11/01 attacks [11]. Children may exhibit a wide range of emotional, physical and psychological reactions after direct exposure to such disasters, including depression, anxiety, anger, relationship problems, and hostility in association with PTSD symptoms [12–16]. With regard to the mental health consequences of such disasters, school-aged youth are likely to show greater impairment than adult rescue workers [17]. Recent findings from a national survey of parental perceptions of the impact of 9/11/01 on their children suggest that youth need not have been present at the event to exhibit symptoms of stress, including anxiety about safety, impaired concentration, nightmares, irritability, and sleep difficulties [2]. Findings regarding the emotional and cognitive impact of indirect exposure to the events of 9/11/01 by the continuous repetition of dramatic news footage on television have been mixed [2,18,19]. For example, in a nationally representative sample conducted 3–5 days after the attacks, 35% of parents indirectly exposed reported their children having at least one of five stress symptoms [2]. However, the PTSD prevalence rate for adult Manhattan residents not directly affected by the attacks was not associated with frequency of television viewing of the attacks 5–9 weeks later [18].

PTSD rates vary according to numerous factors, including the severity of trauma experienced, and range from less than 5% in African-American (AA) 11–17-year-olds [20] 1 year after Hurricane Hugo in South Carolina, up to 90% in 13-year-olds 6 months after exposure to Hurricane Mitch [21]. PTSD rates in New York City adults not directly affected by the 9/11/01 attacks have been reported as dropping from 5% after 1 month to less than 2% at 4 months after the attacks [22]. In the United States, community samples of older (>16 years) adolescents have revealed PTSD prevalence rates ranging from 1% to 3% in Columbia, South Carolina [23] to 6.3% in Boston, Massachusetts [24]. Female gender has been associated with PTSD in adolescents in some studies [11] but not in others [24].

African-Americans are at increased risk for numerous stress-related health problems compared with European-Americans [25–28]. Increased risk of health problems in AAs have been associated with outwardly expressed anger during periods of high levels of life strain, such as unemployment [29]. Individuals' enduring stress-related coping styles may serve as moderators of PTSD symptoms. Resources such as coping skills have been shown to buffer the effects of stress on social and health outcomes in inner-city children who have experienced major life events [30]. Ethnic group minority membership and low socioeconomic status has been associated with increased risk of adverse health outcomes from direct exposure to major disasters [17]. Stress symptoms and distressing thoughts and feelings were reported among AA college students within 3 days of the 9/11/01 attacks [31]. Overall PTSD rates related to terrorism in previous studies in children cannot be inferred because they have used convenience rather than community samples [11]. To our knowledge, the impact of the 9/11/01 attacks on AA adolescents has not been examined.

It has been recommended that research evaluating exposure to the events of 9/11/01 should specify the types and severity of distress in youth [3]. The purpose of this study was to

assess the impact of the 9/11/01 attacks on the physical and psychological stress responses of a community sample of inner-city AA adolescents, individuals who may already experience high levels of stress. This study examines a conceptual model which suggests that the effects of catastrophic events have the potential for increasing physical and psychological stress-related responses in individuals indirectly exposed to such events. Furthermore, it is expected that levels of physical and psychological stress would differ between males and females and would be affected by coping styles.

Methods

Sample and procedure

Data collection occurred in December 2001 during a voluntary health screening conducted on 406 (224 females) African-American (AA) youth at an inner-city high school in Augusta, GA, as part of a health screening to identify youth eligible for participation in a study of the impact of stress reduction on high normal blood pressure. All parents were informed about the screening via a memo sent home from the principal's office and were given the opportunity to refuse consent for their child's participation. No parents refused permission. Subjects were primarily from low socioeconomic status neighborhoods (79% of the students in the participating high school were eligible to receive free/reduced-price lunches) and 95% were AA based on self-report. During the school screening students enrolled in the participating school were approached in classroom settings. The screening included grades 9–12 enrolled in the vocational labs programs and excluded students in special, alternative, and remedial education programs. Subjects were free to decline and only two refused to participate. Subjects were told that the purpose of this particular study was to examine the potential physiological and psychological impact of the 9/11/01 attacks. Permission to conduct this study was granted by the Superintendent of Richmond County Public Schools and the Medical College of Georgia Human Assurance Committee. The subjects had a mean age (SD) of 16.1 ± 1.3 years.

Psychological assessments

Three months after the 9/11/01 attacks, subjects completed self-administered questionnaires supervised by trained research assistants from the Georgia Prevention Institute. Two self-report instruments evaluating the perceived psychological and physiological impact of the 9/11/01 attacks were recommended for use in research studies by the Office of Behavioral and Social Science Research. These included the 12-item 5-point Likert scale Psychosocial Resources Scale (PRS) and a 17-item 5-point Likert scale measure of PTSD symptoms, the PTSD Checklist-Civilian Version (PCL-C) [32] commonly used in 9/11/2001 studies. The PRS measured loss of psychosocial resources, such as control, hope, perceived support, social embeddedness, coping self-sufficiency, and optimism [33]. The PRS correlated with a global measure of total stress ($r = .54$) and exhibited an alpha coefficient of internal consistency of .78 [34]. The PCL was used to measure mental health outcomes, such as persistent cognitive re-experiencing of the attacks, avoidance of stimuli associated with the attacks, and symptoms of increased arousal including sleep disturbance, hyper-vigilance, estrangement, and foreshortened future [35]. This instrument was used in several recent studies that examined the impact of the 9/11/01 events [2,7], including use with AA college students [31]. The PCL has demonstrated high levels of diagnostic accuracy, excellent test-retest reliability ($r = .96$), high internal consistency (coefficient alpha = .97) and strong correlations (range of .46 to .93) with other measures of PTSD [35–38]. The PCL has been previously used with adolescents [23,39,40]. The PCL and PRS instruments are available on the Internet at: <http://obssr.od.nih.gov/activities/911/attack.htm>.

Subjects also completed the 24-item Spielberger Anger Expression Scale [41], the 20-item Spielberger Anger State-Trait Inventory [42], and the 50-item adolescent Cook-Medley hostility scale [43,44]. This version of the Cook-Medley hostility scale measuring total hostility [45] and the Anger Expression and Anger State Trait scales measuring anger control, anger-in, anger-out, state and trait anger have been previously validated for use with adolescents (15–17 years) [46,47]. The reading levels of the various questionnaires were determined to be below the grade levels of the subjects. No interventions related to the 9/11 attacks were provided by the school to the students before or after the study.

Data analysis

The present study was designed to investigate the impact of indirect exposure to the 9/11/01 attacks upon physical and psychological stress responses in a community sample of AA adolescents at 3 months after the 9/11/01 attacks. Collectively, Caucasian, Hispanic, and Asian students made up less than 5% of the sample and thus were excluded from the data analysis. Total scores for both the PRS and PCL inventories were computed by summing the 5-point Likert-type item responses. Scores from both inventories were then compared for gender differences and correlated (by gender) with measures of coping styles of hostility and anger. These included the Cook-Medley Hostility Scale (total score) [43], and Spielberger's Anger Expression Scale (anger-in, anger-out, anger control) [41] and State-Trait Anger Scale (i.e., state anger and trait anger) [42]. Differences in the mean scores between genders and differences in the correlations between the PRS and PCL inventories with the six hostility/anger inventories (in terms of variance explained) were evaluated with standard least squares analysis of variance. Mean differences were assessed by evaluating simple gender main effects. Gender differences between the correlations of the six hostility/anger inventories with the PRS and PCL inventories were assessed by evaluating the interaction sources of variation between gender and each of the six hostility/anger inventories in a model using PRS and PCL as the dependent variables. This interaction source of variation models differential prediction owing to gender (i.e., correlational differences by gender) between the two 9/11/01 stress inventories and the measures related to hostility and anger.

Given the observational nature of the study, statistical differences for all sources of variation were first evaluated for effect size before statistical testing. At a minimum, effects needed to account for at least 5% of the total variance in the dependent variable (midway between Cohen's definition of a small and a medium effect size) [48]. This approach helps control the problem of spurious chance effects while reflecting both clinical and statistical significance. For sample sizes greater than 300, traditional p values will be less than .05 when 5% of the variance is explained. When gender differences between means or correlations were detected (using the minimum effect size criteria of 5%), computer-intensive methods (i.e., bootstrapping) were used to generate 95% bootstrap intervals (1000 re-samplings) around the observed correlations [49]. This approach to statistical analysis is better suited for observational data of this type because it is purely data dependent, nor is it constrained by the probabilistic notions and restrictive assumptions of classical Neyman-Pearson hypothesis testing (which are never met in observational studies) [50].

Bootstrapping is a computer-intensive re-sampling technique in which the consistency of a statistic is determined by examining the distribution of that statistic generated through repetitive re-samplings (with replacement) of the observed data set. For this study, a single sample of size 406 was drawn from the original 406 observations with replacement. Correlations were then calculated for this bootstrap sample. Subsequent bootstrap samples of size 406 were drawn and the correlation calculated. This process was continued until 1000 bootstrap samples and correlations were obtained. The distribution of the correlation coefficients over the 1000 bootstrap samples was used to construct 95% confidence interval around the observed correlations.

A separate secondary descriptive analysis was conducted of the percentage response to individual scale items after the items were dichotomously re-scored (1, 2, 3, vs. 4, 5). Percentage of responses of 4 or higher was considered to be symptomatic of substantial stress [38]. Similarly, a conservative cut-point score of over 50 on the total PCL inventory was used to determine the frequency of possible PTSD cases. This is considered the optimally efficient PTSD cutoff score used with this instrument [31,32].

Results

PRS and PCL scores

Average total scores (SD) on the PRS and PCL scales for males were 28.1 (7.0) and 28.5 (11.7), respectively. For females, the PRS average was 29.7 (7.0) and the PCL average was 30.9 (12.5). Although females scored higher on both scales, gender differences accounted for less than 1% of the total variance for both PRS and PCL. Re-scaled to average differences, this amounts to a two-tenths of an item scale point difference on the PRS (2.5, females vs. 2.3, males) and a one-tenth of an item scale point difference on the PCL (1.8, females vs. 1.7, males). The PRS and PCL were correlated .59 with a 95% bootstrap interval between .52 and .66. For the PCL, 10% of the respondents were identified as reporting probable clinically significant levels of PTSD-related distress (i.e., PCL score > 50). Within this subgroup, the ratio of females to males was equal to that in the complete sample (55% females).

Individual item response frequencies

Individual item response frequencies for the dichotomously re-scored PRS and PCL scales are given in Table 1. The PRS scale item that elicited the largest response concerned feeling closer to at least one person because of things said or done after the disaster (53.7%). Other PRS scale items that elicited large responses (22% to 28%) concerned items representing loss of agency (resources of control, hope and optimism), such as pessimism about future well-being and world peace, and loss of faith in government protection. The PCL scale item that drew the largest response concerned hyper-vigilance, being “superalert” or “on guard” (19.3%). Other PCL scale items that elicited large responses (12% to 14%) concerned problems and complaints such as psychological distress (feeling very upset when reminded by something about the attacks), distress in recollections (repeated disturbing memories, thoughts or images of the attacks), avoidance of thoughts, feelings or talking about the attacks, foreshortened future (feeling as if the future will be cut short) and sleep difficulties.

PRS and PCL relationships to anger/hostility measures

In the statistical models used to correlate the six anger/hostility measures with PRS and PCL, all of the gender main effects (also see above) and the gender by anger/hostility interactions accounted for less than 5% of the total variation in the PRS or PCL scales. Of the 12 correlations examined, 4 explained at least 5% of the gender variation in PRS or PCL. State anger correlated with PRS at .27 with a 95% bootstrap interval between .16 and .37. PCL correlated with both state (.47, .38 to .57) and trait anger (.34, .23 to .45) as well as anger out (.32, .19 to .41). All correlations of PCL and PRS with anger and hostility scales are given in Table 2.

Discussion

Approximately 10% of a sample of African-American high school students living in the southeastern United States who were indirectly exposed to the 9/11/01 attacks and evaluated 3 months after the attacks reported probable clinically significant symptoms of PTSD related to the attacks. The overall low to average response rate for the higher level response

categories suggests that the majority of the students were not overly stressed by the events of 9/11/01. This pattern of findings is similar to those observed in adults indirectly exposed to the 9/11/01 attacks. That is, in adults living outside New York City, PTSD prevalence rates ranged from 17% at 2 months to 5.8% at 6 months post-9/11/01 [1]. A probable PTSD prevalence of 6.8% 6 months after the attacks was reported among New York City residents aged 18–24 years [22]. The current findings are 3–10 times the 1998 prevalence of DSM-IV criteria for PTSD in 16–22-year-old females (2.9%) and males (.8%) living in nearby Columbia, SC reporting any traumatic event [23]. Our findings compare with a 9% PTSD prevalence in a sample of 14-year-old Danish youth associated with direct victimization [46], but are higher than the 1.5% to 4.7% PTSD rates in African-American 11–17-year-olds after direct exposure to the 1990 Hurricane Hugo in South Carolina [20].

The most common specific symptoms reported by adults in a Manhattan sample evaluated 1–2 months post-9/11 were intrusive memories (27%) and sleep disturbance (24%) [51]. Based upon parental report in a national survey 3 months after the 9/11 attacks, 20% of children were perceived as having sleep disturbances and 30% were irritable related to the attacks [3]. A nationwide telephone survey of parents of 5- to 18-year-olds taken 3 to 5 days after the attacks yielded results similar to the present findings, with nearly identical percentages of youth reporting nightmares (5%), irritability (11%), sleep disturbance (12%), and impaired concentration (10%) [2]. Differences in incidence of symptoms in the present sample compared with other samples may be due in part to differences in timing and methods used, (e.g., parental vs. self report, telephone or Web-based surveys vs. in-person questionnaire assessment.)

The effect of dysfunctional stress-related coping responses, such as elevated anger and hostility levels, may exacerbate emotional and physical reactions to indirect exposure to traumatic events. Anger expression is a trait characterized by the extent of engagement in aggressive behaviors when motivated by angry feelings [41]. Although the majority of African-American youth in this sample did not exhibit symptoms of personal physical and/or emotional distress related to the 9/11/01 attacks, those who reported greater negative impact were also experiencing higher levels of current anger and exhibited a characterologic style of higher anger expression. The lack of any gender by anger/hostility interactions indicates that the relationship between PRS or PCL and the six anger measures is constant across genders.

Previously reported Cook-Medley scores in African-Americans aged 18–24 years were 26.2 for males and 23.1 for females [52]. Although the Cook-Medley scores for females in the current study were slightly higher compared with previous findings, Cook-Medley scores were not correlated with PRS or PCL scores in response to the 9/11/01 attack. Although female gender has been previously shown to be a risk factor for PTSD [17,53,54], this finding has not been consistently replicated and is only partially supported by the present study [55]. Differences in rates of stressful feelings and emotions among females compared with males were small and may mostly reflect an overall tendency of males to under-report stress-related conditions.

Limitations

First, the potential roles of pre-9/11/01 stress-related factors and post-9/11/01-related experiences, such as degree of viewing of media coverage of the attacks, discussion of the events at home, school, etc., personal connections to the 9/11 events, and other sources of PTSD that may have affected, were not assessed. Anxiety owing to continued traumatic national events that occurred after the 9/11/01 attacks, such as the anthrax mail threat, anticipated mobilization of United States military personnel, and threat of further terrorist attacks that occurred before the administration of the survey may have contributed further to

the intensity of the responses. Therefore, the findings may represent the impact of additional terrorist-related events or perceived threat of such. Second, generalization of the findings may be limited by the ethnically and demographically homogenous nature of the subjects, (i.e., inner-city African-American adolescents of low socioeconomic status in the Deep South). Third, the study did not introduce interventions and did not assess other sources of support that may have moderated the results. Fourth, personal and family demographics were not collected and subjects were not asked about any direct personal ties to the terrorist attacks related to family or friends involved and these were assumed to be minimal owing to the distance from the attacks.

Conclusions

It is hoped that the present findings will increase the awareness of educators, pediatric caregivers, school psychologists, and counselors regarding the potential physical, emotional and psychological impact of such large-scale traumatic events. Such disasters may significantly affect a small proportion of those who are indirectly exposed. Further, those with characterologic coping styles of high overt anger expression may be particularly vulnerable. Further studies are needed to examine the efficacy of interventions to treat PTSD resulting from major national disasters, and thereby contribute to the prevention of future mental and physical health problems [9].

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Table 1

Assessment of response to 9/11/01 attacks: frequencies of specific thoughts and feelings experienced after the attacks

PRS Item description	% ^a	PCL Item description	% ^b
Feeling closer to others	53.7	Hypervigilance	19.3
Pessimism about future well-being	28.4	Psychologic distress	14.2
Loss of faith in government protection	26.3	Distress in recollections	13.7
Pessimism about world peace	22.0	Avoidance of thoughts of event	13.7
Disappointment in actions of others	20.6	Foreshortened future	13.1
Loss of safety	19.7	Sleep difficulties	12.1
Loss of support from someone	19.4	Feelings of recurrence	11.8
Remorse over not providing support	17.1	Detachment	11.6
Liking others less	14.5	Irritability/anger	11.2
Loss of control	13.1	Impaired concentration	9.9
Disappointment in actions of self	11.5	Restricted range of affect	9.6
Loss of confidence in coping abilities	11.1	Diminished interest in activities	9.1
		Inability to recall part of the event	8.6
		Exaggerated startle	8.1
		Avoidance of activities that arouse recollections	7.4
		Physical reactions to reminders	6.8
		Nightmares (dreams of the events)	5.1

^aResponse to “very” or “extremely true.”

^bResponse to “quite a bit” or “extremely.”

Table 2Descriptive statistics for the anger and hostility scores and their correlations with PRS and PCL (*r* values)

	Mean (SD)	Correlations	
		PRS	PCL
Anger control	20.0 (5.1)	−.06	−.13
Anger-in	15.9 (4.4)	.24	.21
Anger-out	16.2 (4.6)	.24	.32
State Anger	1.5 (0.6)	.27	.47
Trait Anger	2.0 (0.7)	.22	.34
Total hostility	26.7 (7.7)	.11	.17