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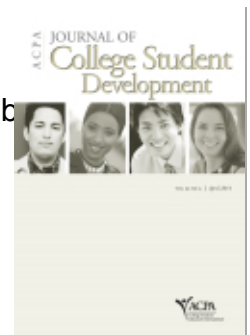
Stress, Social Support, and Health Among College Students After September 11, 2001

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The current study was designed to examine associations among stress due to the 9/11 terrorist attacks, social support, and health (depression and physical illness) in a college student sample. In December 2001, students from Eastern universities (N = 666; 482 women, 184 men; average age 19.5 yrs.) completed measures of stress from terrorism (developed by the authors), supportive behaviors received from friends and family (Experienced Support Scale; Xu & Burleson, 2001), symptoms of depression (Depression Anxiety Stress Scale; Lovibond & Lovibond, 1995), and illness (Pennebaker Inventory of Limbid Languidness; Pennebaker, 1982). The results indicate that even among college students with low exposure to the 9/11 attacks, terrorism-related stress was associated with greater depressive and illness symptoms (p < .05), and that emotional and tangible support were associated with fewer symptoms (p < .05). Findings are considered for their practical implications for college students and personnel.

Without question, the terrorist attacks of 9/11 were a significant stressor for a major segment of the American public. Several studies have shown that substantial numbers of Americans experienced significant stress reactions in the days and weeks following the attacks, even though many of those surveyed were not directly victimized, did not lose loved ones or family members, and did not even live in the geographic vicinity of the attacks (e.g., Melnik et al., 2002; Schlenger et al., 2002; Schuster et al., 2001; Silver, Holman, McIntosh, Poulin, & Gil-Rivas, 2002). For a smaller percentage of Americans, negative health outcomes emerged subsequent to these immediate stress reactions. Although long-term health effects were more frequent and severe in samples with high levels of direct exposure to the attacks (e.g., Galea, Ahern et al., 2002; Galea, Resnick et al., 2002), psychological problems associated with the stress of 9/11 (e.g., symptoms of post-traumatic stress disorder and depression) were also evident in national samples as much as 6 months after 9/11 (Schlenger et al., 2002; Silver et al.).

To date, little research on the health effects of 9/11 has focused directly on college students. This is probably because few college students were direct victims of the attacks, and most institutions of higher education are unlikely to be prime targets for future terrorism. However, understanding the effects of terrorism-related stress on college populations is important. Given the perseverance of terrorist networks world-wide, it is probable that the United States (and other countries) will suffer future attacks. Administrators, educators, and counselors on college campuses need to have

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data on college students' responses to terrorism in order to design institutional responses that assist students in coping (Bosco & Harvey, 2003). Students' experience of terrorist attacks may not only affect their immediate lives (e.g., by generating stress that influences academic performance and personal relationships), but may have broader long-term effects on aggressiveness (Argyrides & Downey, 2004), prejudice against minority groups (Pyszcynski, Solomon, & Greenberg, 2002), and willingness to take jobs in large cities or outside the United States (Bosco & Harvey, 2003). It is also worth noting that college students tend to be youthful, free from serious illness, and from higher socioeconomic classes, all of which can be health protective in the face of disasters (Norris et al., 2002). Thus, examining the relationship between terrorism-related stress and health among college students helps to illustrate the scope and intensity of terrorism's impact.

In addition to understanding how terrorism-related stress influences health among college students, it is also important to examine factors that can reduce negative outcomes, especially factors that affect a wide range of college students and may be subject to intervention. One such factor is social support. Social support is potentially beneficial to health both in general, and in the wake of stressful events (for reviews, see Norris et al., 2002; Wills & Fegan, 2001). It can be obtained through ordinary interaction with social network members (Burleson & MacGeorge, 2002), and could be increased through various interventions in college environments (Helgeson & Gottlieb, 2000). Accordingly, the current study was designed to examine (a) the associations between stress stemming from the 9/11 attacks and two health variables (symptoms of depres-

sion and of physical illness), and (b) the associations between these health variables and three types of social support (emotional, instrumental, and tangible).

Health Outcomes of 9/11

Ample evidence indicates that experiencing a disaster event can have detrimental effects on psychological and physical health and that intended disasters such as the attacks of 9/11 may be especially traumatic (for reviews, see Bromet & Havenaar, 2002; Katz, Pellegrino, Pandya, Ng, & Delisi, 2002; Norris et al., 2002). Several national and regional studies of 9/11 have documented both immediate stress reactions (e.g., Melnik et al., 2002; Schuster et al., 2001) and longer term psychological symptoms and disorders, especially post-traumatic stress disorder (PTSD) (Cardenas, Williams, Wilson, Fanouraki, & Singh, 2003; Galea, Ahern et al., 2002; Galea, Resnick et al., 2002; Schlenger et al., 2002; Silver et al., 2002). Unsurprisingly, the attacks of 9/11 appear to have had stronger health effects on those who lived closest to the sites; residents of lower Manhattan were especially traumatized (Galea, Ahern et al.; Galea, Resnick et al.). Exposure (the extent to which an individual witnessed, was involved in, or was objectively harmed by a disaster event) is a well-documented and strong predictor of postdisaster outcomes (for a review, see Norris et al., 2002).

However, individuals who have relatively low objective exposure to a disaster event may still experience negative health outcomes, depending on how they perceive or interpret the event, and the corresponding stress they experience (Greening, Stoppelbein, & Docter, 2002; Piotrkowski & Brannen, 2002; Silver et al., 2002; Udwin, Boyle, Yule, Bolton, & O'Ryan, 2000).

Appraisal theories of emotion indicate that stress arises in response to events that are perceived to interfere with individuals' goals and activities (Lazarus, 1991; Lazarus & Folkman, 1984). Thus, to the extent that individuals perceive 9/11 as disruptive to their goals and interfering with their typical patterns of behavior, terrorism-related stress is generated. The stress experienced by low-exposure populations is likely to be much milder than that experienced by high exposure populations, but even mild stress, if sustained, can result in poorer mental and physical health (DeLongis, Folkman, & Lazarus, 1988; Lepore, Miles, & Levy, 1997). Accordingly, for college students whose exclusive or primary exposure to the 9/11 attacks came through media reports, health outcomes are likely to be determined by the extent to which the events of 9/11 resulted in goal disruption and behavioral interference over an extended period of time. To date, few studies of disaster events and their health outcomes have focused specifically on samples with little or no direct exposure, but such research is necessary to further understand the scope of negative outcomes from terrorism and the management of stress among low exposure populations (Argyrides & Downey, 2004; Powell & Self, 2004).

Social Support and Health After Disaster Events

Because stress associated with disaster events can have detrimental effects on health, it is important to examine not only those effects, but factors associated with better postdisaster health. One such factor is social support. Two national surveys of coping strategies in the days immediately following 9/11 found that seeking interaction with others was probably the coping strategy most frequently employed for dealing with the stress of the attacks (Melnik et al., 2002; Schuster et al., 2001). Such interactions would have created natural contexts for giving and receiving support of various kinds, and college students may have had greater-than-average access to such conversations through classes and group living situations, and possibly through campus programs intended to support coping with 9/11. In addition, a growing body of studies indicates that people who have greater support from friends, family, and other members of their social networks experience fewer psychological and physical health problems both in general and subsequent to disasters (for reviews, see Norris et al., 2002; Wills & Fegan, 2001). These studies thus suggest that social support obtained through social interactions after 9/11 had the potential to reduce college students' symptoms of depression and physical illness.

However, most studies of disaster events and support have examined *perceived* support, or the global perception of belongingness in a network and belief in the availability of support, not the actual *receipt* of supportive behavior from others (Norris et al., 2002). Some theorists have argued that perceived support is largely an aspect of personality, usually established in childhood (e.g., Sarason, Sarason, & Gurung, 1997), and thus that actual supportive behavior from others plays, at most, a minor role in determining health outcomes. In contradiction to this position, a few recent studies of disaster events (e.g., Dalgleish, Joseph, Thrasher, Tranah, & Yule, 1996; for a review, see Norris et al., 2002) have found that *received support* improved health outcomes. Yet all these studies have focused on samples with high levels of direct exposure to disaster events, in which stress levels are likely to

be very high. In addition, although several studies have found positive associations between received support and health outcomes, one study that focused on college students after Hurricane Andrew found no influence of support on PTSD or depression (Pickens, Field, Prodromidis, Pelaez-Nogueras, & Hossain, 1995). Thus, although some evidence suggests that received social support will be associated with better health among college students with indirect exposure to 9/11, the accumulated findings are inconclusive and this conjecture deserves to be tested.

Scholars who study received support frequently distinguish between various types of supportive behavior (for a review, see Burleson & MacGeorge, 2002), including emotional support (e.g., expressions of sympathy, caring, affection), instrumental support (e.g., information, advice, instruction), and tangible support (e.g., direct assistance, gifts or loans of material goods). To date, studies of postdisaster support and health have typically employed measures that combine emotional, instrumental, and tangible support into a single index (e.g., Dalgleish et al., 1996; Joseph, Yule, Williams, & Andrews, 1993; Udwin et al., 2000). Although this approach has the advantage of parsimony and avoids the challenge of obtaining distinct assessments of different types of support, it also makes it difficult to determine whether specific types of support are most beneficial for particular stressors, populations, and health outcomes. Identifying more and less advantageous forms of support is important for improving supportive communication, either in naturally occurring interactions, or as part of interventions.

The Current Study

To date, only one study of health outcomes

from 9/11 has been focused on college students (Cardenas et al., 2003). The authors documented symptoms of PTSD and depression, as well as substance abuse, among students who were evacuated from their university and city as United Flight 93 circled over Cleveland, Ohio before eventually crashing in Shanksville, Pennsylvania. Cardenas et al.'s study was limited in its generalizability because the researchers focused on a unique college sample with a heightened level of objective exposure. In addition, the researchers did not assess students' stress or social support. The current study was designed to examine the relationships among stress due to terrorism, receipt of social support, and health among a more typical (lower exposure) sample of college students.

Because our conceptualization of stress due to 9/11 was informed by appraisal theory, we elected to operationalize stress in two ways. The first of these is goal disruption, or the extent to which the events of 9/11 interfered with an individual's life goals. The second is behavioral interference, defined as the extent to which the events of 9/11 motivated efforts to reduce threat from terrorism (e.g., avoiding air travel or public gatherings). To the extent that an individual reports greater goal disruption or behavioral interference from a disaster event, appraisal theory indicates that the individual is experiencing greater stress from that event.

Based on widely accepted distinctions between different types of supportive behavior (see Burleson & MacGeorge, 2002), we elected to measure emotional support, instrumental support, and tangible support received from close friends and family. In addition, consistent with most studies of social support and health (for a review see Wills & Shinar, 2000) we elected to employ a measure of received support that

was general in character rather than specific to the stressor event (in this case, 9/11). This measurement choice reflects the fact that supportive behavior from others may not be recognized as targeted at a particular stress, even when it was intended as such. Further, supportive behavior may benefit health even when that behavior does not directly address the stress generated by a particular stressor. For example, support may have positive associations with health by facilitating a generally positive outlook, better self-care, or other health-protective attitudes and behaviors, regardless of stressor events or individuals' stress levels. In short, because measuring "stressor-specific" support is likely to underestimate the quantity of support received and associations between support and health, we chose to measure general received support rather than received support specific to the stress of 9/11.

The health outcomes of depression and physical illness were selected based on consideration of the college student sample. Although PTSD is the most frequently studied health outcome in the wake of disaster events (Norris et al., 2002), its symptoms are closely tied to direct, physical experience of the event (O'Shea, 2001; Schwarzer & Schulz, 2003). Consequently, symptoms of PTSD, as well as cases meeting the clinical definition of the full disorder, are less likely to occur among individuals whose exposure to disaster events is indirect. Second, large scholarly literatures associate both depression and physical illness not only with disaster events (e.g., Norris et al.), but with other kinds of acute and chronic stressors (Schwarzer & Schulz; Stowell, McGuire, Robles, Glaser, & Kiecolt-Glaser, 2003). Third, PTSD is uncommon among college students, whereas depressive symptoms and physical illness are frequent

complaints at college student health centers, and have negative effects on academic performance (e.g., Meilman, Manley, Gaylor, & Turco, 1992).

Accordingly, we examined the following hypotheses and research question:

> Hypothesis 1: Goal disruption and behavioral interference from 9/11 will be positively associated with symptoms of depression and physical illness.

> Hypothesis 2: Emotional, instrumental, and tangible support will be negatively associated with symptoms of depression and physical illness.

> Research Question 1: Do emotional, instrumental, and tangible support differ in the magnitude of their associations with depression and physical illness?

Demographic variables. Although the current study was not intended to focus on demographic predictors, large and random-sample studies of disaster events frequently find evidence that demographic variables influence postdisaster health. For example, women and ethnic minorities tend to experience more negative health outcomes after disasters (for reviews, see Bromet & Havenaar, 2002; Katz et al., 2002; Norris et al., 2002). However, with a college student sample, gender and ethnic differences may be less evident. For example, socioeconomic status may explain ethnic differences in responses to disasters, and socioeconomic differences between minority and non-minority college students are likely to be smaller than such differences in the general population. Accordingly, we proposed the following research question:

> Research Question 2: Do the demographic variables of gender and ethnicity influence symptoms of depression or physical illness in a college population?

METHOD

Data Collection

Data were collected in the first 2 weeks of December 2001. This time frame for data collection was determined by the time required after 9/11 to assemble the research team and data collection instruments, obtain permission for data collection from the institutional review boards at two universities, and subsequently gain access to participants at these two universities.

Participants

Initial recruitment ($N = 739$) took place in several large communication classes at two medium-sized Eastern universities. Students in the classes were asked both to participate and to recruit their friends as well. Because some of the friends who completed questionnaire packets were not students at either school ($n = 21$), or did not report their school ($n = 52$), and this study is focused on college students, these individuals were excluded from the analyses reported in this paper, reducing the sample size to 666. The average age was 19.56 ($sd = 1.28$). Virtually all participants were unmarried (98.9%; 0.9% did not report marital status), and had no children (99.7%). Due to the high level of homogeneity in age, marital status, and number of children, these variables were excluded from the study's analyses.

Gender and Ethnicity. Descriptive analyses for gender indicated that 72.4% of participants were women and 27.6% were men. In addition, most participants were European American (82.6%), but African American (6.3%), Latino American (2.1%), and other ethnic groups (4.3%) were also represented, and 4.7% did not report their ethnicity. The small numbers of participants in each minority ethnic group necessitated combining these groups into a single "minority" category (13.7%) for analytic purposes.

Exposure: School City. None of the participants reported being physically injured in the 9/11 attacks. In addition, most of the participants attended school in Delaware (82.7%), and were thus relatively distant from the attack sites in New York City and Washington, D.C. However, 17.3% of the sample was obtained from a school in Washington, D.C. Although this subsample was unlikely to have viewed the Pentagon attack as it was occurring, and was not evacuated from the campus, their proximity to the Pentagon nonetheless heightens their degree of objective exposure as assessed by many measures of exposure to 9/11 (Schlenger et al., 2002; Silver et al., 2002). Rather than exclude them from the analyses, we elected to include the variable of "school city" in the analyses to assess and control for any effects of the difference in exposure.

Procedures

Participants completed questionnaire packets at the end of a class period, or in a laboratory setting. After providing informed consent, they were given a packet containing 10 questionnaires, 5 of which are pertinent to this study. The first questionnaire obtained demographic and exposure information: gender, ethnicity, age, marital status, number of children, school attended, and whether participants experienced physical injury from the terrorist attacks. The second assessed participants' perceptions of goal disruption and behavioral interference from the terrorist attacks, the third measured received social support, the fourth measured current depressive symptoms, and the fifth measured symptoms of physical illness. The order of these questionnaires was not randomized, but they were interspersed with

other, nonrelated questionnaires, helping to decrease the likelihood that participant responses were inappropriately influenced by questionnaire order. All study procedures were approved by the internal review boards at the universities where the data were collected. Participants received a small amount of course credit for participation.

Instruments

Goal Disruption and Behavioral Interference. The goal disruption and behavioral interference questionnaire began with a prompt to focus participants' attention on their "experiences following the terrorist attacks on the World Trade Center and the Pentagon on September 11th, 2001." To assess goal disruption, we used three items modeled on those proposed by Caplan (2000), each measured on a 7-point Likert-style scale (1 = *strongly disagree,* 7 = *strongly agree*). These items were "Terrorism has made it more difficult for me to achieve my goals in life," "Terrorism has taken me further away from reaching my life goals," and "Terrorism is keeping me from getting what I want out of life." To assess behavioral interference, we created six items, each measured on a 7-point Likert-style scale (1 = *strongly disagree,* 7 = *strongly agree*), and focusing on behavioral changes to reduce the threat of terrorism. These items were "Since September 11th, I am less willing to travel by air," "Since September 11th, I am less willing to use public transportation," "Since September 11th, I am more likely to avoid large gatherings in public places," "Since September 11th, I pay more attention to who is around me," "Since September 11th, I am less willing to travel outside my home city by means other than airplanes," and "As a consequence of terrorism, I am considering a move to

another city, state, or country." Because we had no baseline data regarding the interference created by 9/11 in the lives of college students, this relatively large number of items was included to assess a range of possible behaviors.

The nine items were factor analyzed (principal axis extraction with oblique rotation), yielding two factors with eigenvalues greater than 1.0 (see Table 1). Using a **.**50/.30 criterion, four of the six items for behavioral interference loaded on the first factor. The other two items (regarding paying attention to other people and moving to another city) were dropped due to low loadings. The behavioral interference index was formed from the average of the remaining four items (loadings > .66; α = . 81). Using a .50/.30 criterion, all of the items for goal disruption loaded on the second factor; these three items formed a reliable scale (loadings > .75; α = .88) and were averaged for the goal disruption index. The average level of behavioral interference was 2.84 (*sd* = 1.29), and the average level of goal disruption was 2.30 (*sd* = 1.19).

Social Support. To measure the social support received by participants, we employed the emotional, instrumental, and tangible support items from Xu and Burleson's (2001) Experienced Support scale. Participants reported how much of various support behaviors they received from close friends and family by responding to seven Likert-style items per type of support (1 = *Don't receive at all* to 5 = *Receive a great deal*). Emotional support items included, "Expressing understanding of a situation that is bothering you, or disclosing a similar situation that they have experienced before," and "Comforting you when you are upset by showing some physical affection." Instrumental support items included, "Giving

you advice about what to do," and "Providing detailed information about the situation, or about skills needed to deal with the situation." Tangible support items included "Offering to lend you something (including money)," and "Offering to help you do something that needs to be done." (For the complete item set, see Xu & Burleson, 2001.) Consistent with high internal consistencies reported by Xu and Burleson, Cronbach's alpha was .87 for the emotional support items, .87 for the instrumental support items, and .83 for the tangible support items. Accordingly, the scales were calculated from the mean of the items. The averages were 4.09 ($sd = 0.62$) for emotional support, 3.73 ($sd = 0.66$) for instrumental support, and 3.79 ($sd = 0.69$) for tangible support.

Depression. To assess symptoms of depression, we used the depression items from the short form of the Depression Anxiety Stress Scale (DASS-21) (Lovibond & Lovibond, 1995). Responses given to seven items (e.g., "I felt down-hearted and blue" and "I found it difficult to work up the initiative to do things") indicate how much the symptom was experienced within the past week and are reported on a 4-point Likert-style scale (0 = *did not apply to me at all,* 3 = *applied to me very much, or most of the time*). The DASS depression scale has been found to have good internal consistency, as well as convergent validity with the Beck Depression Inventory (Antony, Bieling, Cox, Enns, & Swinson, 1998). In the current study, the internal consistency for this measure was acceptable ($\alpha = .89$). The average level of depression was 0.50 ($sd = 0.64$). Because depression had a high positive skew (skew = 1.60), a log transformation was performed on scores for this variable prior to the study's primary analyses.

Symptoms of Physical Illness

Symptoms of physical illness were measured using a modification of the Pennebaker Inventory of Limbid Languidness (PILL) (Pennebaker, 1982). The PILL was originally designed to assess the frequency of 54 physical symptoms and complaints in the past year (e.g., itching or painful eyes, running nose, upset stomach, back pains, headaches, sore muscles). Pennebaker reported evidence of external validity and internal consistency. In the current study, participants reported the frequency of symptoms and complaints in the previous week (with responses ranging from 1 = *not at all* to 4 = *6 or 7 days*). Reliability was acceptable ($\alpha = .89$). Consistent with past use of this scale, a total score for the PILL was calculated by summing across all items. The average score was 77.74 ($sd = 16.98$). Because symptoms of physical illness was positively skewed (skew = 1.02), a log transformation was performed on scores for this variable prior to the study's primary analyses.

RESULTS
Preliminary Analyses

Because of the concern that the Delaware and *Washington,* D.C. subsamples might differ on the study's primary variables due to their differential exposure to the Pentagon attack, we conducted a series of *t* tests with school city as the independent variable and the study's primary variables as the dependent variables. The Delaware and Washington, D.C. subsamples did not differ significantly with respect to any of the primary variables: goal disruption, behavioral interference, emotional support, instrumental support, tangible support, depression, and physical symptoms (*p*s ranged from .12 to

.88; details available from the first author). We also examined the effect of school city on gender and age: there was no difference in the gender distribution ($\chi^2 = .26$, $p = .61$), but there was a small difference in age. Delaware students were slightly older, on average ($M = 19.66$ years) than D.C. students ($M = 19.03$ years), $t = 4.93$, $p < .05$. Although these analyses provided little reason to suspect any substantive effect of differential exposure on the study's health variables, we nonetheless retained the variable of school city in the primary analyses to control for any slight effects that might exist.

Hypotheses and Research Question

The study's hypotheses and research question were examined with two hierarchical regression analyses following procedures recommended by Cohen, Cohen, West, and Aiken (2003). In each analysis, the demographic variables of gender, ethnicity

(minority/nonminority) and school city (Delware/Washington, D.C.) were dummy coded and entered at the first step; goal disruption and behavioral interference were entered at the second step; and the three support variables (emotional, instrumental, tangible) were entered at the third step. Zero-order correlations between each of the variables in these analyses are reported in Table 1. Degrees of freedom reflect listwise deletion due to missing data on one or more variables.

Depression

The variables entered in the model jointly accounted for 6.4% of the total variance in depression, $F(8, 608) = 5.20$, $p < .001$. Entered at the first step, the demographic variables explained a nonsignificant 1% of the variance, $F(3, 608) = 2.12$, $p = .10$, although ethnicity was a significant individual predictor, $\beta = .08$, $p < .05$. The

TABLE 1.
Zero-Order Correlations

	1	2	3	4	5	6	7	8	9	10
1. Gender	1.00									
2. Ethnicity	−.10*	1.00								
3. School City	−.02	.02	1.00							
4. Goal Disruption	.13***	−.01	−.02	1.00						
5. Behavioral Interference	.18***	.04	−.05	.51***	1.00					
6. Emotional Support	.30***	−.09*	.04	−.01	.03	1.00				
7. Instrumental Support	.20***	−.03	.01	.00	.04	.75***	1.00			
8. Tangible Support	.20***	−.09	−.01	−.03	.04	.77***	.79***	1.00		
9. Depression	.03	.06	.06	.15***	.12**	−.17***	−.12**	−.15***	1.00	
10. Physical Illness	.07	−.05	−.03	.05	.12**	−.05	−.09*	−.11**	.38***	1.00

Note: Gender, ethnicity, and school city were dummy coded (0 = *male, nonminority,* or *Delaware*; 1 = *female, minority,* or *Washington, D.C.*) Due to missing data, sample size for each correlation varies from 601 to 666.

*p < .05.   **p < .01.   ***p < .001.

significant effect for ethnicity indicated a slightly higher level of depressive symptoms among minorities. Entered at the second step, the stress variables accounted for 2% of the variance, F_{change} (2, 603) = 6.36, p < .01, but only goal disruption was a significant individual predictor, β = .10, p < .05. At the third step, the support variables explained an additional 3.4% of variance, F_{change} (3, 600) = 6.36, p < .001, but only emotional support was a significant individual predictor, β = –.19, p < .01. In partial support of Hypotheses 1 and 2, goal disruption was positively associated with depression, and emotional support was negatively associated with depression.

Physical Illness

The variables entered in the model jointly accounted for 3.7% of the total variance in physical illness, $F(8, 586) = 2.78$, p < .01. Entered at the first step, the demographic variables explained a nonsignificant .06% of the variance, F (3, 583) = 1.23, p = .30; none of the demographic variables were significant predictors. Entered at the second step, the stress variables accounted for 1.4% of the variance, F_{change} (2, 581) = 4.087, p < .05, but only behavioral interference was a significant individual predictor, β = .13, p < .01. At the third step, the support variables explained an additional 1.7% of variance, F_{change} (3, 578) = 3.41, p < .05, but only tangible support was a significant individual predictor, β = –.17, p < .05. In partial support of Hypotheses 1 and 2, behavioral interference was positively associated with physical illness, and tangible support was negatively associated with physical illness.

DISCUSSION

The current study was designed to examine associations between stress due to 9/11 terrorism, several forms of social support, and the health variables of depression and physical illness in a college student sample with low exposure to the 9/11 attacks. The findings provide evidence that terrorism-related stress is associated with poorer mental and physical health, even among college students with low objective exposure to the attacks. In addition, they indicate that social support is associated with better health for these students.

Stress and Health

Consistent with appraisal theories of emotion, stress due to terrorism was conceptualized and operationalized in the current study as goal disruption and behavioral interference. Not surprisingly, these stress variables were moderately correlated (shared variance of 25%). However, their relationships with health outcomes appear to be distinct. Stress as indicated by disrupted goals was associated with greater depressive symptoms, whereas stress indicated by behavioral change directed at reducing threat due to terrorism was associated with symptoms of physical illness.

Although this pattern of results was not specifically predicted, it appears consistent with characteristics of the stress variables, depression, and physical illness. Appraisal theory indicates that goal disruption should lead to negative cognitions and emotions; if such emotions and cognitions are persistent, they are likely to contribute to the feelings of loss, hopelessness, and lack of motivation that help to characterize depression. Although behavioral interference is also theorized to create negative cognitions and emotions, its operationalization in this study may help to explain its association with physical illness and not with depression.

Because behavioral interference was measured as behavioral changes to avoid activities with perceived risk of terrorism (e.g., air travel), these avoidant behaviors still reflect a level of active self-concern that may mitigate against depression. The influence of behavioral interference on physical illness may be explained via health-protective behaviors, or anxiety. To the extent that students were focused on avoiding the threat of terrorism, they may have been engaging in fewer healthy activities such as exercising, shopping for groceries (rather than eating out), or visiting health practitioners. Alternatively (or additionally), symptoms of physical illness may arise from anxiety, reflected in the choice to avoid various activities. Theorizing about postterrorism stress and health outcomes will benefit from future research that distinguishes between different types and sources of stress from terrorism, and assesses varied health outcomes.

Social Support and Health

The findings of the current study indicate that receiving social support from others was negatively associated with depression and physical illness after 9/11. A large body of literature on perceived support has already shown that perceived belonging and belief in the availability of support is associated with a variety of positive health outcomes in the wake of disasters (Norris et al., 2002), but the current study bolsters a much smaller body of literature suggesting the value of specific supportive behaviors (Burleson & MacGeorge, 2002; Norris et al.). The current study also increases our awareness of support-health associations among college students (see also Pickens et al., 1995). The findings of the current research are also intriguing with regard to the benefits of different kinds of support for diverse health outcomes. Emotional support was negatively associated with depression, whereas tangible support was negatively associated with physical illness; instrumental support did not exhibit any independent effect on either health outcome.

These findings must first be considered with respect to the methodology employed in the current study. One of the challenges of assessing how different types of received support affect health (or any outcomes of interest) is that measures of emotional, instrumental, and tangible support are often strongly correlated. Such was the case in the current findings, where correlations ranged from .74 to .79 (55% to 62% shared variance). Multiple regression analyses test for the independent effects of variables and control for shared variance, so it would be better to have smaller correlations between the different support assessments. However, this can be difficult to achieve because of overlap among the concepts of emotional, instrumental, and tangible support (see Burleson & MacGeorge, 2002) and because people who receive high (or low) levels of one type of support probably also receive high (or low) levels of other types.

These observations suggest two contextualizations for the findings of the current study. First, the results should probably not be taken as indicating that instrumental support is wholly unassociated with depression or physical illness, because relationships may be masked in this study by shared variance with emotional and tangible support. Second, the findings do suggest that emotional support may have a unique role to play with respect to depression, because its independent effect emerged despite "competition" for variance with instrumental and tangible support. Social support theorists

have begun to identify means by which particular types of support produce positive effects on recipients, and emotional support is most strongly identified with helping to create a context in which a distressed person's cognitions and emotions can be processed (Burleson & Goldsmith, 1998; Burleson & MacGeorge, 2002). Specifically, the supportive behaviors of active listening, validating emotional experience, expressing positive regard and hope, and assuring confidentiality can lead to a more positive and functional appraisal of a negative event, warding off intrusive thoughts and rumination, and forestalling the development of a depressive mindset. By contrast, tangible support probably achieves its benefits in more concrete ways, such as directly relieving certain kinds of stressors, affording opportunities to distract oneself from a stressor, or facilitating health-protective behaviors. In the current study, tangible support may have been associated with less physical illness because it helped students to see health care providers, purchase better food, get more exercise, find positive social activities, or even escape the stressful college environment (e.g., by traveling home more frequently). Despite the challenges of simultaneously assessing different forms of support, researchers should continue to do so in light of the potential for theoretical and practical insight with respect to types of support and different stressors.

Limitations

To make the strongest arguments about causality, studies of stress, social support, and health need to be conducted longitudinally, assessing the effects of stress at "Time A" on health at "Time B," and measuring support at either point or somewhere in the intervening period. The firmest

conclusions are likely to come from studies in which a sample is studied both before and after a disaster event. Because the authors were not studying the participants in this study prior to 9/11, and did not have the resources to conduct a longitudinal study after 9/11, the current research is cross-sectional, with stress, social support, and health all assessed in the same questionnaire, administered approximately 3 months after the terrorist attacks.

The key problem with this approach is that correlations between stress and health can be interpreted as health or support influencing stress rather than vice-versa. Specifically, it is possible to interpret the stress-health findings as showing that individuals who were more depressed experienced more goal disruption from terrorism, and that individuals who had more physical symptoms adopted more terrorism-avoidant behaviors (behavioral interference). The correlations also allow for the reversal of the support-health relationships. It is also possible that greater depression and physical illness resulted in the receipt of less emotional and tangible support, respectively. It is important that the inability to prove the direction of causality be recognized in the interpretation of these findings.

However, several aspects of the measurement choices in this study lend some support to the idea that stress and support influenced health rather than vice-versa. The terrorism focus of the stress questions (about goal disruption *due to terrorism* and behavioral interference *since September 11th*) makes it somewhat less likely that depression or physical illness determined these relatively specific perceptions. In addition, the health measures assessed symptoms in the previous week, whereas the stress and support questions were not time specific, so that partici-

pants could report overall judgments of goal disruption, behavioral interference, and the three types of support. This construction of the questions helps to support the argument that stress and support over time influenced psychological and physical health, rather than the opposite effects. Finally, it is helpful to note that stress-health and support-health relationships (in those orders) are supported by increasing numbers of longitudinal studies (for reviews see Krantz & McCeney, 2002; Lovallo, 1997; Stowell et al., 2003), including research on disasters (Norris et al., 2002).

Although the relationships among stress due to terrorism, social support, and health were significant, it is important to note that the effect sizes were relatively small; the variables examined in this study explained slightly more than 6% of the variance in depression, and less than 4% of the variance in physical illness. One probable explanation for the small effect sizes is the psychological and physical characteristics of the college student sample. Students' average level of stress due to terrorism was low (consistent with low direct exposure), and they had few average symptoms of depression or physical illness (likely due to youth, good health, moderate-to-high socioeconomic status, and few major life stressors). Thus, the size of the relationships between stress and health can be taken as a testament to the resilience of the college student population, but their statistical significance should also be viewed as a warning that even slight exposure to terrorism may be associated with poorer health among college students. Similarly, although the magnitudes of the associations between social support and health were quite modest, they suggest that emotional support and tangible support may be beneficial to college students' mental and physical well-

being in the wake of disasters. Another possible explanation for the small effect sizes is the timing of the data collection, 11 to 12 weeks after the attacks. Collecting data in December 2001 may have facilitated the detection of associations between stress and health because mild stress must typically persist over time to have negative influence on health (DeLongis et al., 1988; Lepore et al., 1997). However, it is also possible that participants in this study became adjusted to a chronically higher level of stress and that negative health effects had diminished by the time of data collection. Thus, effect sizes might have been larger had we been able to collect data somewhat earlier. In addition, longitudinal research would provide the greatest insight into relationships between stress, health, and support over time.

Finally, as with any convenience sample, generalizations must made with discretion. Systematic differences between this sample and other college student samples, or the college student population at large, could produce somewhat different findings. The ethnic homogeneity of the current sample is probably the greatest concern in this regard. Because ethnic minorities often experience somewhat more negative health outcomes from disaster events (e.g., Norris et al., 2002) and individuals from different cultures may respond somewhat differently to different types of supportive behavior (e.g., Burleson, 2003b), future research should continue to examine the influence of ethnicity and culture on responses to disaster events.

Practical Implications

Since the attacks of 9/11, the threat of terrorism appears to have become more pervasive—or at least is more widely recognized in countries such as the United States. Due to television and personal communi-

cation technologies (e.g., cell phones and e-mail), most people living in the United States and other modernized countries will experience at least some indirect exposure to any future terrorist attacks. College students' access to, and comfort with, technology will likely make their indirect exposure even greater than average. The current study indicates that stress related to terrorist attacks is associated with psychological and physical symptoms, which may in turn translate into weaker academic performance, increased use of health care services, and generally poorer well-being. In addition, although the current study focuses on health outcomes, other recent research highlights the potential for terrorism to stimulate aggression and prejudice (Argyrides & Downey, 2004; Pyszczynski et al., 2002), and to constrict students' employment choices (Bosco & Harvey, 2003). Thus, it is important for college personnel to consider how student stress can be alleviated in the wake of future terrorist attacks.

The current study also suggests that social support, both emotional and tangible, may be a means of improving health among college students who have experienced trauma. Several features of social support make it an especially pragmatic response for college students in the wake of terrorist attacks. First, talking to others is a common response to emotional distress, so these conversations create a natural context in which support can be provided and received (e.g., Rime, Corsini, & Herbette, 2002). Second, support can be exchanged in different types of relationships (e.g., friends, residence hall coresidents, coworkers, strangers), and across multiple media (e.g., face-to-face, telephone, e-mail). Third, an individual's level of social support is subject to intervention (Helgeson & Gottlieb, 2000).

Unlike gender, socioeconomic status, or many other factors that influence psychological and physical responses to disaster events, support can be sought and volunteered. On college campuses, postdisaster programs can encourage the sharing of support between students by educating students about its importance and how to provide it most effectively (e.g., training to enhance emotional support skills; see Burleson, 2003a). Fourth, providing support does not require professional credentials or special equipment. It necessitates only motivation and ability to communicate skillfully about thoughts, feelings, and coping options. Fifth, individuals experiencing the same stressor can still provide support to one another. In some cases, they may be more successful than those who have not experienced the stressor due to greater knowledge and empathy. They may also themselves benefit from the act of assisting another person (e.g., Helgeson & Gottlieb). Of course, receiving social support is not a panacea, either in response to terrorism-related stress, or in response to the myriad stressors of everyday life. Not all individuals have adequate access to supportive others, supportive efforts vary in quality, and support providers can be overtaxed (e.g., Burleson, 2003b; Burleson & MacGeorge, 2002). Those with high levels of exposure to a disaster event are more likely to require professional intervention. Nonetheless, supportive behavior is a beneficial and accessible resource for most college students in the wake of terrorist attacks, and one that can be facilitated by college personnel.

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