

## Future-Oriented Thinking and Adjustment in a Nationwide Longitudinal Study Following the September 11th Terrorist Attacks<sup>1</sup>

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*We conducted a three-year longitudinal study of the mental and physical health of a national probability sample following the September 11th terrorist attacks. Adjustment over the three years following the attacks was associated with higher levels of future-oriented thinking and lower levels of fear about future terrorism (as measured 1, 2, and 3 years post-9/11), even after adjusting for demographics, lifetime trauma, pre-9/11 mental and physical health, and 9/11-related exposure. Future orientation over the three years post-9/11 was associated with fewer pre-9/11 mental health problems, greater frequency of adulthood trauma, and using active coping strategies in response to the attacks. Fear of future terrorism was associated with greater frequency of adulthood trauma, more television watching immediately after the attacks, and using more planning and religion-based coping strategies immediately following the attacks. Thinking about the future can be a double-edged sword: Worrying about future terrorism may undermine well-being, whereas focusing on future goals may enhance it when coping with stressful events like the September 11th attacks.*

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The concept of time has been part of psychological discourse for over a century (James, 1890; Lewin, 1942). Time perceptions are thought to provide an important foundation that contributes to the development of conscious thought and behavior, and are considered the primary context through which individuals understand, make sense of, and organize life experiences (Holman & Silver, 1998; James, 1890; Kelly, 1955; Lewin, 1942; Zimbardo, 1994). Two fundamental and related constructs have received a great deal of conceptual and empirical attention: *time perspective*, which refers to the overall span of cognitive involvement in past, present, and future life domains (Fraisie, 1963; Nuttin, 1985); and *time orientation*, referring to the degree of cognitive involvement focused predominantly on one time zone (i.e., past or future orientation). Together these constructs create an overarching cognitive response bias that helps individuals filter and interpret ongoing life experiences (Zimbardo, 1994). In this way, time perceptions can exert a powerful influence on human thought, feeling, and behavior.

The philosophical perspective asserting that the future dominates human consciousness (Heidegger, 1962; Minkowski, 1970) has influenced much of the psychological research on time. Psychologists have extolled the benefits of future-oriented thinking, arguing that it is motivational for academic achievement (Simons, Vansteenkiste, Lens, & Lacante, 2004), promotes healthy behaviors (Ouellette, Hessling, Gibbons, Reis-Bergan, & Gerrard, 2005; Rothspan & Read, 1996; Strathman, Gleicher, Boninger, & Edwards, 1994; Wills, Sandy, & Yaeger, 2001; Zimbardo, Keough, & Boyd, 1997), promotes mental health and well-being (Adler, 1925; Cottle, 1969; Carmil & Breznitz, 1991; Lewin, 1942; Melges, 1982; cf. Bleich, Gelkopf, & Solomon, 2003), and influences the nature of social relationships (Lang & Carstensen, 2002). Nonetheless, new schools of thought suggest that it is too simple to focus on the “future” without addressing the nature or context of the individual’s future orientation (Atance & O’Neill, 2001; Lang & Carstensen, 2002; and see Lerner, Gonzalez, Small, & Fischhoff, 2003). For example, most prior research on future time perspective has assessed future orientation as a single unipolar construct (e.g., Holman & Silver, 1998; Zimbardo & Boyd, 1999), while ignoring a possible negative approach to thinking about future events. Many items used to assess future orientation have focused on the ability to self-regulate (goal setting, self-control), the future consequences of one’s actions, and planning. As these processes often reflect a sense of having personal agency, it is not surprising that they tend to be positively associated with well-being. Nonetheless, research on future time perspective has focused much less attention on how a “negative” future orientation may impact overall well-being.

A small body of research addresses these contextual gaps in a limited way. Fear of future threat and loss of control have been found to be strong predictors of post-traumatic stress disorder (PTSD) and depressive symptomatology among survivors of the war in the former Yugoslavia (Başoğlu et al., 2005). Palestinian youths also report a more pessimistic and limited view of the future that is associated with higher rates of PTSD when compared to Israeli-Palestinians (Lavi &

Solomon, 2005; cf. Terr, 1991). The concept of “future anxiety” (FA)—a generalized cognitive bias toward the future that has been associated with the tendency to be more pessimistic in predicting future solutions to global problems, manipulating others to assure one’s own personal future, and using “hard” interpersonal power strategies that reinforce a superior-subordinate relationship (Zaleski, 1996; Zaleski, Janson, & Swietlicka, 1997)—has also been associated with high levels of stress experienced by young adults studying in Turkey (Otrar, Eksi, Dilmac, & Sikin, 2002). These latter results have been interpreted as a response to coping with an unknown personal future and the need to exert control over one’s life. As individuals are forced to cope with frequently occurring stressors (e.g., repeated episodes of violence), they may use more coping strategies focused on short-term needs (e.g., immediate survival), and less focused on long-term plans (e.g., setting future goals). At the same time, such experiences may encourage people to “worry” about the future, a process that has been linked to avoidant coping, maladaptive interpersonal relations, and higher rates of cardiovascular problems (see Borkovec, Ray, & Stöber, 1998; Kubzansky et al., 1997). Together, these findings suggest that future orientation may be a double-edged sword: when it is positive and motivational for achieving goals, it may benefit well-being, but when it involves a predominantly negative vision of the future, it may undermine mental and/or physical health.

An important context in which one might examine the relationship between both the positive and negative aspects of future time orientation and well-being involves coping with a highly stressful event that generates uncertainty about the future. To date, research on time orientation following such events has been quite limited. Although we have demonstrated that remaining focused on the *past* in the aftermath of trauma can be detrimental for long-term adjustment (Holman & Silver, 1998), little research has sought to understand the relationship between *future orientation* and adaptation in the context of coping with extreme stress. Moreover, to date the research offers no clear message about how future orientation and post-trauma adaptation are related: There are findings suggesting that trauma survivors may develop a stronger belief in a more positive future (Carmil & Breznitz, 1991), whereas others suggest that future orientation is either limited or more negative following trauma (Lavi & Solomon, 2005; Zaleski, 1996).

The terrorist attacks of September 11, 2001 provided an ideal opportunity to examine the role of future orientation on adjustment over time. The attacks of 9/11 ushered in a period of increased anxiety about subsequent terrorism, two wars in the Middle East, and great socioeconomic change in America, thereby making the potential of a negative future event (i.e., terrorism) concrete and salient for many people. In so doing, the 9/11 attacks have created a unique opportunity to examine the relationship between future-oriented thinking and long-term adjustment to stress.

In the present study, we examined general future orientation (setting goals, planning, etc.), along with a more negative future orientation—concern about future terrorist attacks. We sought to identify predictors of these different future

orientations, as well as to explore how these different aspects of future orientation were associated with adjustment following the attacks over time. We expected that the more general and abstract future orientation (e.g., goal setting) would facilitate adjustment over time, whereas negative post-9/11 fears of future terrorism would hinder long-term adjustment. Given the evidence suggesting the importance of positive affect in promoting active coping with stress (Aspinwall, 1998), the impact of depression and anxiety on overall functioning (Keyes, 2005), and the critical role of stress in the development of physical health problems (McEwen, 1998), our analyses focused on three different aspects of post-9/11 adjustment: positive affect, psychological distress (anxiety, depression, somatization), and physician-diagnosed health ailments.

## METHODS

### Overview

We conducted a longitudinal study of mental and physical health in the US following the 9/11 attacks (Silver et al., 2005; Silver et al., *in press*). Data were collected from a national probability sample of the adult population in collaboration with Knowledge Networks, Inc. (KN), a Web-based survey research company. KN recruits, maintains, and conducts surveys with a nationally representative Web-enabled research panel using an anonymous Web-based methodology.

This panel was developed using traditional probability methods for creating national survey samples and was recruited using stratified random-digit-dial (RDD) telephone sampling. RDD provides a known non-zero probability of selection for every US household having a telephone. KN provides panel households with Web access and an Internet appliance, using a telephone line to connect to the Internet and the television as a monitor. In return, panel members participate in 10–15 min Web-based surveys 3–4 times per month. To date, KN has recruited approximately 60,000 households to participate in their Web-enabled panel, constituting the only Internet-based national probability sample in the US. The distribution of the KN panel closely tracks the distribution of census counts for the US population on age, race, Hispanic ethnicity, education, income, geographical region, and employment status (Dennis & Krotki, 2001). To correct for possible nonresponse bias from panel recruitment and attrition, representative samples are selected for panel surveys by use of post-stratification weights that weight panel distributions to match the benchmarks from the most recent US government statistics for gender, age, race, ethnicity, education, and geographic region. Samples are drawn with probabilities proportional to the panel weights using a systematic sample applied to the eligible panel members. The distributions for the panel samples resemble, within sampling error, the US population distributions for key demographic variables.

Panel members are notified in their password-protected e-mail accounts that an assigned survey is available. Surveys are self-administered and accessible any time of day for a designated period. Participants can complete a survey only once. Survey responses are confidential, and identifying information is never revealed. Members may leave the panel at any time, and receipt of the appliance and Internet service is not contingent on completion of any particular survey. The panel does not respond significantly differently over time to surveys than more “naïve” survey respondents (Dennis, 2001).

## Design

Data were collected at five time points: Before the September 11th attacks, 9–14 days post-9/11/01, and one, two and three years post-9/11/01, as described below. Institutional Review Boards of the University of California, Irvine and University of Denver approved the design and procedures.

### *Pre-9/11 Health Survey*

KN administers several surveys to their national panel, including a demographic questionnaire upon panel entry, and a health questionnaire periodically. The health questionnaire (which provided information on respondents’ history of mental health problems) was completed by approximately 95% of respondents between June, 2000 and September 9, 2001.

### *Acute Response Survey*

Between September 20 and October 4, 2001, a national probability sample completed a measure of acute stress response and coping strategies, as well as a measure of television exposure to the 9/11 attacks. During the fielding period, 2729 adults completed this survey (78% of the 3496 sampled); over 75% did so 9–14 days post-attacks (Silver, Holman, McIntosh, Poulin, & Gil-Rivas, 2002). Of these respondents, 2592 (95%) had also completed the pre-9/11 health survey.

### *Annual Anniversary Surveys*

Approximately one, two, and three years after 9/11, respondents completed follow-up surveys that assessed mental and physical health (e.g., general psychological distress, positive affect, physician-diagnosed mental and physical disorders), exposure to stressful life events, future orientation, and fear of future terrorism, as described below.

Between September 20 and October 24, 2002, a survey was fielded to the 2281 respondents available from the original pool of respondents who had completed both the pre-9/11 health and Acute Response surveys. 1923 respondents participated (84.3% of those fielded; 74% of respondents who had completed the pre-9/11 health and Acute Response surveys). Between September 12 and October 31, 2003, a third survey was fielded to the 2123 respondents available from the original pool that had completed both the pre-9/11 health and the Acute Response surveys. 1576 respondents completed this assessment (74% of those fielded; 61% of respondents who had completed the pre-9/11 health and Acute Response surveys). Between September 12 and November 2, 2004, a fourth survey was fielded to 2471 of the original respondents who had completed both the pre-9/11 health and the Acute Response surveys. 1950 respondents completed this final assessment (79% of those fielded; 71% of respondents who had completed the pre-9/11 health and Acute Response surveys).

## Measures

### *Pre-9/11 Health Survey*

Respondents completed a health survey, modeled after the US Center for Disease Control's National Center for Health Statistics annual National Health Interview Survey (NHIS; US Department of Health and Human Services, 2000), in which they reported whether a physician had ever diagnosed them with each of 35 physical and mental health ailments. Comparisons between estimates from the 2000 NHIS and the KN health survey supported the validity of these data, as the average difference in prevalence across a variety of ailments was only 1.5% (Baker, Bundorf, Singer, & Wagner, 2003; Dennis, 2003; Holman et al., 2006). Indices were created from reports of physician diagnoses representing the number of physical (e.g., stroke, diabetes, heart problems, asthma) and mental (e.g., anxiety, depression) health ailments diagnosed before 9/11/01. Items from this survey provided the baseline assessments for our respondents.

### *Acute Response to the Terrorist Attacks*

*Acute Stress Symptoms.* Respondents completed a modified version of the Stanford Acute Stress Reaction Questionnaire (SASRQ; Cardena, Koopman, Classen, Waelde, & Spiegel, 2000). Respondents were asked whether they did or did not experience stress-related symptoms specific to the 9/11 attacks such as "I felt distant from my own feelings and emotions," "I had nightmares about the recent disaster," and "I actively tried not to think about these events." The mean of all SASRQ items was computed to represent acute post-9/11 distress.

*Coping Strategies.* Respondents completed the Brief COPE (Carver, 1997), which assesses 14 different coping strategies (two items per strategy) used in response to a particular stressor: self distraction, active coping, denial, substance use, emotional support seeking, instrumental support seeking, behavioral disengagement, venting, positive reframing, planning, humor, acceptance, religion, and self blame. Participants indicated on a 4-point scale (1 = “*I didn’t do this at all*,” 4 = “*I did this a lot*”) the frequency with which they used each strategy to cope with the terrorist attacks. Because emotional and instrumental support seeking were highly correlated, they were combined into a single measure of “support seeking.”

*Television Watching.* Respondents were asked “Since the terrorist attack, about how much time each day have you spent watching news footage about this on TV? Please give your best estimate for the first seven days after the attack.” Respondents were provided with a four-category variable ranging from less than one hour per day to over 6 hours per day. Respondents were also asked whether they had watched the attacks “live” on television (i.e., as they occurred).

### *Post-9/11 Adjustment*

*Positive Affect.* Positive affect was assessed using an eight-item measure developed by Diener, Smith, and Fujita (1995). Respondents were asked “During the past week, including today, how often have you had the following feelings” in reference to affection, joy, love, happiness, contentment, caring, pride, and fondness. Reliability was excellent across all waves ( $\alpha = .91-.93$ ); the mean score was computed as an index of positive affect.

*Psychological Distress.* Psychological distress was assessed using the 18-item Brief Symptom Inventory (BSI-18; Derogatis & Spitznagel, 2000), a standardized scale measuring anxiety, depression, and somatization. Reliability for this measure was excellent across all waves (all  $\alpha = .93$ ).

*Post-9/11 Physical and Mental Health.* Variables identical to the baseline pre-9/11 health indices were created representing the total number of physical and mental health ailments reported one, two, and three years post-attacks. In addition, posttraumatic stress symptoms related to 9/11 were assessed annually using the 17-item PTSD Checklist (PCL; Forbes, Creamer, & Biddle, 2001; Weathers, Litz, Herman, Huska, & Keane, 1993). This measure had excellent reliability across all waves ( $\alpha = .93-.94$ ), and was used as longitudinal covariate in the analyses.

### *Future-Oriented Thinking*

*Future Orientation.* General future orientation was assessed one, two, and three years following the 9/11 attacks using 3 items drawn or modified from the Zimbardo Time Perspective Inventory (Zimbardo & Boyd, 1999). Respondents

were asked to indicate the degree to which these items were true for them using a 5-point scale that ranged from 1 “*not at all true*” to 5 “*very true*.” Items include “When I want to accomplish something, I set goals and consider means for achieving them,” “My plans for the future are pretty well laid out,” and “I am usually certain about what I am going to do next.” Reliability of the measure was good over time ( $\alpha = .71, .70, .71$  at each annual assessment).

*Fear of Future Terrorism.* Fears of future terrorism were measured with a two-item measure at one, two, and three years following the attacks: “How often in the past week have you had fears about the possibility of another terrorist attack (e.g., bioterrorism, hijacking)?” and “I worry that an act of terrorism (e.g., bioterrorism, hijacking) will personally affect me or someone in my family in the future.” Items were scored on a 5-point scale ranging from 1 = *never* to 5 = *all the time*. Inter-item correlations ranged from .70 to .72.

### *Other Variables*

*Stressful Life Event Exposure.* Lifetime exposure to stressful events was assessed in the year after 9/11/01 by asking participants whether they had ever experienced each of 37 negative events (e.g., natural disaster, child abuse) and the age(s) at which they occurred. This measure was modified from the Diagnostic Interview Schedule section on trauma (Robins, Helzer, Croughan, Williams, & Spitzer, 1981), expanded using open-ended coding of lifetime traumas reported by a primary care sample (Holman, Silver, & Waitzkin, 2000), and has provided rates of specific traumas in this sample comparable to surveys conducted on other US community samples (Breslau et al., 1998; Kessler, Sonnega, Bromet, & Nelson, 1995). Continuous variables were computed representing the number of traumas experienced in childhood (through 17 years old), adulthood, and during the years following 9/11/01. A continuous count of the number of ongoing stressful events that occurred in the years following the attacks was also included as a covariate in the analyses.

*Exposure to the 9/11 Attacks.* Items modified from prior research on disaster exposure (Holman & Silver, 1998; Koopman, Classen, & Spiegel, 1994) assessed respondents’ 9/11-related exposure (degree of exposure to and loss from the attacks). Individuals were categorized into one of three levels of exposure: *direct exposure*—in the World Trade Center (WTC) or Pentagon, seeing or hearing the attacks in person, or having a close relationship with someone in the targeted buildings or airplanes; *live media exposure*—watching the attacks live on television; and *no live exposure*—seeing or learning of the attacks only after they had occurred.

Distance from the 9/11 attacks was assessed with a variable derived from US Postal Service residential zip codes. Azimuth distance from the WTC was computed as a measure of degree of impact (similar to earthquakes, with lessening



impact as distance from the “epicenter” increases). Distance was categorized into groups representing individuals who lived within 25 miles, 25–100 miles, 100–500 miles, 500–1000 miles, and over 1000 miles from the WTC.

### Overview of Analyses

Statistical analyses were conducted with STATA 7.0, a program designed to handle weighted analysis of complex longitudinal survey data and provide necessary adjustments of standard errors. Data were weighted to adjust for differences in the probabilities of selection and non-response both within and between households. Post-stratification weights were calculated by deriving weighted sample distributions along combinations of gender, age, race/ethnicity, region, metropolitan status, and education. Similar distributions were calculated using the most recent US Census Bureau’s Current Population Survey (CPS) data and the KN panel data. Cell-by-cell adjustments over the various univariate and bivariate distributions were calculated to make the weighted sample cells match those of the US Census and the KN panel. This process was repeated iteratively to reach convergence between the weighted sample and benchmark distributions from the 2001 CPS and the US Census Bureau (US Census Bureau, 2001–2005). All statistics calculated from the KN panel are subject to sampling variability as well as non-sampling error. Quality control and edit procedures are used to ensure the effects of these errors on final survey estimates are minimal.

STATA’s Generalized Estimated Equations (GEE) procedure, which allows weighting for population-based surveys, was used to identify predictors of time-varying levels of psychological distress, positive affect, and physical health ailments over three years post-attacks. GEE analyses were also used to identify predictors of time-varying levels of future orientation and fear of future terrorism over the three years following the attacks. This approach, based on the general linear model, allows regression of a longitudinal outcome variable on a set of predictors. Analyses were conducted to address two key questions: How are future orientation and fears of future terrorism associated with mental and physical health outcomes over the 3 years following the 9/11 attacks? What pre-9/11 and 9/11-related variables help predict future orientation and fears of future terrorism over the 3 years following the attacks? All models were tested and adjusted for within-subject changes in the outcomes over time, with time modeled as a continuous variable (range 1–3 years).

Six blocks of variables were tested for inclusion in the final models: (1) demographics (i.e., gender, age, marital status, race/ethnicity, education, and income); (2) pre-9/11 physician-diagnosed physical and mental health ailments; (3) lifetime exposure to stressful events (i.e., childhood, adulthood, and post-9/11 events); (4) 9/11-related exposure/loss and acute stress response; (5) relevant longitudinal indices of adjustment (i.e., psychological distress, positive affect, post-9/11 mental

and physical health); (6) and longitudinal future-oriented cognitions. Variables that did not reach significance in preliminary models ( $p > .05$ ) were removed from subsequent analyses to provide the most parsimonious model. Final models were estimated adjusting for all significant variables from each of the six groups of predictors and time. Data presented in tables describing longitudinal multivariate models are the final standardized betas ( $\beta$ ) and Adjusted Incident Rate Ratios (AIRR) derived from the final, most parsimonious model of significant predictors from all blocks as entered into the equation simultaneously. AIRRs represent the rate of outcome occurrence (e.g., number of physical health ailments) for people with higher scores on the predictor variable divided by the rate of outcome occurrence for people with lower scores on the predictor variable after adjusting for covariates in the model. The AIRR shows whether a higher levels of a given predictor are “preventative” ( $<1$ ), “causative” ( $>1$ ), or unrelated to ( $=1$ ) the rate of outcome occurrence. All AIRRs are adjusted for the other variables in the model.

The pre-9/11, 1-year, 2-year, and 3-year post-9/11 surveys were missing physician-diagnosed ailments for approximately 8–9%, 6–7%, <1%, <1% of respondents, respectively. As the Little and Rubin MCAR tests for these data were non-significant ( $p > .10$ ), missing health data were imputed within age groups using the expectation maximization (EM) method for the pre- and 1-year post-9/11 health data (Little & Rubin, 1987). KN imputed missing values for income using the mean income score for each respondent’s census block. We chose not to impute data for cases missing traumatic life events, demographics, and 9/11-related exposure. Therefore, our final sample sizes ranged from 1902 to 2002 for different analyses depending on the constellation of significant predictors in each model.

## RESULTS

### Sample

The demographic breakdown of participants from the Acute Response survey, as well as the anniversary assessments at 1, 2, and 3 years post-9/11, compared favorably with CPS benchmarks from the US Census Bureau, suggesting that we successfully recruited and maintained a sample over time with key demographic characteristics similar to the US population (Silver et al., 2002; in press). Most weighted differences are within sampling error, although middle-income households are somewhat over-represented in our sample. The average age of participants whose data are reported in analyses to follow was 47.2 yrs (SD 16.5 yrs); the modal income ranged from \$40K to \$49K per year; 51.7% of the sample was female; the modal level of education was a high school diploma or its equivalent;

and the ethnic distribution included 73.5% Non-Hispanic white, 11.2% Hispanic, 10.6% Non-Hispanic African American, and 4.7% Non-Hispanic others.

Attrition Analyses

Attrition analyses revealed that individuals who completed the Acute Response survey (*N* = 2729) were not different from non-responders (*N* = 767) in terms of their education or marital status. However, responders were older than non-responders (*M* = 47 vs. 39 years; *t* [3494] = 12.12, *p* < .001), reported lower annual income than non-responders (\$35–40K/year vs. \$40–50K/year; *t* [2886] = 2.61, *p* < .009); and were more likely to be white than black or Hispanic ( $\chi^2$  [3] = 51.98, *p* < .001).

Analyses conducted for each post-9/11 wave (1, 2, and 3 years post attacks) revealed no differences between respondents and non-respondents in terms of pre-9/11 mental or physical health, acute stress symptoms, gender, ethnicity, marital status, or income. Respondents at the 1- and 2-year anniversary were, however, older than non-respondents (1 year post-9/11: *M* = 51.8 vs. *M* = 43.3, *t* [2020] = 11.19, *p* < .001; 2 years post-9/11: *M* = 50.6 vs. *M* = 44.4, *t* [2020] = 7.03, *p* < .001), and respondents at all waves had completed more years of education than non-respondents (1-Year:  $\chi^2$  [4] = 19.10, *p* < .01; 2-Year:  $\chi^2$  [4] = 16.11, *p* < .003; 3-Year:  $\chi^2$  [4] = 34.50, *p* < .001). Individuals included in the GEE analyses were not significantly different from excluded cases (missing demographics, exposure, or trauma data) in terms of available demographic information, pre-9/11 mental or physical health status, acute stress symptoms, or future-oriented cognitions.

Associations Between Indices of Adjustment and Future-Oriented Cognitions

Associations between longitudinal indices of future-oriented thinking and longitudinal indices of adjustment demonstrate that both positively- and negatively-valenced future cognitions are associated with overall mental and

**Table I.** Bivariate Associations Between Indices of Adjustment and Future-Oriented Cognitions Over Three Years Following the September 11th Attacks

	Psychological distress $\beta$	Positive affect $\beta$	Physical health IRR
Future orientation	-.10*	.25*	0.99
Fear of future terrorism	.19*	-.07*	1.21*

*Note.*  $\beta$  = Standardized Beta; IRR = Incident Rate Ratio. Each model included both future cognitions and time as the covariate.

\**p* < .001.

physical health in the expected direction: planning/goal-oriented future thinking was associated with higher positive affect, and lower psychological distress (see Table I). On the other hand, fear of future terrorist attacks was associated with lower positive affect, higher distress, and an increased incidence of physical health problems. The associations between future orientation and fear of future terrorism at each time point were small (1 year  $r = -.02$ , ns; 2 year  $r = -.06$ ,  $p < .05$ ; 3 year  $r = -.03$ , ns), suggesting that the constructs are independent of one another.

## Predictors of Adjustment Over Time

### *Psychological Distress*

After adjusting for significant covariates (demographics, pre-9/11 mental health, time-varying levels of positive affect and mental health disorders, recent trauma, acute stress symptoms, and time), future orientation and fear of future terrorism were both significantly and independently associated with distress over the three years following 9/11. Higher future orientation was associated with lower distress, and higher fear of future terrorism was associated with higher distress (Table II;  $N = 1902$ , final model Wald  $\chi^2(10) = 369.76$ ,  $p < .001$ ). No significant interactions were noted between time and other predictors in this model.

### *Positive Affect*

Future orientation was the strongest predictor of positive affect over time, after adjusting for significant covariates (e.g., demographics), time, and ongoing distress. Respondents who reported higher future orientation also reported higher positive affect scores over the three years following the attacks. Fear of future terrorism was not associated with positive affect in the multivariate analyses (Table II;  $N = 1949$ , final model Wald  $\chi^2(7) = 489.86$ ,  $p < .001$ ). No significant interactions were noted between time and other predictors in this model.

### *Physical Health Problems*

Fear of future terrorism was associated with a small (4%), but significant, increased incidence of physical health problems over the three years following the attacks. These findings remained robust even after adjusting for all significant covariates (time, demographics, ongoing mental health problems, psychological distress, and recent trauma) (Table II;  $N = 1964$ , final model Wald  $\chi^2(7) = 869.66$ ,  $p < .001$ ). No significant interactions were noted between time and other predictors in this model.

**Table II.** Longitudinal Multivariate Models Predicting Psychological Distress, Positive Affect, and Physical Health Problems for Three Years Following the September 11th Terrorist Attacks

Predictor	Psychological distress $\beta$ (SE)	Positive affect $\beta$ (SE)	Physical health IRR (95% CI)
Age	—	—	1.21 (1.16–1.25)***
Gender	—	.17 (.02)***	1.07 (1.03–1.11)***
Ethnicity			
Hispanic	.06 (.03)*	—	—
Education			
Bachelor's degree	-.07 (.02)***	—	—
Marital status			
Single	—	-.09(.02)***	—
Divorced	—	-.07 (.02)***	—
Life events			
Recent trauma	.13 (.03)***	—	—
Adulthood trauma	—	—	1.12 (1.07–1.17)***
Pre-9/11 health status			
# MD diagnosed mental disorders	.09 (.03)**	—	—
# MD diagnosed physical disorders	—	—	1.28 (1.22–1.35)***
Longitudinal indices of adjustment			
Psychological distress	—	-.29 (.02)***	—
Positive affect	-.24 (.03)***	—	—
# MD diagnosed mental disorders	.30 (.07)***	-.07 (.03)*	1.27 (1.15–1.27)***
9/11-related acute stress symptoms	.19 (.03)***	—	—
Longitudinal indices of future-oriented cognitions			
Future orientation	-.07 (.02)***	.23 (.02)***	—
Fear of future terrorism	.25 (.03)***	—	1.04 (1.01–1.07)**

*Note.*  $\beta$  = Standardized Beta; AIRR = Adjusted Incident Rate Ratio. The following blocks of variables were tested for inclusion in the final models: (1) demographics (i.e., gender, age, marital status, race/ethnicity, education, and income); (2) pre-9/11 physician-diagnosed physical and mental health ailments; (3) lifetime exposure to stressful events (i.e., childhood, adulthood, and post-9/11 events); (4) relevant longitudinal indices of adjustment (i.e., psychological distress, positive affect, mental and physical health ailments) (5) 9/11-related exposure/loss and acute stress response. Variables that did not reach significance in preliminary models ( $p > .05$ ) were not included in the final model. Dashes indicate variable not included in final model due to non-significance ( $p > .05$ ). Gender is coded 0 male, 1 female. Reference group for ethnicity is all other ethnic groups (white, black, Asian, other); reference group for education is no 4-year college degree completed. Marital status reference group is "married."

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

## Predictors of Future-Oriented Cognitions

### *Future Orientation*

Future orientation decreased significantly over the three years following the 9/11 attacks (1 year  $M = 3.22$ , 2 year  $M = 3.11$ , 3 year  $M = 3.13$ ;  $b = -.05$ ,

$p < .001$ ). In analyses adjusted for time and concurrent positive affect, older, more educated respondents with higher incomes were more future oriented than their younger, less educated and less wealthy counterparts over the three years following the attacks. Pre-9/11 mental health problems, living within a 25–100 mile radius of the WTC and being widowed were also associated with lower levels of future orientation. Finally, respondents who reported engaging in active coping in the first few weeks following 9/11 also reported higher levels of future orientation over the three years following the attacks (Table III;  $N = 1978$ , final model Wald  $\chi^2(10) = 277.42, p < .001$ ). There were no significant interactions between time and the other predictors of future orientation.

### *Fear of Future Terrorism*

Fears of future terrorism decreased significantly over the 3 years following the attacks (1 year  $M = 2.35$ , 2 year  $M = 2.13$ , 3 year  $M = 2.16$ ;  $b = -.10, p < .001$ ). In analyses adjusting for concurrent psychological distress and posttraumatic stress symptoms, more educated individuals and those who lived over 100 miles from the WTC reported lower levels of fear of future terrorism than did respondents who were less well educated and those who lived within 100 miles of the WTC. Respondents who had experienced more traumatic events in adulthood, who had high levels of acute stress symptoms immediately post-9/11, and who used planning or religion-based coping strategies post-9/11, also reported greater fear of future terrorism. Individuals who reported watching three or more hours of TV coverage about the attacks per day in the weeks following 9/11 also reported more fear of future terrorism (Table III;  $N = 2002$ , final model Wald  $\chi^2(17) = 1128.49, p < .001$ ). There were no significant interactions between time and the other predictors of fears of future terrorism.

## DISCUSSION

We have demonstrated that future-oriented cognitions are associated with long-term adjustment following a highly stressful event. After adjusting for pre-9/11 mental health status and salient ongoing psychological states (e.g., distress, positive affect), both future orientation (goal-setting, planning) and fear of future terrorism were each uniquely associated with psychological outcomes over the three years following the attacks, but in opposite directions. Individuals who were setting goals and planning ahead for their futures reported lower levels of psychological distress and higher positive affect than individuals with lower levels of future orientation. However, fear about future terrorism was also *independently* associated with long-term adjustment. Even after adjusting the analyses for future orientation, fear of future terrorism was associated with higher levels of

**Table III.** Predictors of Future Orientation and Fear of Future Terrorism for Three Years Following the September 11th Attacks

Predictors	Future orientation $\beta$ (SE)	Fear of future terror $\beta$ (SE)
Age	.08 (.02)***	.08 (.02)***
Gender	—	.04 (.02) <sup>†</sup>
Education		
Attended college	—	-.05 (.02)**
Completed bachelor's degree	.07 (.02)***	—
Marital status		
Widowed	-.05 (.02)*	—
Income	.06 (.02)**	—
Longitudinal indices of adjustment		
Positive affect	.26 (.03)***	—
Psychological distress	—	.17 (.05)***
Posttraumatic stress symptoms	—	.61 (.06)***
Pre-9/11 health status		
# MD diagnosed mental disorders	-.10 (.02)***	—
Life events		
Adulthood trauma	.05 (.02)**	.04 (.02)*
September 11th exposure		
Distance from WTC		
25–100 miles	-.03 (.01)*	-.06 (.04)
101–500 miles	—	-.14 (.06)*
501–1000 miles	—	-.15 (.06)**
Over 1000 miles	—	-.17 (.07)**
Hours of TV watching		
4–6	—	.05 (.02)**
Over 6	—	.04 (.02)*
September 11th response		
Acute stress symptoms	—	.08 (.02)***
Coping strategies		
Active coping	.06 (.02)***	—
Religious coping	—	.05 (.02)*
Planning	—	.05 (.02)*

*Note.* Future orientation  $N = 1978$ , Wald  $\chi^2(10) = 277.42, p < .001$ ; Fear of future terrorism  $N = 2002$ , Wald  $\chi^2(17) = 1128.49, p < .001$ . Dashes indicate variable not included in final model due to non-significance ( $p > .05$ ). Reference group for marital status includes married, single and divorced respondents; reference group for education includes respondents who did not complete High School; reference group for distance from World Trade Center (WTC) is residential address within 25 miles of WTC in September, 2001

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ , <sup>†</sup> $p < .06$ .

psychological distress. There was also a small but significant increased incidence of physician-diagnosed physical health ailments among individuals reporting greater fear of future terrorism. To the extent that fear of future terrorism is a chronic stressor, these findings are consistent with the known detrimental effects of stress on physical health (see McEwen, 1998; Otrar et al., 2002). Moreover, to

the extent that fear of future terrorism is associated with the tendency to worry, it may also contribute to physical health problems such as cardiovascular ailments (Kubzansky et al., 1997). Research on worry also helps make sense of some of our early post-9/11 coping findings. Worry is considered one way to prepare oneself for anticipated stressors. We found that people who coped with 9/11 by planning also reported higher levels of fear about future terrorism (which is associated with higher distress)—a finding consistent with the idea that people who worry may do so in part to help them plan for future anticipated stress (Borkovec et al., 1998).

Our measure of future orientation – which included items focused on planning ahead—was associated with lower distress and higher positive affect over time. While this finding may appear to contradict the coping by planning findings described above, we note that the planning items included in the Brief COPE (Carver, 1997) referred to specific strategies used to deal with respondents' experiences of a highly stressful event (i.e., the terrorist attacks). In contrast, the planning items included in the future orientation scale assess the more general orientation of having thought about one's future enough to have more distant plans for achieving one's goals. These different aspects of planning—strategizing how best to cope with the attacks in the immediate aftermath vs. planning ahead for one's future—have different time frames (immediate vs. distant future), as well as different emotional contexts (high vs. low stress), which are likely to explain these disparate results.

These findings highlight the importance of considering the nature and context of one's future orientation when examining its impact on mental or physical health outcomes. Much of the previous work on future orientation has taken neither the valence nor the broader social context of future thoughts into account (see Carstensen, Isaacowitz, & Charles, 1999, for an exception). Embedding future orientation in a broad sociocultural and developmental context is critical to understanding its impact and meaning for different individuals (see Atance & O'Neill, 2001; Carstensen et al., 1999). For example, young people living in a war-torn part of the world are likely to have a different concept of "future" than their counterparts living in an American suburb. For one group, the future may be dominated by goals of physical survival (i.e., getting food, shelter; avoiding violence, death), whereas for the other, the future may involve making decisions about school, career, and perhaps building a family. While these different views of the future may both ultimately prove beneficial for short-term well-being (i.e., survival), one is inherently more narrow, stressful, and potentially more damaging to long-term well-being (see Lavi & Solomon, 2005).

Another important topic for future research involves trying to understand the *ways* people engage the future. For example, are future thoughts focused on planning, simulating, reliving, fantasizing, or anticipating (see Atance & O'Neill, 2001)? Some people focus on planning their future to the neglect of their present and past. Others draw from their past to build into the future, and others get stuck in



reliving the past (Holman & Silver, 1998) or believing that their past will ultimately be their future as well—a scenario demonstrated well by the intergenerational transmission of child abuse.

### Correlates of Future-Oriented Thinking

We found that television watching in the immediate aftermath of the attacks was associated with fear of future terrorism. Several studies have reported a cross-sectional association between television exposure to the 9/11 attacks and distress or trauma-related symptoms (Schlenger et al., 2002; Schuster et al., 2001). Research conducted primarily among children after the Oklahoma City bombing (Pfefferbaum et al., 1999; Pfefferbaum et al., 2001) and the Gulf War (Cantor, Mares, & Oliver, 1993) found similar associations. Ours is the first study of which we are aware to link television watching in the aftermath of 9/11 with negative psychological consequences over the three years post-9/11. As early television watching was unrelated to psychological distress and positive affect in our analyses, yet it predicted future-oriented cognitions over time, it would be important to address the potential indirect relationship television watching may have with long-term mental health outcomes through its significant association with fear of future terrorism.

We similarly found that people residing more than 100 miles from the WTC at the time of the attacks reported significantly lower levels of fear of future terrorism than did those residing within 25 miles of the WTC. This finding is consistent the idea that proximity to a stressor can increase its “impact” (similar to earthquakes, with lessening impact as distance from the “epicenter” increases). However, we also found that individuals residing between 25 to 100 miles from the WTC had *lower* future orientation than all others in the sample. This finding raises the possibility that people who were close enough to feel highly threatened but far enough away that they did not experience the hope that stems from a strong sense of community support may end up experiencing a psychologically foreshortened sense of the future as a result of the exposure (Terr, 1991). Future research is needed to examine the combined impact of exposure, threat, and degree of interpersonal and community support on future-oriented cognitions following trauma.

Our finding that lifetime trauma in adulthood was positively associated with *both* future orientation and fear of future terrorism raises intriguing questions about the many ways highly stressful events may be associated with future time perspective. It is possible that prior lifetime stress sensitizes individuals to the point that they become more vigilant—and perhaps, one could argue, realistic—about the potential for experiencing future trauma. Yet at the same time it may encourage them to engage in planning as a coping strategy that allows a greater sense of control over the future. We would suggest, however, that there are many

possible mediating mechanisms for these findings that require further research. For example, we would expect the nature of lifetime traumas to make a difference in how they impact one's sense of the future. Thus, several acute stressors are likely to have a different impact on one's time perspective than several ongoing stressors that chronically stress the individual over time. Cultural differences in worldviews and the ability to make sense of an event may also mediate the relationship between future time perspective and stress.

Finally, given our previous work addressing the role of past orientation and coping with trauma, the results of this and other studies suggest a need to examine the role of time perceptions more broadly when considering their impact on adjustment following trauma (see Boyd & Zimbardo, 2005). Do past and future orientations have independent and unique associations with patterns of adjustment over time? How important is present orientation in post-trauma adjustment? Anecdotal accounts suggest that learning to live in the present moment is one of the more positive post-trauma experiences reported by survivors (Boyd & Zimbardo, 2005; Silver & Holman, 1994), yet we know of no published studies to date that have examined these questions systematically.

### Strengths and Limitations

One of the strengths of the analyses reported herein is the longitudinal statistical controls that were used when testing the impact of future orientation and fear of future terrorism over time. In so doing, we have demonstrated that both future-oriented constructs can have an independent and strong association with long-term adjustment *above and beyond* their relationship to respondents' current and ongoing emotional state (cf. Lerner et al., 2003). Moreover, we assessed bivalent forms of future orientation and tested their independent associations with indices of adjustment over time.

Nonetheless, we also acknowledge some limitations of this work. Some of our measures of pre- and post-9/11 mental and physical health involved self-report of physician-diagnosed disorders. Respondents may have misunderstood or forgot what their doctors told them, or their doctors miscommunicated with them about their diagnoses, and confirming diagnoses using medical records would be ideal. In addition, the concept of future orientation is, to some extent, related to personal control, agency (e.g., goal-setting, planning), and optimism (Aspinwall & Leaf, 2002; Aspinwall, Richter, & Hoffman, 2001). Hence, it is not surprising that future orientation is often associated with positive outcomes, since feeling optimistic or as though one has control over one's own future is known to diminish anxiety about life, enhance one's sense of well-being, and encourage active coping that facilitates adaptation to life stressors (see Aspinwall & Taylor, 1997; Trommsdorff, 1994; Zaleski, 1994). Subsequent research might measure both future orientation and perceived control to allow testing of their unique effects on outcomes over time.

To the extent that perceptions of control are a relatively stable personality trait, it is possible that pre-9/11 perceptions of control spuriously linked both future-oriented thinking (initially measured after the attacks) with post-9/11 adjustment. It would be best to include pre-measures of personal agency and control in future research.

## Conclusions

In sum, our findings clearly demonstrate that the relations between future orientation and long-term adjustment are more complicated than originally thought. Future-oriented thinking can involve negative thoughts (fears about the future) that may ultimately have a detrimental impact on overall mental and physical health over time. Both positively- and negatively-valenced future thinking contributed independently to different indices of adjustment, suggesting that focusing on future goals can help us adapt to life's many changes, but having fears about an ambiguous future may take a toll on our enjoyment of life and render us vulnerable to the negative impact of chronic stress.

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