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Prediction of Health Patterns from General Appraisal, Attributions, Coping, and Trait Anxiety¹

S. H. Hemenover^{2,3} and Richard A. Dienstbier²

We examined the relationships among general appraisal style, attributional style, trait anxiety, coping styles, and health status (i.e., depression, hostility, and flu-like symptoms) in a study for which we also examined the validity of a trait measure of general appraisal. Participants completed personality measures at the beginning of an academic semester, and health assessments at regular intervals throughout the semester. Consistent with our predictions, after removing the influence of neuroticism and attributional style, general appraisal style led to more negative, and less positive affect 2 weeks later, and to more stressful and threatening appraisals of a life event occurring 3 months later. Multiple regression techniques showed that as predicted, after controlling for baseline health general appraisal style and attributional style predicted hostility and flu-like symptoms, and attributional style also predicted depression. These effects were mediated by trait anxiety. We discuss why both negative general appraisal and attributional styles may be risk factors for ill health.

Personality impacts on psychological and physical well-being have been well documented. For example, Type A behavior pattern and trait hostility have consistently predicted coronary heart disease (e.g., Barefoot, Dahlstrom, & Williams, 1983; Wright, 1988; for a recent meta-analysis on this topic see Miller, Smith, Turner, Guijarro, & Hallet, 1996). Other dimensions associated with well-being include optimism (Carver *et al.*, 1993; Scheier & Carver, 1985, 1992; Scheier *et al.*, 1989), hardiness (Kobasa, 1979; Weibe

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& Williams, 1992), extraversion (Friedman & Booth-Kewley, 1987), and repressive coping style and trait anxiety (Brown, Tomarken, Loosen, Kalin, & Davidson, 1996; Jamner, Schwartz, & Leigh, 1988). However, it is not known how personality impacts health. One possible avenue for personality impacts on health involves the physiological arousal that may result from negative cognitive appraisals made during times of stress. Lazarus and Folkman (1984) proposed two interacting stress appraisals: primary appraisal, which involves an assessment of the perceived relevance of an event; and secondary appraisal, which involves an assessment of one's ability to utilize available coping resources. Primary and secondary appraisals interact, leading to an appraisal of a given event as threatening or challenging, and to corresponding patterns of physiological arousal (Dienstbier, 1989; Tomaka, Blascovich, Kelsey, & Leitten, 1993).

Substantial evidence links several dimensions of personality to appraisals made in specific situations. Among those dimensions are hardiness (Florian, Mikulincer, & Taubman, 1995; Kobasa, 1979; Rhodewalt & Agustsdottir, 1984), locus of control (Anderson, 1977; Fame, Sebellico, Gnugnoli, & Corallo, 1992; Jorgensen & Johnson, 1990; Parkes, 1984; Vitaliano, Russo, & Maiuro, 1987), self-efficacy and helplessness (Jerusalem, 1993; Morgan, Owen, Miller, & Watts, 1986), trait negative/positive affectivity (Elliot, Chartrand, & Harkins, 1994); and extraversion and neuroticism (Gallagher, 1990). Based on this literature, a dispositional appraisal style (called general appraisal style) was recently proposed, along with a measure designed to assess this style (General Appraisal Measure [GAM], Hemenover & Dienstbier, 1996). General appraisal style is a personality dimension that leads, across time and situations, to consistent stress appraisals (e.g., appraisals of events as highly stressful and as difficult to cope with). The GAM has exhibited adequate internal and test-retest reliability, and has been found to predict appraisals made in specific situations, independently of other personality dimensions such as neuroticism.

Appraisals that a situation is likely to be (or is) stressful have in turn been associated with poor psychological and physical health. For example, Folkman and Lazarus (1986) found that negative appraisals were associated with depression; Folkman, Lazarus, Gruen, and DeLongis (1986) found that negative appraisals were associated with poor psychological well-being; and Florian *et al.* (1995) found that among Israeli military recruits, making threat appraisals about combat training predicted low psychological well-being 4 months later. In addition, Cohen, Tyrrell, and Smith (1991) found a positive association between psychological stress and vulnerability to a respiratory infection, suggesting that stress may weaken the immune system. Consistent with this possibility, Baum and colleagues (e.g., Baum, Gatchel,

& Schaeffer, 1983; McKinnon, Weisse, Reynolds, Bowles, & Baum, 1989) have found impaired functioning of the immune system among residents living near Three Mile Island (the site of the 1979 nuclear power plant accident). Similar findings have been reported for a variety of other stressful circumstances including academic examinations (e.g., Kiecolt-Glaser, Garner, Speicher, Penn, & Glaser, 1984), the death of a spouse (e.g., Schleifer, Keller, Camerino, Thorton, & Stein, 1983), and divorce (e.g., Kiecolt-Glaser *et al.*, 1987).

General Appraisal Style and Health

The above reviewed literature suggests that personality (e.g., general appraisal style) predicts appraisals, and that the resulting stress impairs psychological and physical health. Although it is not known exactly how personality-induced stress appraisals impact health, negative emotions such as anxiety (and the physiological effects of such emotions) are thought to play a role. In an influential theory of emotion called *appraisal theory*, the features of the person (e.g., goals) and of the situation (e.g., the potential to impact personally relevant goals) interact, resulting in specific patterns of appraisals that lead to specific emotions (e.g., anxiety: for a review of appraisal theory see Smith & Lazarus, 1990; Smith & Pope, 1992). Consistent with appraisal theory as well as findings linking personality to affective experience over time (e.g., Izard, Libero, Putnam, & Haynes, 1993), a negative general appraisal style should lead to consistent threat appraisals and stress. Appraisal-induced anxiety is in turn a major component of stress (i.e., see Lazarus, 1991; Lazarus & Folkman, 1984; Smith & Pope, 1992) that, as demonstrated in the above reviewed literature, is associated with ill health. Moreover, irrespective of prior appraisals anxiety has been associated with ill health (Dua, 1994; Friedman & Booth-Kewley, 1987). Therefore, a negative general appraisal style should be associated with ill health, and that association ought to be mediated by consistent experiences of anxiety (i.e., trait anxiety).⁴

Cognitive appraisals also impact coping efforts (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986). Hence general appraisal style ought to also show reliable associations to coping. However, within appraisal theory (Smith & Lazarus, 1990) it is emotion, and not cognitive

⁴ Although general appraisal style and trait anxiety are most likely mutually causal, most of the literature in this area has focused on the impact of specific appraisals on emotional experience (e.g., Smith & Lazarus, 1993). Consistent with this literature, our focus was on how the general tendency to make positive or negative appraisals influenced anxiety, and how these relationships influenced health outcomes. Therefore we examined the relationship from general appraisal style to trait anxiety, fully understanding that other causal sequences are also plausible.

appraisal, that serves as a direct motivational antecedent. Emotions, “prepare and motivate the person to cope with the adaptational implications of ... [environmental] demands” (Smith & Pope, 1992, p. 36). For example, negative affect has been shown to consistently predict coping efforts (Bolger, 1990). Although coping has been shown to influence emotional experience (Folkman & Lazarus, 1988), we view emotions as primarily impacted by cognitive appraisals (see also Smith, Haynes, Lazarus, & Pope, 1993) and coping primarily impacted by emotions. Coping may modify an ongoing emotion (e.g., anxiety may be attenuated following successful coping), however it is our perspective that the appraisal process and resulting emotions guide coping. Therefore the association between general appraisal style and coping ought to be mediated by consistent emotional experiences (i.e., trait anxiety).

Attributional Style and Health

Another stable dimension of cognitive responding associated with health patterns is attributional style (Abramson, Seligman, & Teasdale, 1978). Attributional style comes from the reformulated model of learned helplessness in which a pessimistic attributional style (i.e., the tendency to explain bad events as due to internal, stable, and global causes) leads to more severe helplessness deficits, and to longer lasting and more global depression than a more optimistic attributional style. The association between attributional style and health has been well documented. For example, using meta-analytic techniques to aggregate earlier findings, Sweeney, Anderson, and Bailey (1986) found that a pessimistic attributional style was significantly associated with depression, while more recent findings demonstrate its association with impaired physical health (e.g., Dua, 1994; Dua & Plumer, 1993; Lin & Peterson, 1990; Peterson, Seligman, & Vaillant, 1988).

One possible explanation of how attributional style impacts health is that coping efforts may partially mediate that relationship (Peterson & Seligman, 1987). Coping is thought to play a central role in mediating the influence of stress on health (see Cohen & Williamson, 1991; Lazarus & Folkman, 1984), and tending to attribute negative outcomes to stable, internal, and global causes implies that the available coping resources will be inadequate to avoid or control future negative events. Taken together, these three attributional dimensions ought to “affect coping in the broadest sense” (Peterson & Seligman, 1987, p. 256), and potentially lead one to “become passive in the face of illness [and stressful events]” (Peterson *et al.*, 1988, p. 26).

Consistent with this possibility, a pessimistic attributional style has been associated with low self-efficacy (Peterson, 1988), and poor problem-solving ability (Alloy, Peterson, Abramson, & Seligman, 1984). In addition, Lin and Peterson (1990) found that those tending to make stable, global, and internal attributions for bad events were less likely to take active steps in coping with a recent illness, and reported being sick more often in the past year than those with a more optimistic attributional style. Moreover, avoidant or repressive coping has been associated with psychological distress (Morrow, Thoreson, & Penney, 1995) and impaired functioning of the immune system (Jamner *et al.*, 1988), and problem-focused coping has been associated with overall good health (Scheier & Carver, 1985), even speeding recovery time after heart surgery (Scheier *et al.*, 1989).

In addition to coping, attributions also impact emotional experiences (Weiner & Graham, 1984), yet that impact is mediated by appraisal processes (Smith *et al.*, 1993). Attributions are *explanations* of why an event happened, and are “non-evaluative and fact-oriented ...” (Smith *et al.*, 1993, p. 917), whereas appraisals involve an *evaluation* of whether “the facts ... [have] implications for personal well-being” (Smith *et al.*, p. 917). Negative attributional styles should therefore be associated with consistent threat appraisals (i.e., negative general appraisal style) and anxiety. Overall, attributional style should be associated with ill health, and that association ought to be partially mediated by coping style, as well as by general appraisal style and emotional experiences (i.e., trait anxiety).

Study Development and Predictions

To explore these issues we designed a study to examine the relationships among general appraisal style, attributional style, trait anxiety, coping styles, two dimensions of psychological health (depression and hostility), and one dimension of physical health (flu-like symptoms). We chose to examine depression and hostility because of their consistent association with various health outcomes (e.g., Friedman & Booth-Kewley, 1987), and to examine flu-like symptoms because of the association between stress, suppression of the immune system, and health outcomes (e.g., Kiecolt-Glaser & Glaser, 1991).

We predicted that independently of initial health status, general appraisal style and attributional style would predict depression, hostility, and flu-like symptoms. Trait anxiety and coping style were predicted to mediate the influence of attributional style on health, while trait anxiety was also predicted to mediate between general appraisal style and health. We expected that the as-

sociation between attributional style and trait anxiety would be partially mediated by general appraisal style, and that general appraisal style would impact coping indirectly, as mediated by trait anxiety.

To further validate the GAM, we included in our research several personality dimensions relevant to appraisals (i.e., neuroticism, extraversion, self-esteem, locus of control, and sensitivity to criticism), as well as measures assessing life stress, positive and negative affect, and appraisals of a recent stressful life event. We predicted that the GAM would be significantly associated with the appraisal-relevant personality dimensions, and that it would predict, independently of attributional styles, affect, stress, and specific appraisals (all in a theoretically meaningful direction).

Our research differed from similar studies on several dimensions. First, unlike other studies examining appraisal and health, we examined *dispositional* appraisal style and not appraisals made in specific situations. Second, by including both general appraisal and attributional style in our research, we were able to examine predicted differences and similarities among these concepts. Third, we used a prospective design predicting health patterns over time, while controlling for initial health status. This approach allowed for a more conservative examination of our predictions, and more confidence in our conclusions regarding the causal direction between personality and health than is typical in similar studies (e.g., Lin & Peterson, 1990; Smith *et al*, 1993).

METHOD

Participants

The sample comprised of 190 (55 male and 135 female) students taking an introductory psychology course at a large Midwestern University. All participants received course credit.

Predictor Variables

General Appraisal. The General Appraisal Measure (GAM; Hemenover & Dienstbier, 1996) contains 21 life events (e.g., fight with roommate, death of a relative) derived from frequently used life event checklists (e.g., Holmes & Rahe, 1967). Participants respond to two items per event: (a) "How stressful would this event be?", and (b) "How able would you be to cope with this event?", on 7-point Likert scales ranging from *not at all* to *very*. The main index of the GAM was formed by taking a ratio of the stress to cope items for each event, summed across all 21 events and averaged. Gen-

eral appraisal increases in magnitude as (a) stressfulness scores increase and (b) perceived coping scores decrease. The GAM scores define a continuum ranging from a challenge appraisal style (low perceived stress and high perceived coping ability) to a threat appraisal style (high perceived stress and low perceived coping ability). As did all the measures used in this research, the GAM had acceptable internal reliability (Cronbach's alpha = .85, all other alphas \geq .82).

Attributional Style. The Attributional Style Questionnaire (ASQ; Peterson *et al*, 1982) contains 12 hypothetical events (6 bad and 6 good), and participants respond to 3 items for each event, assessing dimensions of stability, locus (internal or external), and globality. Items were presented on 7-point Likert-type scales with higher numbers indicating more stability, internality, and globality. Although the ASQ presents both positive and negative events, our interests focused on attributions about negative life events, and so we created an aggregate scale by summing responses to all six bad events for all three dimensions.

Neuroticism and Extraversion. The 92-item Interpersonal Adjective Scale presents 92 personality-relevant adjectives (Trapnell & Wiggins, 1990) to assess five trait dimensions including neuroticism and extraversion. Participants rate the relevance of each adjective for their own personality on 8-point disagree-agree Likert-type scales.

Self-Esteem. Participants respond on 5-point Likert-type disagree-agree scales to 10 items assessing global feelings of self-worth or self-acceptance (Rosenberg, 1965). Higher numbers indicate more self-esteem.

Locus of Control Scale. The Internal-External Locus of Control Scale (Rotter, 1966) presents 58 items assessing the general expectancy regarding the causation of outcomes. Participants respond on 5-point Likert-type scales ranging from *not at all* to *extremely*. Instead of participants choosing between two alternatively worded statements as is typical for this scale, participants rated agreement with all items. This allowed the computation of both an internal and external locus of control score.

Sensitivity To Criticism. For each of 30 life events two items are presented: "To what extent would you consider this a criticism?"; and "To what extent would this hurt you?" (Sensitivity To Criticism Scale: Atlas, 1994). Responses for all items are made on 7-point disagree-agree Likert-type scales and summed, resulting in an aggregate index of sensitivity to criticism.

Coping Style. The Coping Strategy Indicator (Amirkhan, 1990) presents 33 coping strategies that might be employed in any situation. Participants respond on 3-point Likert-type scales ranging from *not at all* to *a lot*. Participants were instructed to rate the extent to which they generally use each

coping strategy. Three coping styles are assessed by this scale; problem-focused, seeking social support, and avoidant.

Trait Anxiety. Participants completed the trait portion of the State-Trait Anxiety Inventory with higher numbers indicating more anxiety (STAI: Spielberger, Gorsuch, & Lushene, 1970).

Outcome Variables

Affect. Participants responded on 5-point Likert-type scales ranging from *never* to *very often*, to an affect adjective scale (Folkman & Lazarus, 1985). Participants were instructed to rate the extent to which, during the past 2 weeks, they have experienced each emotion. Two dimensions were assessed: (a) negative affect including the terms; fearful, anxious, worried, angry, sad, disappointed, disgusted, and “guilty; and (b) positive affect including the terms; relieved, happy, pleased, confident, hopeful, and eager.

Perceived Stress. On the Perceived Stress Scale (PSS) participants responded on 5-point Likert-type scales, ranging from *never* to *very often*, to 14 items assessing the extent to which they perceived their lives in the past 2 weeks as uncontrollable, unpredictable, and overloading (Cohen, Kamarck, & Mermelstein, 1983). All items were summed to produce an overall index of perceived stress.

Stress Appraisal. The Stress Appraisal Measure assesses seven dimensions of appraisals made for a specific event including; threat, challenge, centrality, controllable by the self, controllable by others, uncontrollable, and stressfulness (Peacock & Wong, 1990). All 28 items are presented on 4-point Likert-type items ranging from *not at all* to *extremely*.

Health. To minimize the inaccuracies that may be associated with retrospective reports over more extended intervals, our participants rated their mental and physical health at 2- to 3-week intervals rather than only at the study's beginning and end. Participants completed the hostility, depression, and somatization (hereafter referred to as flu-like symptoms) subscales of the Symptom Checklist 90 Revised (SCL-90-R; Derogatis, 1977), a measure designed to assess psychological and physical well-being. Participants rated, on 5-point Likert-type scales ranging from *not at all* to *extremely*, the extent to which they had been bothered by each symptom “during the past 2 weeks.” The flu-like symptoms subscale contains 12 common symptoms of the flu (e.g., headaches, nausea, lump in the throat), the hostility subscale contains six symptoms (e.g., temper outbursts you cannot control), and the depression subscale contains 13 symptoms (e.g., crying easily).

Procedure

Participants completed questionnaires both at the beginning of an academic semester (baseline), and approximately every 2 to 3 weeks during the semester. During the baseline assessment, participants came into the laboratory and completed a packet of measures including the General Appraisal Measure, the Attributional Style Questionnaire, the Interpersonal Adjective Scale, the Self-Esteem Scale, the Internal-External Locus of Control Scale, the Sensitivity to Criticism Scale, the Coping Strategy Indicator, the State-Trait Anxiety Inventory, and the flu-like symptoms, depression, and hostility subscales of the SCL-90-R. For all other assessments participants received the questionnaires by mail and returned them to the laboratory when completed.

During assessment 2, participants completed the negative and positive affect scales, the Perceived Stress Scale, and again completed the three health subscales of the SCL-90-R. During Assessments 3 through 5, participants again completed the three health subscales. During the fifth and last assessment (i.e., approximately 3 months after the first assessment) participants also made appraisals of a recent stressful life event by completing the Stress Appraisal Measure, and again completed the GAM. This assessment schedule resulted in four post-baseline assessment periods, for which 89% ($n = 170$) of the original sample provided complete data. The four post-baseline health assessments were aggregated (within health subscales) to produce more stable indicators of health status during the semester.

RESULTS

Validation of The General Appraisal Measure

We predicted that the GAM would be significantly correlated with several stress-relevant personality variables in theoretically meaningful ways. As predicted, the GAM was positively correlated with neuroticism, external locus of control, and sensitivity to criticism, and negatively correlated with self-esteem and extraversion (Table I). The GAM also exhibited an acceptable 3-month test-retest reliability (i.e., $r = .72$, $p < .01$), and a modest correlation with attributional style.

We also predicted that general appraisal style would prospectively predict various outcomes with the impacts of attributional style first removed. To address these predictions, we performed hierarchical multiple regression analyses with several of the measures taken at several times over the semester used as criterion variables. Those criterion measures included the positive

Table I. Correlations Between General Appraisal Style and Stress-Relevant Personality Dimensions

	General appraisal style
Neuroticism	.41 ^b
External locus of control	.30 ^b
Sensitivity to criticism	.34 ^b
Extraversion	-.23 ^b
Self-esteem	-.44 ^b
Attributional style	.15 ^a

^a*p* < .05.^b*p* < .01.

and negative affect scales, the PSS, and the seven appraisal dimensions of the Stress Appraisal Measure (i.e., threat, challenge, centrality, controllable by the self, controllable by others, uncontrollable, and stress-fulness). To further assess the unique contribution of general appraisal style to stress-relevant outcomes, we included neuroticism in our analyses. For all regression analyses to examine contributions to affect and appraisals beyond that provided by attributional style and neuroticism, we entered the GAM into the model in step 3, after entering neuroticism and attributional style in steps 1 and 2.

As Table II shows, independent of neuroticism and attributional style, general appraisal style significantly predicted the appraisal dimensions of stressful and controllable by the self, and marginally predicted the threatening dimension, $F(3, 150) = 10.38, p < .0001$; $F(3, 150) = 6.85, p < .0001$; and $F(3, 150) = 7.99, p < .0001$, respectively. (Based on our a priori directional predictions, we used one-tailed *t* tests to determine significance level for all beta coefficients reported in this study.) Attributional style significantly predicted the appraisal dimension of controllable by the self and marginally predicted the stressful dimension. General appraisal style also significantly (and more powerfully than attributional style) predicted perceived stress and negative affect, and appraisal style marginally predicted positive affect, $F(3, 150) = 15.38, p < .0001$; $F(3, 150) = 15.14, p < .0001$; and $F(3, 150) = 4.21, p < .007$, respectively.

General Appraisal Style, Attributional Style and Health

We predicted that independently of baseline health, general appraisal style and attributional style would predict patterns of depression, hostility, and flu-like symptoms over an academic semester. To examine our predictions, we per-

Table II. Standardized Beta Coefficients from Hierarchical Multiple Regression Predicting Appraisals and Affect

Variable	R ²	Neuroticism	Attributional style	Appraisal style
Threatening				
Step 1	.12	.35 ^d		
Step 2	.13	.36 ^d	.07	
Step 3	.14	.32 ^d	.07	.11 ^a
Stressful				
Step 1	.14	.38 ^d		
Step 2	.15	.38 ^d	.12 ^a	
Step 3	.17	.38 ^d	.12 ^a	.15 ^b
Controllable by self				
Step 1	.07	-.27 ^d		
Step 2	.09	-.23 ^c	-.15 ^b	
Step 3	.12	-.16 ^b	-.14 ^b	-.18 ^b
Perceived stress scale				
Step 1	.17	.42 ^d		
Step 2	.18	.33 ^d	.04	
Step 3	.23	.32 ^d	.05	.27 ^d
Positive affect				
Step 1	.06	-.25 ^c		
Step 2	.06	-.25 ^c	-.04	
Step 3	.08	-.25 ^b	-.04	-.13 ^a
Negative affect				
Step 1	.19	.44 ^d		
Step 2	.19	.45 ^d	.04	
Step 3	.23	.45 ^d	.04	.22 ^c

^a*p* < .10.^b*p* < .05.^c*p* < .01.^d*p* < .001.

formed hierarchical multiple regression using the aggregated subscales of hostility, depression, and flu-like symptoms as criterion variables. For all regression analyses to examine contributions to health beyond that provided by attributions and baseline health, we entered general appraisal style into the model in Step 3, after entering baseline health and attributional style in Steps 1 and 2.

As can be seen in Table III, our predictions for hostility and flu-like symptoms were supported. Independent of baseline health, general appraisal style significantly, and attributional style marginally, predicted hostility, and general appraisal style and attributional style significantly predicted flu-like symptoms, $F(3, 152) = 50.76, p < .0001$; and $F(3, 143) = 29.80, p < .0001$, respectively. Neither general appraisal nor attributional style were significant predictors of depression (i.e., both Betas < .05, *ns*).

Table III. Standardized Regression Coefficients Predicting Health and Coping^a

Variable	R ²		Attributional style	Appraisal style
Hostility		Hos1		
Step 1	.50	.71 ^e		
Step 2	.51	.69 ^e	.09 ^b	
Step 3	.52	.67 ^e	.07	.11 ^c
Flu-like symptoms		Flu1		
Step 1	.54	.74 ^e		
Step 2	.56	.63 ^e	.12 ^e	
Step 3	.57	.62 ^e	.07 ^c	.10 ^c
Depression at Time 5		Depl		
Step 1	.40	.63 ^e		
Step 2	.42	.59 ^e	.15 ^d	
Step 3	.42	.57 ^e	.15 ^d	.05

^aHos1 = hostility at Time 1, Depl = depression and Time 1, Flu1 = flu-like symptoms at Time 1, Att Style = attributional style, Appraisal Style = general appraisal style.

^b*p* < .10.

^c*p* < .05.

^d*p* < .01.

^e*p* < .001.

To further examine the relationship between personality and depression, we used the depression subscales from assessment Periods 2, 3, 4, and 5 as criterion variables in a series of post-hoc hierarchical multiple regression analyses. To control for initial depression, we entered baseline depression into the model in Step 1, and entered attributional style into the model in Step 2, followed by general appraisal style entered in Step 3. Results showed that attributional style, but not general appraisal, marginally predicted depression at the fourth assessment ($R^2 = .44$), $F(3, 153) = 39.58$, $p < .0001$; full model $\beta_s = .08$, $p > .10$; and $.07$, $p < .20$, respectively, and significantly predicted depression at the fifth assessment $F(3, 156) = 33.80$, $p < .0001$ (Table III). Upon closer inspection a trend became apparent, showing that over time the relationship between attributional style and depression became stronger.⁵ This trend can be seen most clearly by examining the beta weights for attributional style from all the regression equations involving attributional style, general appraisal style, and depression full model β_s for Time 2–5: $p = .00$, $p > .90$; $\beta = .06$, $p > .27$; $\beta = .08$, $p < .10$; and $\beta = .15$, $p < .05$, respectively).

⁵ We offer thanks to an anonymous reviewer for suggesting this possibility.

Trait Anxiety, Coping Style, and Health

We predicted that trait anxiety would act as a mediator between attributional style and health, between general appraisal style, coping style, and health, and that coping style would act as a mediator between attributional style and health. To confirm mediation, the following conditions need to be met: (a) the independent variables (general appraisal style and attributional style) must account for significant variation in the proposed mediators (trait anxiety and coping style); (b) the independent variables must account for significant variation in the dependent variables (hostility, flu-like symptoms, and depression); and (c) when the dependent variable is regressed on both the independent variable and the proposed mediator, the path (i.e., regression coefficient) from the independent variable to the dependent variable must be substantially lower than in condition (b), with complete mediation producing a coefficient equal to 0 (see Baron & Kenny, 1986).

To examine our mediational predictions, we performed a series of hierarchical regression analyses using as criterion variables trait anxiety, the three coping styles (i.e., problem-focused, seeking social support, and avoidant), hostility, flu-like symptoms, and depression (at the fifth assessment).⁶ We entered baseline health (when relevant), attributional style, and general appraisal style all into the models in Step 1. For all relevant models we next entered trait anxiety in Step 2, and used a forward stepwise procedure to enter the three coping styles into the model in Step 3. (This regression procedure tested two of the conditions needed for mediation, i.e., conditions a and c. The other necessary condition, i.e., condition b, was tested as a result of earlier analyses; see Table III.) As there was no strong theoretical basis for expecting one, and not another, of the three coping styles to be a significant predictor, we chose a conservative stepwise procedure in which the coping styles competed for entry into the model. For the models predicting coping styles we entered attributional style, general appraisal style, and trait anxiety in Steps 1, 2, and 3.

As can be seen in Table IV condition (a) was met for trait anxiety with general appraisal style and attributional style significantly predicting trait anxiety, $F(2,167) = 26.85$, $p < .0001$; and for coping with attributional style pre-

⁶ Time 5 depression was significantly predicted by attributional style, whereas depression levels assessed prior to Time 5 were not as strongly related to attribution. Thus by using only the Time-5 depression measure we recognize that we employ a less conservative strategy. However, our analyses are already quite conservative as a result of first controlling for the effects of baseline depression. Since our analyses are both to test our formal hypotheses and to determine relationships between these dimensions irrespective of our hypotheses, this less conservative approach seems appropriate.

Table IV. Standardized Regression Coefficients Predicting Health and Coping^a

	R ²	Hos1	Att style	Appraisal style	TraitA	
Hostility						
Step 1	.52	.67 ^d	.07	.11 ^b		
Step 2	.55	.59 ^d	.04	.03	.23 ^c	
	R ²	Flu1	Att style	Appraisal style	TraitA	
Flu-like symptoms						
Step 1	.57	.62 ^d	.07 ^b	.10 ^b		
Step 2	.59	.60 ^d	.02	.04	.20 ^c	
	R ²	Depl	Att style	Appraisal style	TraitA	Avoid
Depression at Time 5						
Step 1	.42	.57 ^d	.15 ^c	.05		
Step 2	.46	.34 ^d	.12 ^b	.00	.34 ^d	
Step 3	.47	.33 ^d	.11 ^b	.00	.30 ^c	.17 ^c
	R ²	Att style	Appraisal style	TraitA		
Trait anxiety						
Step 1	.06	.25 ^d				
Step 2	.24	.19 ^c	.43 ^d			
	R ²	Att style	Appraisal style	TraitA		
Problem focused coping style						
Step 1	.01	-.09				
Step 2	.05	-.06	-.21 ^c			
Step 3	.12	-.00	-.07	-.31 ^d		
	R ²	Att style	Appraisal style	TraitA		
Seeking social support coping style						
Step 1	.04	-.20 ^c				
Step 2	.04	-.20 ^c	-.00			
Step 3	.04	-.18 ^b	-.04	-.09		
	R ²	Att style	Appraisal style	TraitA		
Avoidant coping style						
Step 1	.02	.12				
Step 2	.06	.10	.20 ^c			
Step 3	.13	.03	.06	.33 ^d		

^aHos1 = hostility at Time 1, Dep1 = depression and Time 1, Flu1 = flu-like symptoms at Time 1, Att Style = attributional style, Appraisal Style = general appraisal style, TraitA = trait anxiety, Avoid = avoidant coping style.

^b $p < .05$.

^c $p < .01$.

^d $p < .001$.

dicting seeking social support coping, $F(3, 161) = 2.57, p < .05$, and general appraisal style predicting problem-focused and avoidant coping, $F(3, 161) = 7.79, p < .0001$; and $F(3, 167) = 8.19, p < .0001$, respectively. Condition (b) was met with general appraisal style significantly, and attributional style marginally, predicting hostility; general appraisal style and attributional style significantly predicting flu-like symptoms; and attributional style significantly predicting depression (see Table III for betas and above text for F s). Condition (c) was met for hostility, flu-like symptoms, and depression, with trait anxiety acting as the only significant predictor (other than baseline health) of hostility and flu-like symptoms in the full regression model, $F(7, 144) = 27.27, p < .0001$, and $F(7, 143) = 29.80, p < .0001$, respectively. Attributional style and trait anxiety were significant predictors of depression on Step 4, however the beta coefficient for attributional style was substantially reduced on this step, $F(7, 147) = 18.80, p < .0001$.

Overall, these findings support trait anxiety as a mediator between general appraisal style, and both hostility and flu-like symptoms; and as a mediator between attributional style, and both depression and flu-like symptoms. We present these results in a path diagram (Fig. 1). The findings further support trait anxiety as a mediator between general appraisal style and coping (i.e., problem-focused and avoidant coping), and general appraisal style as a mediator between attributional style and trait anxiety. Effects decomposition revealed significant indirect effects from attributional style to flu-like symptoms, depression, and trait anxiety, and from general appraisal style to flu-like symptoms, hostility, and problem-focused and avoidance coping (Table V). Indirect effects were also found from trait anxiety to depression. Even though attributional style predicted seeking social support, that coping style did not predict health patterns. Therefore the proposed mediation by coping between attributional style and health was not supported.

DISCUSSION

Validation of the General Appraisal Measure

Replicating earlier work (Hemenover & Dienstbier, 1996) and consistent with our predictions, the GAM exhibited high internal reliability, was highly stable over a 3-month period, was associated with several stress relevant personality dimensions, and predicted appraisals, affect, and perceived stress 2 weeks to 3 months later. Overall it appears that the GAM is a highly reliable and valid instrument that assesses a stable dimension of personality.

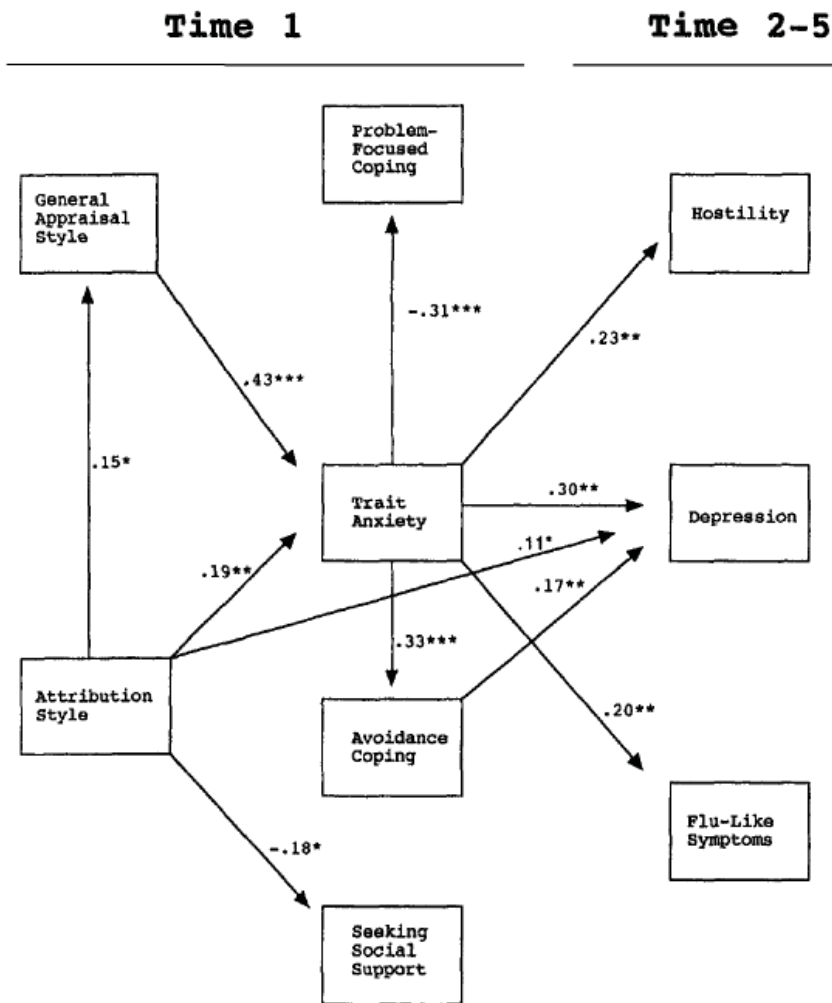


Fig. 1. Standardized regression coefficients from the path analyses. All coefficients for health are independent of the relevant baseline health scale. For the sake of clarity, the coefficients for the baseline health scales are not represented here (see Table III), * $p < .05$; ** $p < .01$; *** $p < .001$.

Table V. Indirect Effect Coefficients from the Regression Analyses^a

	Att style	App style	TraitA
Hostility	—	.10 ^d	—
Depression	.07 ^c	—	.06 ^c
Flu-like symptoms	.04 ^b	.09 ^d	—
Problem-focused coping	—	-.13 ^d	—
Avoidance coping	—	.14 ^d	—
Trait anxiety	.06 ^c	—	—

^aAtt Style = attributional style, App Style = general appraisal style, TraitA = trait anxiety. Indirect effect coefficients were computed by summing the product(s) of all indirect paths between variables (see Fig. 1).

^b $p < .05$.

^c $p < .01$.

^d $p < .001$.

Appraisals and Attributions

We predicted that independently of attributional style, general appraisal style would predict specific appraisal and affect patterns. Results show that, independently of attributions (and of neuroticism), the more one generally viewed life events as threatening, the more negative, and the less positive affect one experienced, the more one's life was viewed as uncontrollable, and the more a recent life event was appraised as threatening, stressful, and difficult to control. General appraisal style was also a stronger predictor of trait anxiety than was attributional style, and partially mediated the relationship between attributional style and trait anxiety. Attributional style did not predict affect or perceived stress, but marginally predicted stressful appraisals, and significantly predicted the appraisal dimension of controllable by-the-self.

These results suggest that both appraisal and attributional styles are important (and somewhat independent) predictors of specific stress appraisals. However, consistent with earlier findings (Smith *et al*, 1993), appraisal style was more relevant for affective experiences than was attributional style. This pattern of findings highlight the conceptual distinctions between appraisal and attributional styles, and complement previous research in illustrating the usefulness of general appraisal style in predicting stress relevant outcomes (e.g., Hemenover & Dienstbier, 1996). It is clear that general ap-

praisal style is a somewhat stable and unique personality dimension that predicts a wide variety of stress responses. More research is needed to further examine the long-term stability of, and range of responses predicted by, general appraisal style.

Health

Negative general appraisal and attributional styles led, independently of baseline health, to greater hostility and flu-like symptoms during the semester, while a negative attributional style also led to more depression (only for the fifth assessment). As predicted, these findings were mediated by trait anxiety. Although the specific mechanisms by which trait anxiety influenced health are unknown, past research suggests that negative emotional experiences (i.e., as a result of stress appraisals) suppress immune responding, resulting in greater vulnerability to viral infections (see Cohen *et al.*, 1991; Kiecolt-Glaser & Glaser, 1991). Therefore it is likely that our participants with negative appraisal and attribution styles, who were also high on trait anxiety, and who made more threat appraisals and experienced greater negative affect, would be ill more often during the semester and hence would report more flu-like symptoms than those with positive styles. It is also likely that the consistent experience of anxiety would engender a host of negative responses, including feelings of antagonism. Therefore appraisal and attributional styles may have led to greater hostility as a result of their influence on threat appraisals and anxiety.

Inconsistent with our predictions, coping style did not mediate between attributional style and health. Although a negative attributional style was negatively associated with seeking social support, this coping style did not predict health patterns. This was surprising because past research has shown an association between attributional style, specific coping responses, and self-reported health (e.g., Lin & Peterson, 1990). It is possible that social-support coping is not relevant for the types of health we assessed, or that 3 months was not enough time for the emergence of a reliable association between coping and health. This latter possibility is consistent with the finding of only one significant association between coping and health (i.e., between avoidance coping and depression). We leave clarification of this issue to future research.

The finding that attributional style predicted depression only for Assessment 5 was surprising given the large literature linking attributions and depression (e.g., Sweeney *et al.*, 1986). However, because depression may develop over time, the effects of attributional style on depression may be most clearly seen for a longer period than observed in the present study. This pos-

sibility is consistent with the positive temporal trend observed between attributional style and depression, and with previous research showing that attributional style influences health outcomes, but only after an extended period of time (Peterson *et al.*, 1988).

Overall, the current findings replicate and expand on past research that has linked health with specific appraisals and attributional style (e.g., Folkman *et al.*, 1986; Peterson *et al.*, 1988). They indicate that general appraisal style and attributional style may act as somewhat independent risk factors for ill health, and that this risk may be transferred to health outcomes through consistent affective experiences. It is clear that to fully understand the effects of personality on health both general appraisal style and attributional style should be considered.

An alternative explanation for our findings of an association between appraisals, attributions, and health is that reporting such symptoms may reflect a response bias rather than ill health. For example, neuroticism has been associated with self-reported health independent of actual health status (Costa & McCrae, 1980, 1985). To avoid such an interpretation, some researchers have advocated the use of more objective health measures such as visits to physicians. However, such visits are likely to be influenced by practical considerations (availability of appropriate appointment times and the press of work, etc.) as well as the same mix of psychological (e.g., neuroticism) and health factors that influence symptom reporting on questionnaires. In addition, physicians tend to rely on self-reported symptoms when diagnosing the health problems assessed in the current study (e.g., viral infections such as the flu). Finally, because response bias impacts on symptom reporting should not necessarily change over time, our procedure of controlling for baseline health may also control for any existing response biases. We therefore argue for the relative validity of our health measure based upon similar bias problems with alternative measures that only appear to be more objective, and based on our conservative regression procedures controlling for baseline health.

Future Directions

As our study is the first to examine the impacts of both general appraisal style and attributional style on health, more research is needed. The possibility that the immune system is consistently suppressed by negative appraisal and attributional styles should be investigated using measures of health status that directly assess immune function. Further research should also examine other variables that may mediate the influence of appraisal and attributional styles on health. Although our research suggests one such mediator (i.e., trait anxiety), others need further study (e.g., specific coping efforts). Finally, to

examine the possibility that our results are due primarily to a response bias, we recommend that future researchers utilize health measures that are not responsive to the psychological factors (e.g., neuroticism) that influence symptom reporting on questionnaires.

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