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Pessimistic explanatory style moderates the effect of stress on physical illness

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Abstract

Explanatory style is a cognitive personality variable that reflects the tendency to explain bad events involving the self with causes that are internal to the self, stable across time, and global in effect. The attribution reformulation of helplessness theory predicts that stress coupled with a pessimistic explanatory style leads to negative outcomes, including physical illness, among at-risk individuals. This longitudinal study of 198 college students examined whether pessimistic explanatory style interacts with perceived stress to predict subsequent illness, even when controlling for baseline illness. Results confirmed this hypothesis. © 2002 Published by Elsevier Science Ltd. All rights reserved.

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What predicts the onset of illness? Current thinking points to an interaction among biological, psychological, and situational risk factors (Justice, 1988; Ornstein & Sobel, 1989; Scheier & Carver, 1992). A representative model of these interactive influences is the attribution reformulation of helplessness theory (Peterson & Bossio, 1991, 1993, 2001). According to this diathesis-stress model, stress coupled with a pessimistic explanatory style leads to negative outcomes, including illness, among individuals who are biologically or otherwise at risk (Abramson, Seligman, & Teasdale, 1978).

Explanatory style is a cognitive personality variable that reflects the tendency to explain bad events involving the self with causes that are internal to the self (“it’s me”), stable across time (“it’s going to last forever”), and global in effect (“it’s going to undercut everything”) (Peterson & Seligman, 1984). Explanatory style has been examined extensively as a risk factor for depression (Sweeney, Anderson, & Bailey, 1986), but an emerging literature shows too that it foreshadows

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poor health measured in a variety of ways: symptom reports, doctor visits, physician exam, immunosuppression, survival time with cancer, recurrence of heart disease, and untimely death (e.g. Buchanan, 1995; Kamen-Siegel, Rodin, Seligman, & Dwyer, 1991; Levy, Lee, Bagley, & Lippman, 1988; Lin & Peterson, 1990; Peterson, 1988; Peterson, Seligman, & Vaillant, 1988; Peterson, Seligman, Yurko, Martin, & Friedman, 1998).

What research has not shown to date is that explanatory style interacts with stress to make illness more likely. By and large, previous studies have not examined the diathesis-stress hypothesis. Instead, most studies have focused on testing the “main effect” of explanatory style on poor health. In one study that did examine the role of stress in the form of major life events, no evidence was found for an interaction with pessimistic explanatory style (Dykema, Bergbower, & Peterson, 1995). Although the helplessness reformulation may well be wrong with respect to the diathesis-stress prediction, the design of this nonconfirming study makes it inconclusive. College students were the research subjects, and they were followed for one month. The occurrence of stressful life events for the entire time period was assessed at the end of the month, and when during the past month these events took place was not measured.

One problem with this design is that very few of the students experienced the sorts of life events during the study period that epidemiological research has linked to the onset of illness (Holmes & Rahe, 1967). Stress as indexed by experiencing life events might have yielded insufficient variance to do justice to the diathesis-stress hypothesis. As well, the life events scale used might have missed some of the events that were stressful for the participants. Finally, even if stress-inducing, health-damaging life events did occur for some research participants, and even if they were correctly identified by the measure employed, the time period might have been too short to detect such an effect, especially if the events occurred shortly before the end of the month, as some of them surely would have.

Here, we report a more appropriate study. College students were again the research subjects, but they were followed over a 9-week period. Perceived stress was measured at the beginning of the study, along with explanatory style and a baseline measure of health status (to index generic vulnerability to illness). Rather than asking about specific life events, we requested that research participants each make a summary judgment of the stress they were experiencing at that time. Subsequent health status was determined by weekly symptom reports, yielding — we hoped — a stable estimate of physical well-being. The hypothesis of interest remained the diathesis-stress prediction of the attribution reformulation of helplessness theory. Specifically, we predicted that the relationship between stress and illness should be positive and stronger for individuals with more pessimistic explanatory styles than for individuals with more optimistic explanatory styles.

1. Method

1.1. Participants and procedure

One hundred ninety-eight students from a public university in the mid-Atlantic region of the United States participated in a 9-week study investigating the relationship between stress, coping, and personality with physical illness and psychological distress. Participants were members of an Introduction to Health Psychology course ($n=205$) in which students were given a choice

between participating in the study or writing three short papers. Approximately 97% of the class chose to participate in the study. Of those who participated, 70% were female, 27% were male, and 3% did not report their gender. Self-identified Whites comprised 69% of the sample, along with 21% self-identified African Americans and 10% self-identified Asian Americans, Native Americans, or Latina/os. Five percent of the sample were first-year students, 18% second-year students, 42% third-year students, 29% fourth-year students, 3% fifth- or sixth-year students, and 3% did not report their year in college.

During the third week of class, participants were given a health psychology journal that consisted of a series of psychological and health-related questionnaires. These measures were completed on a weekly basis over a 9-week period, with many measures repeated across weeks. Participants were instructed to complete the journal at the end of each week of the study and to turn in the completed portion of the journal to class on the following Tuesday.

1.2. Measures

Although there were numerous measures included in the health psychology journal, we describe only those relevant to the present study.

1.2.1. *Perceived Stress Scale (PSS)*

During week one of the study, participants completed the PSS, which includes 14 items that assess the degree to which individuals appraise their lives as stressful (Cohen, Kamarck, & Mermelstein, 1983). Participants responded to a 5-point scale (from 0, “never” to 4, “very often”) about how often they have had specific feelings or thoughts over the past month. Sample items include: “In the last month, how often have you felt nervous and ‘stressed?’” and “In the last month, how often have you felt on top of things?” A summary score was created by reverse-scoring the appropriate items and averaging across the 14 items. A higher score indicates greater stress. In the present sample, the internal consistency of the PSS, estimated by Cronbach’s (1951) coefficient alpha, was 0.85. Possible scores on this scale ranged from 0 to 4; actual reported scores ranged from 0.50 to 3.36.

1.2.2. *Expanded Attributional Styles Questionnaire (EASQ)*

During week two of the study, participants completed the EASQ (Peterson & Villanova, 1988). This measure presents respondents with 24 hypothetical bad events. They are asked to imagine each event happening to them and to provide in writing the one major cause of this event. They then rate the cause of the given event on a seven-point scale according to its internality, stability, and globality. As in previous studies, these ratings were averaged across events and across the three attributional dimensions to yield a single score (Peterson, Maier, & Seligman, 1993). Higher scores on the scale represent a more internal, stable, and global — more pessimistic — explanatory style. In the present sample, the composite explanatory style measure had a coefficient alpha of 0.88. Possible scores on this scale ranged from 1 to 7; actual reported scores ranged from 2.61 to 5.65.

1.2.3. *Physical illness*

During each week of the study, participants completed an 11-item measure of physical illness devised for the present study. The first three items asked respondents to rate the number of days,

from 0 to 7, in the past week in which they: (a) felt ill; (b) missed a class because of illness; and (c) went to a doctor or health professional for a diagnosis and/or treatment of an illness. For the final eight items, participants used a four-point scale (1 = have not been bothered; 4 = greatly bothered) to rate the extent to which they were bothered during the past week with each of the following health problems: colds, headaches, body aches, over-eating, under-eating, extreme tiredness, insomnia, and dental problems.

Two composite scales of illness reports were generated. The first composite, which we called the Previous Illness Index (PII), was created by standardizing all of the items in week one to place them on the same metric and then averaging the standardized scores into a single composite ($\alpha = 0.69$). Before standardizing, possible scores on the mean of the first three items on this scale ranged from 0 to 7; actual reported scores on the mean of these items ranged from 0 to 5. Possible scores on the mean of the remaining eight items ranged from 1 to 4; actual reported scores on the mean of these items ranged from 1 to 3.38.

We created a second composite score, the Subsequent Illness Index (SII), by standardizing and then averaging the items for weeks three through nine ($\alpha = 0.81$). Before standardizing, possible scores on the mean of the first three items on this scale ranged from 0 to 7; actual reported scores on the mean of these items across weeks three through nine ranged from 0 to 2.72. Possible scores on the mean of the remaining eight items ranged from 1 to 4; actual reported scores on the mean of these items across weeks three through nine ranged from 1.08 to 2.27. For both the PII and the SII, higher scores represent greater self-reported illness.

2. Results

The descriptive data presented in Table 1 show that this was a fairly healthy population. As mentioned, there were relatively low levels of perceived stress and self-reported physical illness (previous and subsequent). However, there was adequate variance in explanatory style, perceived stress, previous illness, and subsequent illness to test our hypothesis. Gender and ethnicity were

Table 1
Means, standard deviations, and zero-order correlations

	1	2	3	4
1. Previous illness	–	0.42***	0.21***	0.27***
2. Stress		–	0.17*	0.15*
3. Explanatory style			–	0.07
4. Subsequent illness				–
Mean	0.00 ^a	1.84	4.22	0.22
S.D.	0.49	0.54	0.53	0.28

^a The mean of 0.00 for previous illness reflects that to create the Previous Illness Index, items of differing metrics were standardized (resulting in a mean of zero), not that there was no previous illness in this sample.

* $P < 0.05$.

*** $P < 0.001$.

not related to self-reported physical illness (previous or subsequent), and were not analyzed in subsequent analyses.

Our hypothesis was that the interaction of pessimistic explanatory style and perceived stress would predict subsequent physical illness, even when baseline illness was controlled. We used hierarchical multiple regression to test both the main effects of explanatory style and previous perceived stress, and their interaction, on subsequent illness, controlling for previous illness (Table 2). The hierarchical regression model was constructed as follows: participants' previous illness was entered in Step 1; explanatory style and perceived stress were entered in Step 2; and finally, the explanatory style by perceived stress interaction was entered at Step 3.

The explanatory style by perceived stress interaction accounted for a small but statistically significant portion of the variance in predicting subsequent illness. The interaction of explanatory style (higher scores indicating a more pessimistic style) and perceived stress predicted subsequent illness, even when controlling for previous illness. Further, when regressions were calculated separately for those with a more pessimistic explanatory style and for those with a more optimistic style (as determined by a median split on the EASQ), perceived stress predicted subsequent illness for pessimistic individuals ($\beta=0.28$, $t=2.8$, $P<0.005$) but not for optimistic individuals ($\beta=-0.07$, $t=-0.64$, ns; Fig. 1). In sum, even when controlling for initial stress, pessimistic explanatory style appears to exacerbate the impact of stress on illness.

3. Discussion and conclusion

These results support the diathesis-stress prediction of the attribution reformulation of helplessness theory: pessimistic explanatory style interacts with perceived stress to predict subsequent physical illness, even when baseline illness is controlled. For those with an optimistic explanatory style in this study, there was no relationship between stress and illness. These data also suggest that researchers do not capture the whole story when examining only the main effects of either the diathesis or the stressor on subsequent physical illness. Neither perceived stress nor pessimistic attributional style alone predicted subsequent physical illness; only the interaction of perceived stress and pessimistic attributional style predicted subsequent physical illness. While the interaction accounted for a small portion of the variance, it still accounted for more than the given diathesis and stressor each did separately. Further, these data show that personality

Table 2
Hierarchical multiple regression analyses predicting subsequent illness

Step and predictor variable	Subsequent illness		
	β	ΔR^2	Final β
1. Previous illness	0.27***	0.07***	0.23**
2. Explanatory style	0.04	0.00	0.03
stress	0.02		0.02
3. Explanatory style \times stress		0.02*	0.14*

* $P=0.05$.

** $P<0.01$.

*** $P<0.001$.

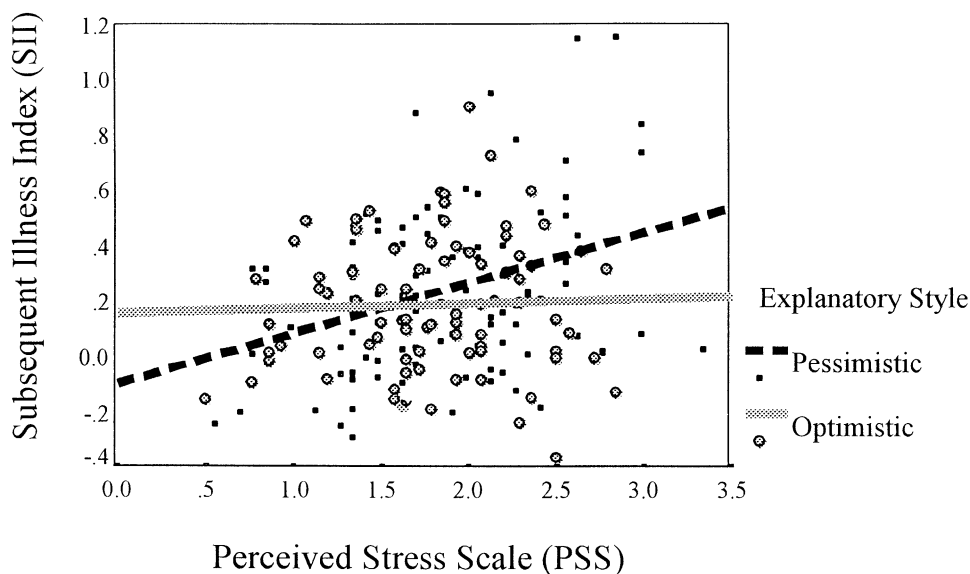


Fig. 1. The relationship between perceived stress and subsequent illness by explanatory style.

characteristics — such as pessimistic explanatory style — can serve as a diathesis for subsequent *physical* health outcomes. This suggests that researchers and clinicians could meaningfully incorporate personality measures to help understand the onset and course of physical health and illness.

As well, these data suggest that a more optimistic explanatory style may be a protective factor against the deleterious influence that stress may have on physical health. However, it is still unclear as to the processes by which explanatory style may be interacting with stress to effect health. One possible process is through the appraisal and coping process. Sellers and Peterson (1993) found evidence in a sample of college athletes that explanatory styles were related to coping behavior via individuals' appraisals of controllable events. Specifically, pessimistic individuals were more likely to appraise these controllable events as being ones that they could handle, and in turn, reported greater coping effort. It is possible that when individuals with more pessimistic explanatory styles confront stress, their propensity to appraise stressful situations as manageable makes them particularly vulnerable to physical illness when they are unsuccessful in their attempts to reduce the stress.

In sum, this research provides a useful first step toward establishing that explanatory style interacts with stress to influence physical health. Importantly, there are limitations to this study that need to be remedied in future investigations. To see if this interaction of pessimistic explanatory style and stress may be generalized beyond a college sample, future research needs to use samples more diverse across age span, perceived stress, and physical health. Using different methods to assess explanatory style, stress, and physical health would be important to establish that the effects found here are due to more than shared method variance. For example, future studies could use peer, partner, and self-ratings of explanatory style, stress, and physical illness. Physical illness could also be assessed from medical records. Also, it is important to see if this interaction may be generalized to predicting other types and degrees of illness outcomes: accidents, more serious physical illnesses, and emotional distress. Finally, it remains to be explained whether explanatory style is most linked to the onset of illness, its course, or its recurrence.

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