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Pessimistic Explanatory Style Is a Risk Factor for Physical Illness: A Thirty-Five-Year Longitudinal Study

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Explanatory style, the habitual ways in which individuals explain bad events, was extracted from open-ended questionnaires filled out by 99 graduates of the Harvard University classes of 1942–1944 at age 25. Physical health from ages 30 to 60 as measured by physician examination was related to earlier explanatory style. Pessimistic explanatory style (the belief that bad events are caused by stable, global, and internal factors) predicted poor health at ages 45 through 60, even when physical and mental health at age 25 were controlled. Pessimism in early adulthood appears to be a risk factor for poor health in middle and late adulthood.

Do our habits of explaining bad events when we are young predict our physical health in later life? Several lines of evidence imply that such explanatory styles might predict subsequent ill health. For example, research with animals suggests that uncontrollable bad events make poor immune functioning and illness more likely (Laudenslager, Ryan, Drugan, Hyson, & Maier, 1983; Sklar & Anisman, 1979; Visintainer, Volpicelli, & Seligman, 1982). And research with humans suggests that individuals who explain such bad events pessimistically have lowered immune function (Kamen, Rodin, & Seligman, 1987) and, over a 1-year span, make more doctor visits than do individuals who explain bad events optimistically (Peterson, 1988). We set out to investigate whether individuals who explain bad events pessimistically in early adulthood have more illness in middle and late adulthood.

We believe that an adequate investigation of early psychological precursors of illness and death should meet several stringent methodological requirements:

1. The research design must be longitudinal and span enough time for change in illness status to occur; this may require several years or even decades. Our study covers a 35-year period.

2. The initial health status of research participants must be known when the investigation begins. We began with certifiably healthy members of the Harvard University classes of 1942–1944.

3. An adequate number of research participants must be studied because links between psychology factors and illness—if they exist—are probably modest. We used 99 subjects.

4. Objective measures of health and illness that go beyond self-report must be available at the time the investigation begins, during the study, and at the time at which it ends. We used physician examinations numerically rated by an internist who was blind to other data.

5. There must be minimal attrition over the course of the investigation. We had less than 5% attrition.

Our study met these criteria and found that a cognitive personality variable, explanatory style, predicts health two and three decades later in life.

Explanatory style is the habitual way in which people explain the bad events that befall them (Peterson & Seligman, 1984a). Three dimensions of these explanations are of interest: stability versus instability, globality versus specificity, and internality versus externality. A stable cause invokes a long-lasting factor ("it's never going to go away"), whereas an unstable cause is transient ("it was a one-time thing"). A global cause is one that affects a wide domain of activities ("it's going to ruin everything I do"), whereas a specific cause is circumscribed ("it has no bearing on my life"). Finally, an internal cause points to something about the self ("it's me"), whereas an external cause points to other people or circumstances ("it's the heat in this place").

Explanatory style emerged from the reformulation of the learned helplessness model as a way of accounting for the diversity of people's responses to uncontrollable bad events (Abramson, Seligman, & Teasdale, 1978). A person who explains such events with stable, global, and internal causes shows more severe helplessness deficits than a person who explains them with

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unstable, specific, and external causes. These deficits include passivity, depression, poor problem solving, low self-esteem, poor immune function, and higher morbidity (Kamen et al., 1987; Maier & Seligman, 1976; Peterson, 1988; Seligman, 1975). Explanatory style is a prime candidate as a psychological precursor of good or bad health because it affects the severity of deficits following uncontrollable aversive events (Peterson & Seligman, 1984a).

Researchers usually use a questionnaire to measure explanatory style (Peterson et al., 1982), but also suitable and validated is a procedure that content analyzes natural speech for explanations (e.g., Peterson, Bettes, & Seligman, 1985; Peterson, Luborsky, & Seligman, 1983). It is called the CAVE technique (Content Analysis of Verbatim Explanations). Causal explanations are frequent in written and spoken material when bad events are on focus (cf. Weiner, 1985). Judges extract and rate causal explanations according to their stability, globality, and internality. Explanatory style assessed in this way is blind and reliable, with accumulating validity (Peterson & Seligman, 1984b). It is also stable: Explanations for bad events correlate .55 over 52 years (Burns & Seligman, 1987). Most important for the present purposes, the CAVE technique allows explanatory style to be measured using verbatim statements from the distant past.

We used the CAVE procedure to analyze open-ended questionnaires completed in 1946 (at approximately age 25) by participants in the well-known Study of Adult Development at the Harvard University Health Sciences. This project is an ongoing longitudinal investigation initiated by Clark Heath and Arlie Bock in 1937 to study "the kinds of people who are well and do well" (Vaillant, 1977, p. 3). Our major hypothesis was that the men who explain bad events pessimistically, with stable, global, and internal causes, will show worse health outcomes later in life than men who explain bad events with unstable, specific, and external causes. Furthermore, this relation should hold above and beyond their initial health status.

Method

Subjects and Procedure

The Study of Adult Development began with mentally and physically healthy and successful members of the classes of 1942 through 1944 at Harvard University. Potential subjects were first screened on the basis of academic success (40% of the entire student body was excluded), then on the basis of physical and psychological health (another 30% was excluded), and finally on the basis of nominations by college deans of the most independent and healthy individuals. In all, 268 young men were included in the study. See Vaillant (1977, pp. 30–49) for details of the selection procedure.

Each subject, while an undergraduate, took an extensive physical examination and completed a battery of personality and intelligence tests. After graduation, the subjects completed annual questionnaires about employment, family, health, and so on. The results of periodic physical examinations of each subject, conducted by his own doctor, are also available. A total of 10 men withdrew from the study during college, and 2 more men withdrew after graduation.

For the present investigation, we studied 99 of these subjects, chosen arbitrarily according to the first letter of their last names. We used this sample size because previous investigations of explanatory style have consistently found significant correlations in samples of this size (see Peterson, Villanova, & Raps, 1985; Sweeney, Anderson, & Bailey, 1986).

Assessment of Explanatory Style

Using the CAVE technique, we analyzed the responses of these 99 men to open-ended questionnaires completed in 1946 that asked about difficult wartime experiences:

> What difficult personal situations did you encounter (we want details), were they in combat or not, or did they occur in relations with superiors or men under you? Were these battles you had to fight within yourself? How successful or unsuccessful in your own opinion were you in these situations? How were they related to your work or health? What physical or mental symptoms did you experience at such times?

When a bad event involving the subject was described, along with a causal explanation, both were extracted and written on index cards. The index cards were shown to four independent judges, blind to the source of the quotes, the health of the individual, and the other statements he had made. Judges rated each cause on 7-point scales according to its stability, globality, and internality.

The ratings were averaged into a composite (across judges, across events, and across dimensions) so that each research participant had an explanatory style score ranging from relatively unstable, specific, and external to relatively stable, global, and internal. For the 99 men, a total of 1,102 bad events and causal explanations were identified (average = 11.1). Rating reliability, estimated by alpha coefficients, was highly satisfactory: .85 for stability, .77 for globality, .90 for internality, and .89 for the composite of stability + globality + internality. To make the procedure more concrete, we present in Table 1 some of the explanations made by those participants at age 25 who were among the least and the most healthy at age 55.

Subject consistency (the tendency for an individual to explain different events in the same way) was assessed by looking at the 59 men who made 10 or more causal explanations. As estimated by alpha coefficients, the consistencies of their first 10 explanations was .40 for stability, .46 for globality, .48 for internality, and .61 for the composite. These figures seem notable in that explanations measured with the CAVE procedure reflect not only individual differences in explanatory style but also variation produced by the reality of the actual events explained (see Peterson & Seligman, 1984a).

Assessment of Physical Health

Health status at eight ages was scored from serial physical exams by the men's personal physicians and rated by a research internist in the following way: 1 = good health, normal; 2 = multiple minor complaints, mild back trouble, prostatitis, gout, kidney stones, single joint problems, chronic ear problems, and so on; 3 = probably irreversible chronic illness without disability, illness that will not fully remit and will probably progress, for example, treated hypertension, emphysema with cor pulmonale, and diabetes; 4 = probably irreversible chronic illness with disability, for example, myocardial infarction with angina, disabling back trouble, hypertension and extreme obesity, diabetes and severe arthritis, and multiple sclerosis; and 5 = deceased. Health scores were available for each subject at ages 25 (approximately the time of completion of the open-ended questionnaire from which causal explanations were extracted), 30, 35, 40, 45, 50, 55, and 60. From age 50 on, the research internist also had available blood and urine tests, an electrocardiogram, and a chest X-ray for most subjects. Again, see Vaillant (1977) for details of these procedures.

In 1945, a global measure of college soundness was made for each subject by an examining psychiatrist using a 3-point scale estimating the participant's likelihood of encountering emotional difficulties in the future. Although recognizing the limitations of this rating, we used it in subsequent analyses to control for the initial emotional well-being of the subjects (cf. Schleifer, Keller, Siris, Davis, & Stein, 1985).

Table 1
Examples of Explanations of Men Who Were Least and Most Healthy at Age 55

Subject	Health (age 55)	Representative explanation (age 25)
314	Deceased (=5)	"I cannot seem to decide firmly on a career . . . this may be an unwillingness to face reality." (rating = 5.75)
316	Deceased (=5)	"What I feel is characterized more by confusion than by sense." (rating = 5.67)
327	Deceased (=5)	"(I dislike work because I have) . . . fear of getting in a rut, doing the same thing day after day, year after year." (rating = 5.42)
347	Deceased (=5)	"I have symptoms of fear and nervousness . . . similar to those my mother has had. She is still very nervous." (rating = 4.67)
301	Healthy (=1)	"My career in the Army has been checkered, but on the whole characteristic of the Army." (rating = 3.92)
315	Healthy (=1)	"I occasionally feel lazy . . . (due to) . . . lack of physical exercise." (rating = 3.75)
305	Healthy (=1)	"I tried to bluff my way through a situation . . . I didn't know the facts, a situation common to all green junior officers when they are first put in charge of men." (rating = 2.75)
320	Healthy (=1)	"Accused of violating a confidence . . . because the officer had not bothered to get all the facts." (rating = 1.83)

Note. Explanation ratings range from *optimistic* (1) to *pessimistic* (7).

Results

Overall, men who explained bad events with stable, global, and internal causes at age 25 were less healthy later in life than men who made unstable, specific, and external explanations. This correlation held even when initial physical and emotional health were held constant.

Table 2 presents the means and standard deviations of our major variables. As one would expect, overall health status gradually worsened with age, and variability in health across subjects increased. Also included in this table is the number of deceased subjects at each age.

We correlated composite explanatory style scores with the measures of objective health status available at various ages, partialing out health status at age 25. We partialed out the rating of college soundness as well. Results are shown in Table 3. As can be seen, explanatory style is initially unrelated to physical illness, but as time passes, the hypothesized correlation emerges. Its most robust level was reached at age 45, approximately 20 years after the time that explanatory style was assessed. After this time, the correlation between explanatory style and illness somewhat falls off.

Table 2
Means and Standard Deviations of Overall Health Status and Number of Deceased Subjects

Variable	*M*	*SD*	No. deceased
Composite explanatory style	3.60	0.45	—
College soundness	1.80	0.71	—
Physical health			
Age 25	1.16	0.66	0
Age 30	1.20	0.71	0
Age 35	1.30	0.84	0
Age 40	1.41	0.94	2
Age 45	1.60	1.05	4
Age 50	1.91	1.14	5
Age 55	2.21	1.24	9
Age 60	2.67	1.83	13

Note. $N = 99$.

A particularly stringent way to investigate our hypothesis is to correlate explanatory style with health at a particular age, partialing out health status not at age 25 but at the immediately preceding age. These analyses test whether explanatory style (at age 25) predicts *changes* in health at later ages. So, at age 40, the partial correlation (controlling for health at age 35) was .19 ($p < .06$), and at age 45, the partial correlation (controlling for health at age 40) was .42 ($p < .001$). The other partial correlations (at ages 30, 50, 55, and 60) did not attain significance, although all were positive.

We conducted several additional analyses, with the following results. First, when examined separately, the individual dimensions of explanatory style (stability, globality, and internality) showed the same relations with health. Second, the relation between explanatory style and health was linear and did not depend simply on including deceased subjects in the analyses. Third, explanatory style was not related to the number of explanations offered by a subject, nor to Thematic Apperception Test measures of motives and clinical ratings of defense mechanisms made by other researchers (cf. Vaillant, 1977). Fourth, the number of explanations offered by a subject tended to predict subsequent health but independently of explanatory style.

Discussion

What have we accomplished in the present study? We believe that we have shown unambiguously that a psychological vari-

Table 3
Partial Correlations Between Explanatory Style and Poor Physical Health

Poor health: Age	Partial *r*
30	.04
35	.03
40	.13
45	.37****
50	.18*
55	.22**
60	.25***

Note. $N = 99$. Partialed out are initial physical and mental health.
* $p < .10$. ** $p < .05$. *** $p < .02$. **** $p < .001$.

able—pessimistic explanatory style—predicts physical illness two and three decades later. Prediction is successful even when possible third variables like initial physical health and initial emotional health are controlled. Whether psychological states influence health and illness is hotly debated. This debate is typically characterized more by opinions than evidence. The present study is an empirical foray into this controversy, one that sides with the claim that psychological factors can predispose physical health and illness.

Explanatory style did not predict immediate health status. This is not surprising because there was little variation. But in early middle age (35–50), health becomes more variable, and psychological factors come to play a role, perhaps by contributing to lifestyle, self-care, and social support. In late middle age (50–60), the relation between explanatory style and health falls off a bit, and we have no good explanation why. Perhaps constitutional factors or alcoholism, or both, dominate the health picture, and psychological factors from youth thus play a smaller role.

According to the learned helplessness reformulation, explanatory style influences the generality of deficits following bad events (Peterson & Seligman, 1984a). This proposal has been contested, but the present results extend and clarify its empirical support in several ways. First, our study goes beyond questionnaire approaches to explanatory style and its consequences. We found that people indeed offer spontaneous causal explanations for events they encounter. We found that different explanations by the same person are consistent with respect to their stability, globality, and internality. We found that explanatory style predicts an objectively measured health outcome decades later.

Second, although most investigations of the helplessness reformulation focus on depression, explanatory style pertains to a much wider range of outcomes. The present study links illness to explanatory style, just as other recent studies show that explanatory style predicts good or bad performance in academic, athletic, and work domains (cf. Kamen & Seligman, 1985; Nolen-Hoeksema, Girgus, & Seligman, 1986; Peterson & Barrett, 1987; Peterson & Seligman, 1984b; Seligman & Schulman, 1986). Explanatory style influences helplessness, and because helplessness is involved in many important failures of human adaptation, one should expect explanatory style to be broadly relevant. A difficult question thus arises: Granted that someone explains bad events with stable, global, and internal causes, what dictates the particular consequence he may suffer—depression, illness, job failure, and so on? Future studies are needed that simultaneously look at these different outcomes of pessimistic explanatory style.

Qualifications of the present research should be made clear. Our sample was originally chosen to be nonrepresentative, so generalization is of course a problem. All of the subjects began the study as healthy, and the present results might not have been obtained had the subjects been ill to start. Also, the study did not test the whole of helplessness theory, which is a diathesis-stress model. Explanatory style (the diathesis) predicted subsequent illness, but we do not know if this is because particular bad events (the stress) were processed through the style. Some of our measures were less than ideal, particularly that of college soundness. Finally, the various correlations in Table 3 are not independent of each other, because a subject's prior health constrained his later health.

These qualifications aside, what have we not accomplished in the present study? Basically, we do not know the mechanism by which pessimistic explanatory style puts one at risk for eventual poor health. Explanatory style could influence illness in several ways (cf. Peterson & Seligman, 1987). Perhaps individuals who offer stable, global, and internal explanations become passive in the face of illness. Not seeking medical advice or not following medical advice are two helpless behaviors that might exacerbate illness (Seligman, 1975). Similarly, individuals with a negative explanatory style might neglect the basics of health care in the first place, either because they see no connection between anything they might do and the onset or offset of illness or because they feel that behaviors that promote health are useless (Becker, 1974; O'Leary, 1985; Wallston & Wallston, 1982).

People who offer stable, global, and internal explanations for bad events tend to be poor problem solvers (Alloy, Peterson, Abramson, & Seligman, 1984). They may experience more numerous and severe bad life events because they never nip a crisis in the bud. Increased illness may be a consequence of these accumulated life changes (Rabkin & Struening, 1976). Yet another possible mechanism is loneliness and lack of social support. The person who makes negative explanations for bad events is socially withdrawn (Anderson, Horowitz, & French, 1983). Supportive social contacts with others may buffer one against illness (Cobb, 1976), and perhaps explanatory style affects long-term health through an interpersonal pathway.

Finally, a negative explanatory style may affect immune function, making morbidity and mortality more likely. By analogy to animal studies, helpless people may have less competent immune systems (Jemmott & Locke, 1984). Data from our research group suggest that people who make stable, global, and internal explanations for bad events show increased immunosuppression (Kamen et al., 1987).

Peterson (1988) conducted a preliminary investigation of what mediates the correlation between explanatory style and illness and found that pessimistic explanatory style predicted stressful life events, unhealthy habits, and low self-efficacy to change these habits for the better. These in turn predicted reports of poor health. However, this investigation is limited because it was cross-sectional. Longitudinal studies are obviously needed to map out the process by which pessimistic individuals eventually become ill. So, in a longitudinal study, Peterson and Lin (1987) found that pessimistic college students who developed colds or flus were less likely than their optimistic counterparts to take mundane steps to combat their illness, like sleeping more, increasing fluid intake, and curtailing activities.

Bidirectional influence among each of these variables, health, and explanatory style is perhaps to be expected. We regard explanatory style as traitlike because it is stable across time and situation (Peterson & Seligman, 1984a). We hasten to add that we do not regard traits as rigidly fixed. To date, we know little about the origins of explanatory style. Early socialization and early experience with loss may mold explanatory style. And experiences later in life, like illness or therapy, may encourage someone to be more versus less pessimistic.

In conclusion, we doubt that any single mechanism will prove responsible for the risk that pessimism creates for a nonspecific

variable like poor health. Although mechanisms remain to be investigated, it is clear that the person who habitually explains bad events by stable, global, and internal causes in early adulthood is at risk for poor health in middle age. It may be important that training programs exist that reliably change this explanatory style for the better (Beck, Rush, Shaw, & Emery, 1979).

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