

# Coping as a Moderator and Mediator between Stress at Work and Psychosomatic Complaints

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## Introduction

Coping has become a central variable in psychological stress research. The concepts of coping and defense have been introduced to explain phenomena that cannot be explained by a simple stress-strain model. Some people react strongly to minor stressors, whereas others do not react even to major stressors. There are two ways to explain this. Coping or defense may be either a mediator or a moderator. (For ease of presentation, I shall use the term *coping* to stand for both coping and defense

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in the following presentation.) This distinction, between moderator and mediator, has rarely been made in the literature:

1. Coping serves as a *mediator* when it is related to both the stressors and the stress reaction or, more specifically, when it *links* the stressors to the stress reaction. The causal impact of stressors on the stress reaction works via coping (see Figure 1). Theoretically, this may mean that the stressor situation influences a certain type of coping response that, in turn, leads to psychological health or dysfunctioning. More technically, this can be examined with a partial correlation procedure (Simon, 1954).

2. Coping can function as a *moderator* when the relationship between stressors and stress reaction is dependent on whether a person is a "good" or a "bad" copier (or defender). Here the relationship between stressors and stress reaction is increased or reduced by a third, independent variable. Figure 2 displays this graphically. Theoretically, this may mean that people have learned certain coping strategies (or coping styles) and use them *vis-à-vis* the stressors. Depending on the coping strategies or styles, dealing with the stressors may produce psychological dysfunctioning or positive growth. This moderator function can be analyzed by comparing the correlations between stressor and stress reaction for different subgroups or by using an interaction term in a regression analysis (Zedeck, 1971).

Thus, the moderator or mediator effect of coping may either enhance or disturb psychological functioning. Although most theories seem to agree that problem-focussed coping has positive consequences, there is disagreement on emotion-focussed coping. Here, psychoanalysis has been much more pessimistic than the more cognitive approach of Lazarus (1966, 1982). According to psychoanalysis, emotion-focussed coping is often done in the form of repression. This implies that energy is expended, that this process is unconscious, and that the result of this process may be the development of psychopathology (A. Freud, 1978; Haan, 1977; Vaillant, 1977). In contrast, Lazarus's cognitive approach argues that "repression" does not, of necessity, lead to continuous expenditure of energy, that the process of repressing can be conscious, and that the result is usually positive because the negative emotion has been dealt with, and therefore does not exist any more. Once an emotion has been

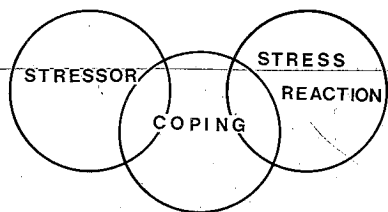


Figure 1. Coping as mediator.

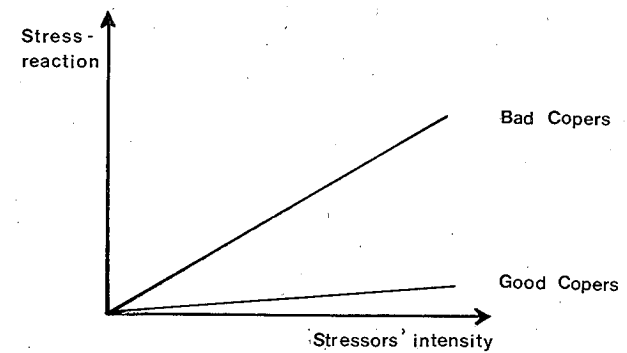


Figure 2. Coping as moderator.

coped with, the emotion no longer has a negative impact, as long as other stressors do not trigger the same type of emotion again.

There is still a third approach to the question of the cost and benefit of coping—the action theory perspective (cf. also Schönplugg, this volume). According to this perspective, coping involves effort if the method to cope is not highly practiced and automatic. If a certain coping strategy has been used often enough, it will take very little effort to use it again. This implies that effort is involved only when a coping strategy that has not been highly practiced is used. Moreover, using such a strategy is a conscious process. There is an additional implication within action theory that is of interest here. Human beings turn conscious attention to things only when it is necessary. This necessity arises when a regularly used strategy does *not* work, when one is in a new situation, or when unexpected problems and difficulties arise (Frese & Sabini, 1985). Thus, usually, we use automatic, overlearned strategies. Only when the normal, easy to use, automatic coping strategies do not work do we think of them consciously. This notion has implications for measuring coping. If coping strategies are checked off on a questionnaire, only consciously used strategies will be checked. This means that problematic coping strategies will be reported more often than nonproblematic (i.e., automatically used) ones. Therefore, this theory would suggest that measuring coping with questionnaires (e.g., like the one used by Lazarus and co-workers, cf. Lazarus & Folkman, this volume), leads to reporting problematic coping strategies, although indirect measurement of coping (that includes automatic coping) will have different relations with psychological functioning. Conscious and problematic coping strategies should be positively related to psychological dysfunctioning although automatic coping strategies should be negatively related.

Coping refers to stressors. Stressors can be conceived to be either

objective (as seen from an observer's point of view) or subjective (as seen by the subject). Furthermore, a stressor can be a stimulus occurring at only one point in time (e.g., an earthquake) or occurring repeatedly, as in daily hassles (DeLongis, Coyne, Dakof, Folkman, & Lazarus, 1982). Little is known about coping with everyday *objective* "hassles." Stress has been studied either in extreme situations, like disasters, war, or unemployment (thus leaving out the daily hassles), or assessed by subjective questionnaire responses (thus leaving out the objective side).

The study of the moderator effect of coping has looked, for the most part, at the relationship between subjectively measured stress and long-term stress reaction [signified as (a) in Figure 3]. If the objective features of a stressful situation are considered as well, then two additionally interesting effects can be conceptualized. The relationship between objective stressors and stress perception could be mediated or moderated by coping [(b) in Figure 3]. According to psychoanalytic theory, this should occur because defenses influence stress perception (A. Freud, 1978). In a similar vein, modern cognitive stress theories argue that the perception of stress is influenced by coping (e.g., by defensive reappraisal) (Lazarus, 1966). Additionally, coping may have a direct influence on the relationship between objective stress and psychosomatic complaints. This would follow specifically from psychoanalytic theory, because even repressed, or otherwise defended stress situations, may

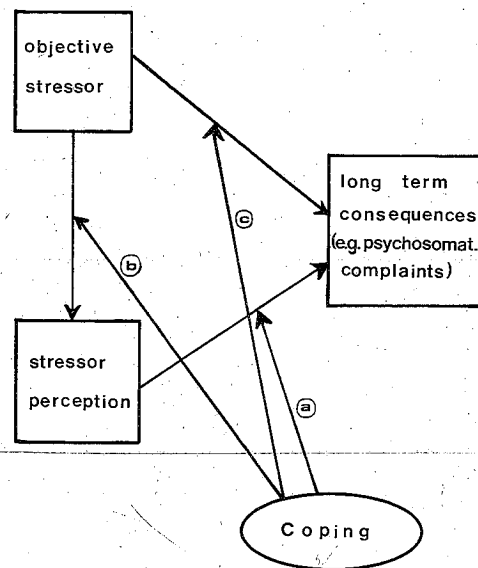


Figure 3. Theoretically possible mediator and moderator effects of coping.

have a long-term influence on psychosomatic complaints [(c) in Figure 3]. Stress at work is an area in which both the objective conditions as well as daily problems can be studied (cf. Gardell & Johansson, 1981). Here, it is possible to look at all three moderating or mediating functions of coping.

Thus, in summary, this chapter will argue that it is useful to distinguish moderator and mediator effects of coping and that it is necessary to study not only conscious coping strategies but also automatic ones. This is particularly important if one is interested in the relationship of coping with psychological dysfunctioning, like psychosomatic complaints. Conscious strategies are problematic and are, therefore, positively related to psychosomatic complaints, while automatic coping strategies are negatively related.

## Study Methods and Design

Three studies will be reported, all with blue-collar, male workers from several different firms in the automobile and steel industries in the Federal Republic of Germany (details of these studies can be found in Greif, Bamberg, Dunckel, Frese, Mohr, Rueckert, Rummel, Semmer, & Zapf, 1983). The first and second studies are cross-sectional studies, involving 206 and 841 blue-collar workers, respectively; the third is a longitudinal study, involving a subsample of 90 subjects from the first-cross-sectional study, who filled out questionnaires for a second time, 16 months later, and whose work places were re-observed (for details, see Frese, 1985).

The same measurement design was used in all three studies. Stress at work was measured in three different ways: (1) Subjects were asked to fill out a questionnaire on relevant job dimensions. Wording of the items was as objective as possible. For example, we did not ask whether the subject felt that the work was straining but "Does your work demand quick reactions?" (2) Trained observers observed the subjects at work for 1 hour to 1 1/2 hour intervals and filled out the same questionnaire items as the subjects. (3) The third measure was an aggregate called the "group" level measurement. We had three or more people in the same job (for example, three welders) fill out the questionnaire. The median obtained on each dimension was then used as the measure for each person; for example, if three welders gave the answers 2, 3, and 5 for intensity of work, a 3 was assigned to each of them. This index has two advantages: it eliminates idiosyncratic responses (the same way as the observers' judgments do); and it takes the expertise of the subjects seriously. None of these measures is perfect, but the problems offset each other, those of one method not being the problems of the other.

## Measures of Stress

The following stressors were assessed:

*Psychological stress* (measured on the subjective, observed, and "group" level) is an index of five different scales on stress at work (which were developed by Semmer, 1982, 1984) that correlate with each other. These are "uncertainty" (e.g., ambiguities, conflicts, and small error-big damage), "organizational problems" (e.g., one does not get material to work with on time), "environmental stress" (e.g., noise), "danger of accidents," and "intensity" (speed) of work.

*Physical stress* combined two indices (developed by Semmer, 1982, 1984): physical intensity and one-sided stress of parts on the body, for example, arms, legs, and so forth. These indices were also measured on the three levels.

*Social stress* (developed by the author) was assessed on the subjective level only. A typical item was: "One is always criticized here; and nobody acknowledges it if one does something well."

Additionally, *leisure-time stress* (developed by Bamberg, 1986) was included in the analyses of the longitudinal study because it had been suggested (e.g., Folkman & Lazarus, 1980; Pearlin & Schooler, 1978) that the choices for coping strategies are different for work stressors than for stressors outside work. A typical item was "I have so much to do that I cannot do anything for my hobby."

The dependent variable used in the studies reported was psychosomatic complaints (an adaptation of Fahrenberg's (1975) *Freiburger Beschwerden Liste* by Mohr, 1984). The items ask for reports of headaches, stomachaches, sleeping problems, and so forth.

## Measures of Coping

Before discussing the development of the measures of coping, some theoretical remarks are in order. There is a debate about whether one should measure situationally specific coping strategies or consistent coping styles. There is no doubt that the choice of strategy depends, to a large extent, on the situation. However, if one wants to argue that ineffective coping contributes to long-range problems, like psychosomatic complaints, then it is unlikely that only situationally specific coping strategies play a role. The assumption is that psychosomatic complaints are developed only when one is exposed to ineffective coping strategies rather frequently. Thus, in order for coping to influence the development of psychosomatic complaints, there must be some commonality in type or style of coping strategies.

Further, research on coping should enable us to draw general conclusions about the usefulness of certain coping "strategies" versus others, and since we cannot determine the infinite number of potential coping-situation transactions, the notion of style helps us to make research more manageable. In fact, coping strategies are combined into styles by nearly all researchers, regardless of whether they argue for an idiographic or a nomothetic approach to measuring coping.

The measurement approach chosen here is somewhere between the two positions—style versus strategy. Although a situation-based questionnaire was used, the answers were grouped across situations. Four different stressors were described briefly, as a vignette, on the top of the questionnaire. The four situations were: "When I am under pressure in work, then . . .," "When something bothers me at work, then . . .," "When I have an argument with a colleague, then . . .," and "When I have an argument with my wife or girlfriend, then . . ." Below each of these four vignettes various alternative strategies were listed, and the subjects were asked to rate each alternative. There were 80 items in all.

## Factor-Derived Scales

Principal component analysis revealed six clear and stable factors all but one of which cut across the different stress situations. Only the factor "socially focussed positive outlook" was specific for the two social situations. Repeating this analysis, with a somewhat reduced set of items in the second cross-sectional study (with different subjects), led to the same stable factors. (The six factors are described in Table 1.)

With the exception of socially oriented coping, all the factors can be described as "emotion-focussed" coping. This is not just the result of the selection of coping alternatives listed in the questionnaire and used in the principal component analysis. Several questionnaire items were concerned with "problem-focussed" coping. (For example: "When I am under pressure in work then . . . I postpone other things and concentrate on the work that I have to do"; . . . "I tell the supervisor that I will not be able to finish this work in time"; . . . "I work not faster but with more care"; or ". . . I tell the supervisor that I do not want to be pressured.") Interestingly, these items did not comprise a factor. On the other hand, the more emotion-focussed items, like "I tell myself consciously: Now be calm," and so forth, easily clustered into factors.

This suggests that there may be an asymmetry between emotion-focussed and problem-focussed strategies or styles. Problem-focussed coping implies that a specific means is used to solve a specific problem. Thus, coping strategies change with problems, since a different solution will be necessary for each problem. Therefore, there can be little in the

**Table 1. Coping Factors<sup>a</sup>**

- If something bothers me in my work, then . . .  
(Pressure, argument with colleague, argument with spouse)
- (1) Positive outlook (5 items;  $\alpha = .68/.75$ )  
“ . . . I say consciously to myself: ‘Now be calm.’ ”
  - (2) Socially focussed positive outlook (9 items;  $\alpha = .78/.77$ )  
“ . . . I think that there are better sides to him/her.”
  - (3) Brooding (6 items;  $\alpha = .81/.84$ )  
“ . . . I think about it for some days.”
  - (4) Socially oriented coping (6 items;  $\alpha = .70/.62$ )  
“ . . . I ask other colleagues for help.”
  - (5) Attention diverting (5 items;  $\alpha = .72/.75$ )  
“ . . . I try to divert my attention from this.”
  - (6) Repression (4 items;  $\alpha = .76/.76$ )  
“ . . . I swallow down my anger.”

<sup>a</sup> Number of items and Cronbach's alpha for the two cross-sectional studies shown in parentheses.

way of coping *style* in problem-focussed coping. Emotion-focussed coping, on the other hand, can be similar in different situations because the focus (the emotion) is less differentiated. As a small number of emotions have to be dealt with, emotion-focussed coping can be more stylistic and more cross-situationally consistent.

### Additional Scales

In addition to the six-factor analytically-derived scales, there are four more scales on coping (as displayed in Table 2). Two of these relate to pressures at work, denial and avoidance. Avoidance is related to wanting to leave one's job when under pressure. Denial consists of relatively extreme responses about the positive quality of job pressure. (I do not want to imply that this scale measures denial in a psychoanalytic sense. A more parsimonious explanation would be that it measures a redirection of attention—one looks at the bright side of pressures at work instead of at the negative side.)

All the scales described so far are self-report scales. The final two coping scales used are indirect measures and, like all indirect measures, they hinge on certain assumptions. The theoretical assumption is that coping and defense have an impact on stress perception, a position shared by psychoanalytic (e.g., Haan, 1977; Vaillant, 1977) as well as cognitive theories of stress (e.g., Lazarus, 1966). The assumption is that defenses reduce the perception of stress, and palliative, as well as problem-focussed,

coping have an impact on how threatening a stress situation is perceived to be. It follows, then, that the difference between the objective stress situation and the subjective perception of it can be taken as a measure of coping.

Two “objective” indicators of psychological stress were used, each independent of a particular subject's perception, namely, the observers' and the “group” estimates. Two deviation scores were derived by subtracting the observers' (or “group”) estimates from the subjects' estimate of psychological stress. In each case, the scales making up psychological stress at work were transformed into z-scores and the subtraction was done separately for each scale. The resulting scales (4 for overreporting/deviation from observers and 5 for overreporting/deviation from “group”) were then recombined to make up the two overall deviation scales. In each case, the 4 or 5 deviation scores (items) lead to acceptable Cronbach alphas, despite the brevity of each overall scale. The two resulting scales correlated .52 in each of the two cross-sectional studies.

### Methods of Analysis

In general, a correlational approach was used. The mediator effect was analyzed by partial correlations (criterion—change of .10 between zero order correlation and partial correlation) the moderator effect by subgrouping on the coping variables and comparing correlations between the respective variables (Fischer's z-test).

The analysis of the longitudinal study used a cross-lagged panel

**Table 2. Additional Coping Scales**

- (1) Denial (6 items;  $\alpha = .73/.78$ )  
“When one is under pressure in work, one is able to show what one can accomplish.”
  - (2) Avoidance (3 items;  $\alpha = .63/.65$ )  
“When the pressure at work is high, I think sometimes about changing my job.”
- Overreporting:
- (3) Overreporting/deviation from observers →  
subject's psychological stress – observed psychological stress (4 scales;  
 $\alpha = .64/.71$ )
  - (4) Overreporting/deviation from “group”-level →  
subject's psychological stress – “group” psychological stress (5 scales;  
 $\alpha = .70/.74$ )

<sup>a</sup> Number of items and Cronbach's alpha for the two cross-sectional studies are shown in parentheses.

correlation approach (Kenny, 1979). A difference of the z-standardized cross-lagged correlations of .20 or higher was used as a criterion. Although not extremely stringent, it was deemed sufficient in light of the exploratory nature of the research (in order not to overlook any possible relationships), the relatively small time lag of 16 months (which does not allow for the development of large effects), and the homogeneity of the sample.

The cross-lagged correlation approach has recently been criticized (e.g., Rogosa, 1980). Rogosa showed that differences (and similarities) between the cross-lagged correlations could be produced by differences in stabilities and by lack of "stationarity." These criticisms were taken into account. Partialling out the stabilities did not change the results dramatically, and the principle of stationarity was rarely violated.

In summary, results were based on eight scales on stressors (three on psychological stress, three on physical stress, and one each on social and leisure-time stress); and ten scales on coping, six of which were derived from a principal component analysis of a situation-oriented questionnaire. The dependent variable was psychosomatic complaints (see Table 3).

## Results and Discussion

The results are presented in the following steps: (1) The bivariate relationships between stressors and coping, (2) the bivariate relationships between coping and psychosomatic complaints, (3) the role of coping as a mediator and moderator of the relationship between objective stressor and stressor perception, and (4) the mediating and moderating function of coping in the relationship between stressors and psychosomatic complaints.

### Stress and Coping

The bivariate relationships between stress and coping are presented in Table 3. With the exception of avoidance and overreporting, the correlations are relatively small. There is a fair degree of consistency across the two cross-sectional studies. In the main, stressors and coping seem to be largely independent factors.

Longitudinally, one might look for subjective stress to be either mainly determined by coping or to cause coping strategies to develop. However, here too, no consistent relationships of any importance were found between stress and coping in the cross-lagged correlations of the

Table 3. Bivariate Relationships between the Variables in the Cross-Sectional Studies

| Coping                                    | Observed             |                      | "Group"              |                      | Subject's            |                      | Observed        |                 | "Group"         |                 | Subject's       |                 | Social |        | Leisure- |             | Psycho-            |                    |  |
|---|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|--------|--------|----------|-------------|--------------------|--------------------|--|
|   | psychological stress | psychological stress | psychological stress | psychological stress | psychological stress | psychological stress | physical stress | physical stress | physical stress | physical stress | physical stress | physical stress | stress | stress | stress   | time stress | somatic complaints | somatic complaints |  |
| Denial                                    | -.13*/.04            | -.10/.03             | -.12/.01             | -.01/.05             | -.01/.06             | -.08/.05             | -.06/-.08**     | -.03/-.01       | -.27**/.03      |                 |                 |                 |        |        |          |             |                    |                    |  |
| Socially focussed positive outlook        | .13*/.04             | .02/.07              | .14*/.14**           | .09/-.08             | .17*/.05             | .09/.01              | .05/.04         | .17*/.10        | .16*/.07**      |                 |                 |                 |        |        |          |             |                    |                    |  |
| Positive outlook                          | .20**/.07            | .17*/.11**           | .16*/.15**           | .08/-.08             | .14*/.05             | .07/.02              | .02/.05         | .10/.07         | .03/.10**       |                 |                 |                 |        |        |          |             |                    |                    |  |
| Brooding                                  | .10/-.04             | .04/.06              | .19**/.10**          | .06/-.02             | .13/.08*             | .10/.14**            | .33**/.14**     | .19**/.17**     | .33**/.36**     |                 |                 |                 |        |        |          |             |                    |                    |  |
| Socially oriented Coping                  | .15*/.04             | .11/.03              | .09/.12**            | .01/-.11*            | -.08/.04             | .01/.07*             | .22**/.16**     | .22**/.12**     | .19*/.11**      |                 |                 |                 |        |        |          |             |                    |                    |  |
| Diverting attention                       | .11/.01              | .04/.08*             | .16**/.04            | .10/-.04             | .16**/.04            | .15*/.05             | .08/.05         | .02/.03         | .22**/.11**     |                 |                 |                 |        |        |          |             |                    |                    |  |
| Repression                                | -.05/-.12**          | -.02/.04             | .07/.10**            | .15*/.01             | .21**/.03            | .17*/.10**           | .02/.05         | -.05/.06        | .23**/.12**     |                 |                 |                 |        |        |          |             |                    |                    |  |
| Avoidance                                 | .02/.03              | .09/-.01             | .29**/.12**          | .18**/.15**          | .10/.10**            | .19**/.21**          | .40**/.31**     | .35**/.18**     | .23**/.23**     |                 |                 |                 |        |        |          |             |                    |                    |  |
| Overreporting 1 (deviation obs./subj.)    | —                    | .16*/.12*            | —                    | .18*/-.07            | .23**/.01            | .36**/.19**          | .24**/.23**     | .08*/.11**      | .21**/.11**     |                 |                 |                 |        |        |          |             |                    |                    |  |
| Overreporting 2 (deviation "group"/subj.) | -.14/.03             | —                    | —                    | .17*/.05             | .01/.14**            | .22**/.28**          | .11/.30**       | .04/.11**       | .17*/.23**      |                 |                 |                 |        |        |          |             |                    |                    |  |

\* p < .05; \*\* p < .01. Note. First number from 1st study/second one from 2nd study.

longitudinal study. This is not surprising since most theories describe coping predispositions and stressors as coming from distinct sources that are not causally related.

### Coping and Psychosomatic Complaints

The question of whether inadequate coping strategies cause psychosomatic problems or vice versa is important, both theoretically and empirically. On the cross-sectional level, moderately high and largely positive correlations were found between coping strategies and psychosomatic complaints, as shown in Table 3. With the exception of positive outlook and denial, all coping strategies have consistent, significantly positive relationships with psychosomatic complaints in both studies. This seems to contradict those theories that see the primary function of coping to be its reduction of stress effects.

The same pattern of positive correlations is also found in the longitudinal study (data not shown). Here three of the coping strategies (socially focussed positive outlook, avoidance, and overrating/deviation from observers) show positive causal correlations with psychosomatic complaints that are higher (criterion .20) than the other cross-lagged correlation (the path from psychosomatic complaints at  $t_1$  to coping at  $t_2$ ). This would suggest that the measured coping strategies are actually *ineffective*, leading to more rather than fewer psychosomatic complaints. I shall return to this later.

### Coping as Mediator or Moderator of the Relationship between Objective and Subjective Stress

Does coping have a moderating or mediating role in the relationship between objective stressors and their subjective perception? There are two "objective" indices in our studies—group level and observers' level.

No important reductions in the correlations are found after the coping factors are partialled out. An exception is when overreporting/deviation from a group is partialled out, which increases the correlation between subjective stress and observed stress in both cross-sectional studies.

In a second step, the moderator effect of coping was tested. The samples were divided into subgroups of equal numbers (median partition). Two groups (in the first cross-sectional study) and three groups (in the second study) were formed according to their scores in each coping strategy. When the correlations between objective and subjective stress

**Table 4.** Repression as Moderator of the Relationship between Observed and Subjective Psychological Stress

| First study |      | Second study |        |      |
|-------------|------|--------------|--------|------|
| repression  |      | repression   |        |      |
| low         | high | low          | medium | high |
| .48         | .24  | .53          | .29    | .23  |

were then compared, there were some significant differences between the correlations of the subgroups. Repression is the only variable, however, that shows a consistent difference between the correlations in the two cross-sectional studies. As shown in Table 4, the relationship is higher for the low repressors. (This speaks for the scale's validity, because repressors should not be able to perceive stress adequately.)

In the longitudinal study, there are no clear-cut results that point to any moderator effect. This may be partly due to the fact that, at the time of the study, the subjects had been in their particular jobs for a long time and had therefore developed a particular picture of their stress situation that no longer fluctuated over time. (This conceptualization of their stress may have been influenced by coping styles and strategies at an earlier point). Therefore, this nonresult does not necessarily mean that coping styles play no role in the development of stress perception at the beginning of a career or after a job change (cf. Frese, 1982, 1984).

In summary, there is little indication of any important mediator or moderator effects of coping on the relationship between objective and subjective stress in these data.

### Coping as Mediator or Moderator of the Relationship between Stress and Psychosomatic Complaints

Using partial correlation, there is again very little indication of coping mediation between stressors and psychosomatic complaints. The only exception is avoidance, which is a mediator between social stress and psychosomatic complaints in both cross-sectional studies.

The moderator effect of coping was again examined by dichotomizing (first study) and trichotomizing (second study) the subjects, according to their scores on each coping variable, and searching for significant differences between the subgroups' correlations of stressors with psychosomatic complaints. The 7 stressors (leisure-time stress was not

included in this analysis) and 10 coping factors in the two studies allow for 140 comparisons. Were only the results of the first study to be presented, some interesting moderator effects could be reported. The same would be true, if only the results of the second study were presented. However, when we examine both sets of results together, there is no consistent moderator effect that appears in both cross-sectional studies. (When using interaction terms "stressor  $\times$  coping" in moderated regression analyses, the same results prevail. There are no moderator effects that appear consistently in both cross-sectional studies.)

In summary, there is no indication for a moderator effect and there is only little indication of a mediator effect (except in the relationship between social stress and psychosomatic complaints). The most consistent findings, so far, are the simple correlations between coping and psychosomatic complaints. These are nearly all positive—meaning more coping leads to more psychosomatic complaints.

### Longitudinal Findings

In the longitudinal study, the expectation of similar inconsistent findings as were found in the cross-sectional studies turned out to be wrong; there were some interesting and consistent moderator effects.

In this study, the sample was dichotomized into high and low groups on each of the respective coping dimensions at time 1 ( $t_1$ ). A cross-lagged panel design was used again for analyzing the results. There were two criteria now—the cross-lagged correlations had to be different, that is, the z-standardized correlation of stress  $t_1$  with psychosomatic complaints  $t_2$  had to be at least .20 greater than the correlation of psychosomatic complaints  $t_1$  with stress  $t_2$ . Second, the difference between high and low copers (on each dimension) had to be at least .20 in the largest cross-lagged correlation. (As before, these are not extremely stringent criteria but, given the nonresults in the cross-sectional studies, I did not want to miss any effect in the longitudinal study. A stringent significance criterion would be difficult to reach in a study that does not stretch over a long time period. Furthermore, the sample gets very small when 90 people are partitioned into two subgroups.) Third, the criterion of a double difference is not easily reached. Finally, I think it may be more important to find consistent results in this type of research than to find significant results.

In Table 5, a truly fascinating picture emerges. (For methodological reasons, the two observed indicators and the group index for physical stress could not be used, as their stabilities were too low, partly due to slight differences in the training of observers at the two measurement points.) The meaning of the numbers in this table can be explained with

Table 5. Longitudinal Study: Coping as Moderator of the Correlation between Stress and Psychosomatic Complaints

| Coping $t_1$                         | Correlations <sup>a</sup>                           |             |   |             |  |             |                                    |             |  |             |             |             |
|--------------------------------------|---|-------------|---|-------------|--|-------------|------------------------------------|-------------|--|-------------|-------------|-------------|
|                                      | Subject's psychological stress $t_1$ /Psychom $t_2$ |             | Group psychological stress $t_1$ /Psychom $t_2$ |             | Subject's physical stress $t_1$ /Psychom $t_2$ |             | Social stress $t_1$ /Psychom $t_2$ |             | Leisure-time stress $t_1$ /Psychom $t_2$ |             | Coping high |             |
|                                      | Coping low  | Coping high | Coping low                                      | Coping high | Coping low                                     | Coping high | Coping low                         | Coping high | Coping low                               | Coping high | Coping low  | Coping high |
| Denial                               |   |             |   |             |  |             |                                    |             |  |             |             | .56         |
| Socially focused positive outlook    |   | .58         |   |             |  |             |                                    |             |  |             |             | .60         |
| Positive outlook                     |   | .57         |   | .40         |  | .47         |                                    |             |  |             |             |             |
| Brooding                             |   | .52         |   |             |  |             |                                    |             |  |             | .54         |             |
| Socially oriented coping             |   |             |   |             |  |             |                                    |             |  |             |             |             |
| Attention diverting                  |   | .51         |   |             |  | .49         |                                    |             |  |             |             |             |
| Repression                           |   | .56         |   | .41         |  |             |                                    |             |  |             |             |             |
| Avoidance                            |   |             |   | .45         |  |             |                                    |             |  |             |             |             |
| Overreporting 1 (dev. obs./subj.)    |   | .44         |   | .38         |  |             |                                    |             |  |             | .43         | .55         |
| Overreporting 2 (dev. "group"/subj.) |   | .49         |   | .41         |  |             |                                    |             |  |             | .43         | .58         |

Note. Psychom = Psychosomatic complaints.

<sup>a</sup> A number appears in a cell only when the double criterion (see text) has been met.

the example given in Figure 4. Here, all the correlations of the cross-lagged panel are displayed. Repression  $t_1$  was median-split and then all the correlations were computed for the high and low repressors. High repressors show the highest cross-lagged correlation between stress  $t_1$  and psychosomatic complaints  $t_2$  ( $r = .51$ ). This correlation is .20 higher than the respective cross-lagged correlations ( $r = .31$ ) for low repressors. Similarly, it is also higher than the other cross-lagged correlation ( $r =$  psychosomatic complaints/ $t_1$ , psychological stress/ $t_2$ ) for high repressors ( $r = .20$ ). The highest cross-lagged correlation ( $r = .51$ ) in the figure is displayed in Table 5 in the respective cell.<sup>1</sup> As can be seen in Table 5, with the exception of two cases, whenever the double criteria are met, the highest paths from stress  $t_1$  to psychosomatic complaints  $t_2$  are in the "high coping" cells. Moreover, the highest cross-lagged correlations are consistently from earlier stress to later psychosomatic complaints. Most of the moderating effects involve subjective psychological stress, but they are reproduced, for the most part, with the more objective indicator of "group" level psychological stress. The smallest number of moderating effects involve social stress and subjective physical stress. The most consistent relationships are found with the two indices of overreporting.

The fact that, with only two exceptions, the "high" copers show the highest causal paths from stressors  $t_1$  to psychosomatic complaints  $t_2$ , may be taken as a test of psychoanalytic versus cognitive theories. The cognitive position (e.g., by Lazarus, 1982) would predict that emotion-reducing coping strategies, like denial and repression, lead to less negative effects of stress on psychosomatic health. This is obviously not the case (cf. Table 4 and the example in Figure 4). Thus, these data seem to be more supportive of psychoanalytic conceptualizations that presuppose that emotion-focussed coping strategies are not effective and may lead to the development of psychosomatic complaints (Haan, 1977, Vaillant, 1977).

However, this statement is true only for the self-reported coping scales (all except the two indices of overreporting). The indirect indices of overreporting tend to favor a cognitive account against the psychoanalytic one. A cognitive account of stress would predict that overreporters show greater stress-effects because they perceive more stress and therefore develop more psychosomatic complaints. This prediction would not follow from a psychoanalytic account. Since the underreporters are repressors, from a psychoanalytic perspective, they should show the great-

<sup>1</sup> Whenever the double criterion applies, the higher cross-lagged path leads from stress  $t_1$  to psychosomatic complaints  $t_2$  and not from psychosomatic complaints  $t_1$  to stress  $t_2$ .

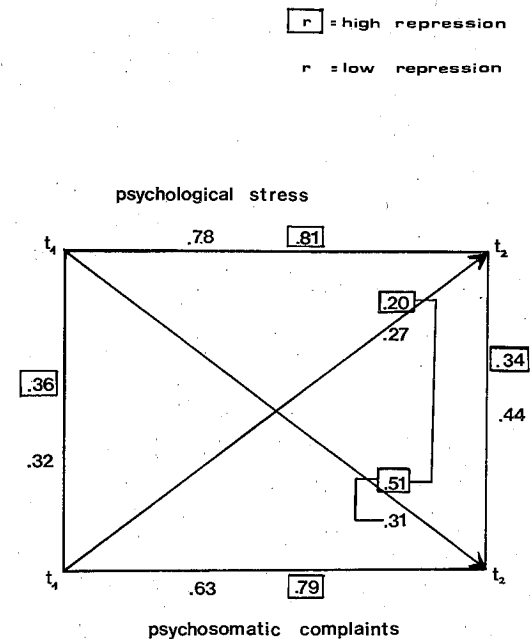


Figure 4. Cross-lagged panel for repression (example).

est impact of stress on the development of psychosomatic complaints.<sup>2</sup> However, the data do not support this prediction; there is a higher causal path from stress to psychosomatic complaints for overreporters than for underreporters (see Figure 5 for an example). A cognitive theory of stress seems to be supported here.

Thus, there is an interesting paradox in the data—the coping factors that directly measure coping via questionnaires show a moderating effect, supporting psychoanalytic theory. On the other hand, the indirect and more objective indicators of coping seem to support a cognitive account.

### Interpretation

To interpret these results, it is useful to consider the situation of the subject filling out a questionnaire. To report a coping strategy, the

<sup>2</sup> The psychoanalytic theory by Vaillant (1977) would be somewhat vague in its predictions because overreporting may stem from (positive) suppression or (negative) repression. However, within his system, it is reasonable to argue that underreporters are repressors and they should, therefore, show the highest impact of stress on the development of psychosomatic complaints.

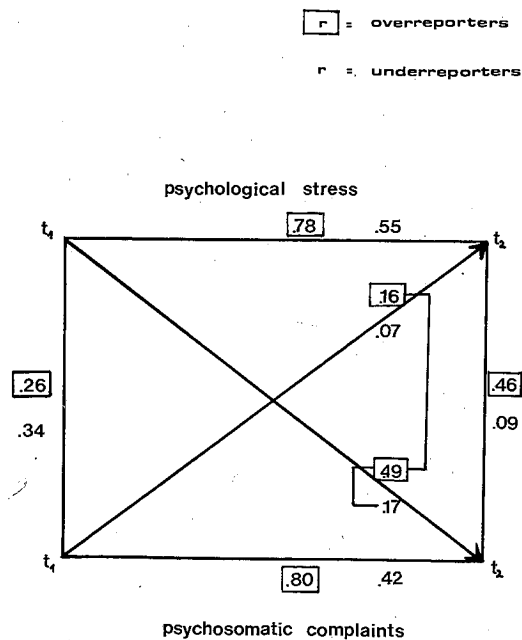


Figure 5. Cross-lagged panel for overreporting deviation from "group".

subject has to know, consciously, what kind of coping strategy he uses when he checks a response. As suggested before, only those coping strategies that are "problematic" are consciously represented, and, therefore can be checked on a questionnaire. Ordinarily, we use automatic, overlearned coping strategies. Only when the normal, easy to use, automatic coping strategies do not work do we think about them consciously. Therefore, checking off a coping strategy on a questionnaire may mean that it is a strategy used in a difficult, new, surprising situation—in short, that it is a *problematic* strategy. Therefore, questionnaire studies on coping may produce the result that coping strategies lead to psychological problems or show moderator effects similar to the ones found in this study. Coyne, Aldwin, and Lazarus (1981) reported that out of the seven coping strategies they studied, six had a higher (although not always significant) use by depressed than by nondepressed subjects.

This explanation does not imply that the results derived from questionnaires are methodological artifacts. They may be perfectly valid, but reflect only the correlations between *problematic* coping strategies (those that people think about) and psychosomatic complaints (or depression). It seems that a great impact of stress on psychosomatic complaints, under conditions of high repression or high positive outlook, may mean only

that one is uncomfortable enough with these strategies to have been forced to think about them. This uncomfortableness may, in turn, be due to the realization that these coping strategies are not effective, or that the stress situation is high enough to make one think of possible ways to reduce it.

This action theoretic interpretation not only explains the results from the self-reported coping factors but also those with the variable of over-reporting. Since over-reporting is measured indirectly, all of the unconscious, automatic, highly practiced coping strategies are operative here as well. Overreporters suffer from greater stress effects, a finding consistent with cognitive theory of stress.

Therefore, we can conclude that questionnaire studies on coping are only useful if we are interested in this specific problematic type of coping strategies, and that it is more useful to develop indirect measures of coping that include automatic coping strategies. Furthermore (at the time of writing), since daily hassles are emphasized in stress research (instead of singular events with which people do not have any prior experience), it becomes imperative to look at the routinized coping responses that people have learned to use vis-à-vis the daily hassles.

### Some Remaining Problems of Interpretation

There are some potential problems of interpretation that still remain. First, could the indices of overreporting actually be scales of demand characteristics (Orne, 1962) or social desirability? Second, how can the differences in findings between the cross-sectional and longitudinal studies be explained? Third, do methodological problems of the cross-lagged panel design lead to the obtained results? And fourth, how can the findings of other studies (notably the one by Pearlin & Schooler, 1978) be explained in the light of our theoretical interpretation?

The issues of demand characteristics and social desirability are quite complex in the context studied here. Some subjects may have thought that the study was supposed to prove the existence of great stress at work. In such a case, demand characteristics would produce low correlations between stress at work and psychosomatic complaints, since stress reports would be elevated. Also, overreporters (who comply with demand characteristics) would show a *lower* correlation than underreporters. This was not the case.

Other subjects may have reported elevated levels of both stress at work and psychosomatic complaints because they thought that this was in line with the hypothesis of the investigators. However, this is not likely, as such a hypothesis is not really salient when one is confronted with a

lengthy questionnaire on all aspects of life at work and outside work. Empirically, there is no evidence for demand characteristics. If these demand characteristics were operative, the variable overreporting should moderate the relationship in the cross-sectional studies. The results of these studies give no hint of a moderator effect—only the longitudinal study does. It is unlikely, further, that demand characteristics would produce effects 16 months later (it is doubtful that the subjects even remembered their answers after such a long time interval). Finally, the results of the variable “group” level psychological stress cannot be explained with the notions of social desirability or demand characteristics. If overreporting were due to social desirability or demand characteristics, it would not moderate the relationship between group psychological stress and psychosomatic complaints, which it does in the longitudinal study (cf. Table 5). Thus, demand characteristics and social desirability cannot explain the results.

Why are there different results in the cross-sectional and longitudinal studies? The former do not lead to clear and consistent results, whereas the latter do. First, let me state that the differences are not due to an artifact. Since the first cross-sectional study and the first portion of the longitudinal study share the same subjects, the latter could have just replicated the results of the first cross-sectional study. However, this is not the case. Of the 16 differences between high and low copers, which were found in the longitudinal study, five also appeared in the first cross-sectional study (leisure time stress was not included in the analysis). Conversely, in the 11 instances in which the correlations of stress with psychosomatic complaints are different between high and low copers in the first cross-sectional study, 5 are replicated in the longitudinal study. There is some overlap, but the overall picture is much clearer in the longitudinal study.

Let me hasten to point out that I did not expect different results between the cross-sectional and longitudinal studies, and my explanations are, therefore, necessarily *post hoc*. In another study, on the effects of unemployment (Frese, in press), we found that hope (for theoretical reasons called “hope for control” in this study) had a negative correlation with depression on the cross-sectional level but a positive correlation in a longitudinal study for those who stayed unemployed. The interpretation was that only after one had experienced unemployment for a certain amount of time does one lose hope. Under such conditions, it is much worse if one had had high hopes in the past. A similar argument might apply for coping. Repeated unsuccessful attempts to cope have a greater impact on the development of psychosomatic complaints than does giving up trying to cope in the first place (cf. Schönplflug, 1985, for a similar argument), or having been able to cope using automatized

strategies. Processes of this kind need time to develop. One has to be exposed to the stressors and to (ineffective) coping strategies for a long period of time before psychosomatic complaints can develop. Therefore, the results can be expected to become clearer and more coherent in longitudinal studies. It should be noted that the coping strategies described in this study are considered ineffective only with regard to the development of psychosomatic complaints. They may be very effective in dealing with the task at hand—for example, producing products in the factory (see Schönplflug, this volume).

As already noted, there are several methodological problems in using cross-lagged correlations, mainly the impact of stabilities on such correlations and lack of stationarity. Using a difference of .20 or higher between the correlation of stress and psychosomatic complaints at  $t_1$  and the same correlation at  $t_2$  as a criterion for the violation of the stationarity assumption, 5 of the 21 correlations shown in Table 5 violate this assumption (among them, the relationship displayed in Figure 5). There are no apparent patterns. To reduce its confounding effect, stability was partialled out (a procedure suggested by Pelz & Andrews, 1964). When this is done, 3 of the 21 differences between the cross-lagged correlations disappear, but 6 additional relationships now meet our double criterion of differences between high and low copers. It seems unlikely that the methodological problems of the cross-lagged panel design lead to the results at hand.

How do the results presented here relate to other studies in the field? There are only a few that look at coping as moderating or mediating the relationship between stressors and a psychological health variable. Coyne *et al.* (1981), although not really looking at the moderating or mediating role of coping, nevertheless found essentially the same results—people with higher self-reports of coping show more depression. Pearlin & Schooler (1978) reported different results, namely, that coping seems to be an effective shield against the stress effects. However, I think that their study does not really test the moderating effect of coping. Coping should moderate the relationship between stressors and strains, but these, as measured by Pearlin and Schooler, are theoretically and empirically not really different concepts. Stress is measured with questions about whether one feels unhappy, worried, frustrated, and so forth, in daily situations (as in daily life with one's spouse). Strains are measured essentially in the same way. For example, there is a scale on “frustration of role expectations” (strain) and a scale on “nonacceptance of spouse” (stress). The latter includes items such as “My marriage doesn't give me enough opportunity to become the sort of person I'd like to be,” which actually seems to be an instance of “frustration of role expectations.” It is not surprising, therefore, that, for example, the correlation between

strain and emotional stress in the marriage role is .78 (given the unreliability of their scales, this is practically unity). Thus, the moderation of the relationship between stress and strain cannot be tested with this design, since the two concepts, stress and strain, measure practically the same thing.

In summary, our study found only very few mediating effects of coping. A consistent moderator effect was found in the longitudinal study. Our interpretation was that self-report measures assess only problematic coping strategies, and coping strategies of this kind open one up to stress effects. In contrast, the indirect measures, related to normal and automatic everyday coping strategies, show a different picture, one that supports the cognitive theory of stress.

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