

Social Support as a Moderator of the Relationship Between Work Stressors and Psychological Dysfunctioning: A Longitudinal Study With Objective Measures

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The match hypothesis proposed by S. Cohen and T. A. Wills (1985) is extended, and the buffer effect of social support is tested within a longitudinal study with objective measures ($N = 90$ male blue-collar workers in the German metal industry). Stressors at work were ascertained by observers and a variant of a peer rating. Psychological, physical, and social stressors at work and leisure time stressors were ascertained. The dependent variables of dysfunctioning were psychosomatic complaints, depression, irritation/strain, and (social) anxiety. There were moderator effects of social support on the relationship between stressors and psychological dysfunctioning. Results are in line with the match hypothesis as social stressors and socially oriented aspects of psychological dysfunctioning were affected most strongly.

This study examined the buffer effect of social support within a longitudinal study design by using objective measures of work stressors and testing an extension of the match hypothesis (S. Cohen & Wills, 1985). It looks specifically at the moderator effect of social support in a work setting.

Social support is characterized by affective support (i.e., love, liking, and respect), confirmation (i.e., confirming the moral and factual "rightness" of actions and statements), and direct help (e.g., aid in work, giving information or money; Kahn & Antonucci, 1980). These various aspects of social support are usually highly interrelated. If coworkers help another employee, for example, to finish a task, they often concurrently give affective support in

addition to direct aid. In doing all of this, the coworkers also confirm the other person's belongingness to the group.

There is ample evidence for the importance of social support in directly affecting health variables, including mortality and cardiovascular and immune functioning (Uchino, Cacioppo, & Kiecolt-Glaser, 1996). However, the moderator hypothesis has received mixed confirmation (Peeters, 1994; Repetti, 1993). This hypothesis—also called buffer hypothesis (House, 1981; LaRocco, House, & French, 1980)—implies that the relationship between work stressors and ill health is affected by social support: High support protects individuals from the negative effects of work stressors. Some studies show buffer effects (House & Wells, 1978; LaRocco et al., 1980; Norbeck & Tilden, 1983; Roos & Cohen, 1987; Winnubst, Marcelissen, & Kleber, 1982), whereas others do not (e.g., Ganster, Fusilier, & Mayes, 1986; LaRocco & Jones, 1978; Turner, 1981).

There are two important reasons for this lack of consistency of the studies on social support. First, lack of methodological rigor may have produced inconsistencies. Second, social support should not produce positive effects under any circumstances. Rather, as in the match hypothesis by S. Cohen and Wills (1985), there should be a "match between coping requirements and the available support" (p. 314).

Methodological Requirements

Stressors should be measured as objectively as possible (Kasl & Wells, 1985) because reporting of stressors and social support may be confounded

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(Dohrenwend, Dohrenwend, Dodson, & Shrout, 1984). This is so because social support may produce positive feelings that lead to less reporting of stressors. When there are confoundings between the variables, there is little chance of finding an interaction effect of these variables. If in physics height, length, and width were not measured independently from each other, one could not calculate volume as a three-way interaction.

There is a dimension from subjective to objective measurement of stressors (Frese & Zapf, 1988). An item is all the more subjective the more there is cognitive and emotional processing by the target person. A measure can be called "objective" if there is no such processing by the target person, for example, when a trained observer observes the stressors at work. Because the target person is the job incumbent who also gives an ill-health rating, the cognitive and emotional processing of observers is not affected by the target person. The wording of the questionnaire items may also accentuate the subjective or objective nature of a question. For example, the wording "How easily can a little error lead to a high damage?" (an item of the uncertainty scale) is more objective (implies less influence of cognitive-emotional processing) than "My job is unclear" or "The uncertainty in my job wears me down." I assume that studies with more subjectively measured (and worded) stressors would have more difficulties finding an interaction effect. Objective observations used by Kirmeyer and Dougherty (1988) and Wells (1982) produced significant interaction effects of social support.

For this reason, the stressors were operationalized in three ways: by observations, by a sort of peer rating that gets rid of idiosyncratic responses, and by the target person's perception of the stressors. Even for the last, the items were worded as objectively as possible.

A second methodological requirement implies that it is more useful to do a longitudinal study in this area. L. H. Cohen, Towbes, and Flocco (1988) showed with a mood induction technique that there may be a confounding of mood with perceived social support. When initial level of dysfunctioning (as an equivalent to mood) is controlled for, this potential confound is reduced. Within a longitudinal study, one can control for the initial level of dysfunctioning. Controlling for initial level of dysfunctioning also gets rid of the problem of negative affectivity, because negative affectivity is assumed to be a constant personality trait and its effect would, therefore, be as strong on the initial-level ill-health as it would be on later ill-health

(Burke, Brief, & George, 1993; Zapf, Dormann, & Frese, 1996). By partialing prior ill-health, one controls for all of the relevant trait variance of negative affectivity as well.

In cross-sectional studies, a certain amount of variance of the dependent variables of psychological dysfunctioning may be due to negative affectivity. This would work against finding significant buffer effects in cross-sectional studies because that part of the dependent variable affected by negative affectivity cannot be influenced by stressor-social support interactions. Partialing out prior psychological dysfunctioning within a longitudinal study holds negative affectivity constant and, therefore, enhances the chances to find significant buffer effects (Spector, Zapf, Chen, & Frese, *in press*). Another positive aspect of longitudinal studies is that they allow a stronger causal ordering (Thoits, 1982; Winnubst et al., 1982; Zapf et al., 1996). Dormann and Zapf (*in press*) counted only 10 longitudinal studies on social support as a buffer at work (including a prior unpublished version of this article). For all of these reasons, I used a longitudinal design for this study (see also Repetti, 1993).

Match Hypothesis

S. Cohen and Wills (1985, p. 314) argued that buffering should be highest when there is a "reasonable match between the coping requirements and the available support." One implication of this hypothesis is that social kinds of stressors should be affected most strongly by social support. The match should be highest here because social support gives direct access to social resources to deal with the effects of social stressors. For example, in a conflict with a supervisor, support by one's colleagues will immediately be helpful. The effects of social stressors can be reduced by other people giving emotional support because it provides the person the security that he or she "is okay" in spite of this conflict.

Going somewhat beyond S. Cohen and Wills (1985), one could extend the match hypothesis to the dependent variables. Here the match is between those coping strategies that are based on social support and the affected dependent variables. Given this argument, dysfunctioning of social relations should be affected more by the moderator social support than nonsocial ones. For example, a person who reacts to stressors with an outburst against others may show less of this response when he or she receives social support. Thus, social support should function as a buffer more regularly in relation to a social type of

dysfunctioning than a nonsocial type of psychological dysfunctioning, for example, psychosomatic complaints (I use psychological dysfunctioning as a generic term for strain and ill-health). This extended match hypothesis would argue that social anxiety and irritation toward others should be more strongly buffered by social support than the less social areas of dysfunctioning, for example, depression or psychosomatic symptoms. Social anxiety and irritation are both social forms of psychological dysfunctioning. Although depression may also have social implication, it is not a disturbance of the social relationship itself (Beck, 1972). This reasoning implies that the present study has to distinguish various stressors and strain variables (see also Ganster et al., 1986, for this type of argument).

It should be kept in mind that the predictions from the match hypothesis are not meant to be all-or-none arguments. Thus, I do not hypothesize that moderator effects should *only* appear for irritation strain and social anxiety or that *none* should appear for psychosomatic complaints. Rather, the buffer phenomenon should occur in general but should be more pronounced with irritation and social anxiety than with psychosomatic complaints.

A variant of the match hypothesis would hypothesize that under certain circumstances, social support may actually have negative consequences, as shown by Peeters (1994) and Kaufman and Beehr (1986); these would be circumstances in which social support signals bad performance and leads to a reduction of self-esteem ("You seem to need support because you are such a weak performer"). I did not have any particular hypotheses with regard to these negative buffer or enhancer effects, but I wanted to be open to this possibility.

A further issue of the match hypothesis is the match of the source of social support with the coping requirements (e.g., Jackson, 1992). One could develop differential hypotheses with regard to supervisors, coworkers, and spouses. However, I did not have specific hypotheses in this area because the particulars of the match are probably highly specific for each situation. For example, a problem with a machine may be better solved with the help of a coworker in a certain situation, whereas in a somewhat different work situation, the supervisor may be relevant to deal with such a problem. In certain social stress situations, the supervisors and the coworkers may actually be part of the problem (Jackson, 1992) and, therefore, only the spouse may be a positive social support source. The design of the present study did

not allow collecting this type of information, and, therefore I developed no specific hypotheses.

Thus, the hypotheses are the following:

1. Social support acts as a moderator for the stressor-psychological dysfunctioning relationship.
2. Significant moderator effects should occur more frequently with social stressors than with other kinds of stressors (match hypothesis).
3. Significant moderator effects should occur more frequently with social forms of dysfunctioning as dependent variables, such as social anxiety and irritation, than with psychosomatic complaints and depression (extended match hypothesis).

Method

Some of the methods and sample characteristics have been described in Frese (1985), who studied the causal impact of stressors on psychosomatic complaints in the same longitudinal data set without looking at social support.

Measures

The measures were first developed in a set of qualitative and four to eight quantitative pilot studies. The items used a 4-, 5-, or 7-point Likert answer scale (most of them were worded in accordance with Rohrmann's, 1978, results on equidistance). The scales, sample items, and Cronbach's alphas for the questionnaire are presented in Table 1 (operationalizations of constructs are capitalized). The number of items in the scales varied slightly for the observers' and the participants' versions (the number of items of the perceived version is given below).

Measures of stressors. The psychological and physical stressors were measured in three ways: perceived stressors, observer's estimate, and group estimate. The items were essentially identical; however, there were sometimes fewer items in the observed versions because some aspects could not be observed. The participants' own ratings were not completely subjective because we tried to word the questions as objectively as possible (e.g., the wording would not be "Do you feel under pressure?" but "Does your work demand quick reactions?").

Trained observers rated the workplace of each individual after observing the participant's work for 1.5 hr. (The observers were advanced work and organizational psychology students or psychologists who received a 1-week training in stress-related work analysis.) For the group estimate, the median of three or more persons doing the same job was calculated. Because the group medians were calculated from the scales, no alpha was computed for this level. Usually three or more (up to seven) workers who were doing the same job were asked to participate in the study (they were not necessarily working together). Care was taken to make sure that only those people who actually did the same kind of work, for example, used the same machine in different shifts or the same machine at different locations, were taken as a group. This group measure minimizes idiosyncratic and illusory answers because the outliers were filtered out of the group median (see also Semmer, Zapf, & Greif, 1996). Therefore, this measure is more objective than

Table 1
Main Measures: Item Content and Reliabilities

Scale and sample item content	Reliabilities (observed)	Time 1		Time 2		Range
		M	SD	M	SD	
1. Psychological Stressors consisting of the following scales:		13.72	2.51	13.97	2.30	5-25
1.1 Intensity: time pressure	.81 (.71)					
1.2 Uncertainty: unclear commands/small error leads to large damage	.72 (— ^a)					
1.3 Organizational problems: material does not come on time	.71 (.56)					
1.4 Environmental stress ^b : noise, dirt, odors						
1.5 Danger: danger of accidents	.73					
2. Physical Stressors consisting of the following indexes:		0.98	0.41	1.04	0.39	0-2
2.1 One-sided stress of body parts ^b : "Does a part of your body hurt after work?"						
2.2 Physical intensity of work ^a						
3. Social Stressors: "My supervisor pushes all the time" "I have to work with people who do not understand fun"	.86	1.89	0.51	1.98	0.49	1-4
4. Leisure Time Stressors: "I have to help others in my leisure time"	.78	2.02	0.45	2.16	0.48	1-4
5. Social Support/Supervisor	.86	2.76	0.64	2.81	0.65	1-4
6. Social Support/Coworkers	.86	2.76	0.56	2.79	0.52	1-4
7. Social Support/Wife	.87	3.38	0.68	3.32	0.68	1-4
8. Social Support/Others	.89	2.41	0.66	2.47	0.65	1-4
9. Psychosomatic Complaints: headaches, stomachaches, etc.	.89	2.08	0.83	2.40	0.82	1-5
10. Anxiety: "I avoid talking to my supervisor" ^c	.84	2.55	1.05	2.87	1.03	1-5/1-7
11. Depression: "I have sad moods" ^c	.61	1.53	0.33	2.89	0.67	1-5/1-7
12. Irritation/Strain: "I am rather nervous when I come home tired from work" ^c	.88	2.99	1.08	3.31	1.12	1-5/1-7

^a Only one item in this scale, therefore no reliability computed. ^b No reliability was computed for this index because there is no theoretical reason that the different items should correlate highly. ^c Differences in M and SD between the two waves (Time 1 and Time 2) are due to using five answer categories in the first and seven categories in the second wave.

the individual's perception. Moreover, this measure avoids the problems of the brief period of observation. However, I am aware that even this measure has a conservative bias. Workplaces are never identical. Even if the same machines are used in different shifts, the supervisors are different and will demand different work patterns. Even if the same type of machine is used, one may, for example, be older than the other. Thus, some responses that may appear to be idiosyncratic may actually correspond to reality.

Psychological Stressors is a composite index of scales concerning uncertainty in the job (7 items), organizational problems (10 items), danger of accidents (3 items), environmental stressors (13 items), and intensity of concentration and workload (9 items). These different scales are interrelated and therefore warrant a combination into a second-order scale (Frese, 1985). One can calculate Cronbach's alpha using the scales as items; Cronbach's alphas were .73 (perceived), .76 (group level), and .52 (observed—only four scales used here because danger of accidents was not observed in Study 1). Because these are alphas for second-order scales, they are adequate (they would be much higher if one would dissolve the scales and would use the individual items to calculate Cronbach's alphas; see Cortina, 1993). The individual scales have been developed by Semmer (1982, 1984), who showed that they have adequate reliability and validity. The average correlation between different observers was .56 for the stressor scales analyzed for this article (Semmer, 1982). This may seem to be a low interrater agreement; however, it is the same as for observations of other complex situations, as Semmer's (1984) analysis showed.

Physical Stressors is composed of two indexes: one-sided stress of parts of the body (7 items) and physical intensity of work (2 items). The correlations between these two indexes were .27 for perceived, .25 for group, and .39 for observed levels (all of the correlations were significant, $p < .001$).

Social Stressors (17 items) is a measure of social animosities, conflicts with coworkers and supervisors, and a negative group climate in the work group. It was only measured on the perceived level. Frese and Zapf (1987) discussed the validity of this scale and showed that this scale is not related to social desirability and that the alphas and the distribution are similar across several subgroups (age, job tenure, different companies). Moreover, it shows a meaningful negative correlation with communication at the workplace.

Leisure Time Stressors (11 items) relates to stressors that appear in leisure time (Bamberg, 1986).

Social support. The social support measures were translated and adapted from House (n.d.) and Caplan, Cobb, French, van Harrison, and Pinneau (1975). All of the measures asked five questions on support: How much can each of these people be relied on when things get tough at work? How much is each of the following people willing to listen to your work-related problems? How much is each of the following people helpful to you in getting your job done? How much is each of the following people willing to listen to your personal problems? and How easy is it to talk to each of the following people? Each of these questions was answered with reference to four groups of people: supervisor, coworkers, wife/girlfriend (the sample consisted of male workers only), and friends and relatives (called *others*). Thus, there are four measures of social support: Social Support/Supervisor, Social Support/Coworkers, Social Support/Wife, and Social Support/Others. The internal

consistencies (Cronbach's alpha) are given in Table 1. There is a moderately high stability of these Social Support scales across 16 months, the test-retest correlations being .44, .40, .54, and .60 for social support by supervisor, coworkers, wife, and others, respectively. The scales have meaningful correlations with other socially relevant variables (e.g., Social Stressors) and seem not to be confounded with Social Desirability (with the possible exception of Social Support/Supervisor; see Frese, 1985).

In terms of validity, one issue in the literature has been whether social support is a result of a realistic assessment of the support a person receives (Repetti, 1987) or whether it is in the eye of the beholder, possibly as a personality trait (Sarason, Sarason, & Shearin, 1986). Probably, both positions are true to a certain extent. In other areas of stress research, the measures of stressors were influenced both by the reality of the stress situation and by individual factors (Frese & Zapf, 1988).

Frese (1989) did a first test on the question of how realistically social support was perceived using the Social Support/Coworkers scale. Frese studied 16 groups that had three to six people working together (from Time 1 [T1] dataset). Thus, it was possible to test the impact of the group on perceived social support. Similarly to Repetti (1987), the argument is based on the group having some kind of common social environment. If the perceptions of the workers are realistic, the variance based on this common social environment should be rather high. In an analysis of variance with the groups as an independent variable, the common social environment (i.e., the groups) accounted for 48% of the variance; the remaining 52% was due to the following three factors: random error of the instrument, rater error, and real differences between different people within any one group (Frese, 1989). Were the social support measure a personality variable, the rater error should be quite high. Unfortunately, it was not possible to estimate independently the percentage of the rater error. But from the above results, I can be confident that personality differences do not account for the largest percentage of explained variance in social support. This conclusion is also supported by Repetti (1987). Furthermore, Kirmeyer and Lin (1987) showed that there are objectively recordable behavioral underpinnings (i.e., communications) to the perception of social support.

Dependent variables. There were four dependent variables (all of them developed or adapted and validated by Mohr, 1986): (a) Psychosomatic Complaints (16 items) is a modified version of Fahrenberg (1975). It lists several complaints, like headaches, stomach aches, and so on, and is similar to various English scales of somatic complaints (e.g., the one used by Caplan et al., 1975). (b) Anxiety (7 items) is a scale that comprises mainly social anxieties. (c) Depression (8 items) is an adaptation of Zerssen's (1973) and Zung's (1965) scale. To make it distinct from Psychosomatic Complaints, all of the items referring to some physical problems (e.g., not being able to sleep) were excluded from this scale. (d) Irritation/Strain (16 items) is a newly developed and validated scale (Mohr, 1986). It uses statements given by blue-collar workers of how they conceptualize psychopathology. It refers to anger and exhaustion, mostly after work.

Mohr (1986) showed that the scales have meaningful correlations with other variables, for example, with the use of medication (significant correlations with Psychosomatic Complaints and Irritation/Strain and nonsignificant correla-

tions with Anxiety and Depression) and absenteeism (significant correlations with Psychosomatic Complaints, Depression, and Anxiety but not with Irritation/Strain). Furthermore, Psychosomatic Complaints have significant correlations with medical problems (.27) and with seeing a physician (.63; Frese, 1985).

Although the dependent variables are relatively highly intercorrelated, they should not be collapsed into one index of dysfunctioning because I suspect different effects for different dependent variables. Although I assume that there is also a common theme of "demoralization" (Dohrenwend, Shrout, Egri, & Mendelsohn, 1980) that underlies these different scales of dysfunctioning, there are other more specific themes for each of the variables.

Sample

This article is based on a longitudinal study of German male blue-collar workers from steel and automobile companies, both from rural and urban areas, in different parts of the Federal Republic of Germany (the study was done between 1979 and 1981; Greif, Bamberg, & Semmer, 1991). An earlier article presented the relationships between stressors and ill-health without referring to social support (Frese, 1985). A wide range of jobs were included, from heavy jobs at the blast furnace to simple repetitive tasks on an assembly line to highly skilled repairmen to work in control rooms. All of the participants had worked at least 6 months at their respective jobs.

The longitudinal study was based on a sample consisting of 206 workers from five different companies. Workplaces were selected systematically by having the research team walk around in the factories and rating potential workplaces with a screening instrument (with the help of shop stewards and supervisors). This was done to obtain a wide range of jobs differing in the following factors: control at work, complexity of work, and work speed. After a particular workplace had been decided on, three or more workers doing this particular job were selected at random (except when there were fewer than three workers in this particular job). Some of these workers worked together, some did not. Of 250 workers selected, 206 participated in the study. This difference was not due to refusal but to organizational problems (e.g., some workers could be absent from work, some would have missed the only bus that went to their hometown and could not participate if the interview was after work). Twelve participants had to be excluded because they were recent immigrants of German extraction from Poland and I was not sure if they could speak German well enough.

The average age of this sample was 36 years, the participants had been in their job on average for 4 years, 20% were single, and 80% lived with a partner. On average, participants had 2 children, 22% had learned their trade for their current job as an apprentice, 72% just had an extensive training period, and 4% had little to no training for their job.

The longitudinal study was based on 90 participants of four of the five companies that took part in the study. They filled out the questionnaire, and their workplaces were observed again 16 months later. The "experimental mortality" of the longitudinal study was not due to unwillingness of the workers to participate in the second wave but because of dismissals, turnover, absenteeism, vacations, and shiftwork schedules as well as administrative

problems. For example, some people could not stay after working hours to fill out the questionnaires because they participated in a car pool. In one factory, a shortened work week had been introduced and people were laid off because of a general steel crisis. One of the five factories had gone out of business completely. Furthermore, the interviews had to be completed within a certain number of days in each factory; therefore, people on holidays could not be included. The participation rate in the second wave ranged from 35% in one steel factory to 66% in one of the automobile factories. To determine differences between the longitudinal sample from the ones who just participated in the first wave, I performed 35 multiple *t* tests at T1 on relevant socio-demographic and job variables. Because the purpose was to test for similarity of the sample and because the variables were correlated, multiple *t* tests are conservative in this case. Of the 35 tests, 7 were significant (but all of the differences except one were not high using a criterion of half a standard deviation). These differences constitute a ratio of 20%, which although higher than the expected 5%, indicates that the differences between the samples were not large. The workers who participated in both waves had somewhat better working conditions (more variability and complexity; less organizational, social, and environmental stressors; and more chances to communicate) than the nonparticipants of the second wave.

All of the participants were paid for their participation. The questionnaires were filled out in groups of 4 to 8 people either during work or afterward. There was always one of the research staff members present to answer questions. The different parts of the questionnaire of Study 1 were given in permuted order (except the work analysis questions). There were no order effects.

There were missing data for the group and the observed measures because of the study design. The group measures of Psychological and Physical Stressors could only be developed for workers who shared similar jobs. Whenever there were individuals who had singular jobs or when there were singular respondents in the second wave owing to missing data, I could not calculate a group measure; this problem was more pronounced for the group measure even though I integrated the second wave into a larger cross-sectional study to get more respondents doing the same jobs. In all, I had the group measures at Time 2 (T2) for only 53 participants. I was not able to observe all participants during their work (this was due to the organizational problems alluded to above). Thus, for all correlations including Observed Stressors, the sample size was reduced to 78. Moreover, some logical missing data appeared for social support through partner because not everyone had a partner. This variable had a sample size of 83 in the first wave and 86 in the second wave. Finally, there were some missing data because parts of the questionnaire were not filled out; this was a problem only for the first wave Subjective Stressors, for which the sample size dropped to 79.

Statistical Treatment

Moderator or buffer effects were tested with the hierarchical moderated regression approach (J. Cohen & Cohen, 1975; Zedeck, 1971) with the initial values of the dependent variable (the T1 values) entered first. This partialled out the influence of earlier dysfunctioning and thus

investigated the effects of stressors and social support on the change of the dependent variable ($Y_{T2} = A + B_1 Y_{T1} + B_2 \text{Stressor}_{T1} + B_3 \text{Social Support}_{T1} + B_4 \text{Stressor}_{T1} \times \text{Social Support}_{T1}$). Because the match hypothesis demands that social support helps to deal with current stressors, the T1 measures of social support were used in this study.

Because the regression weights of the interaction terms are not invariant to transformations, only the significance of the increase of R^2 can be interpreted (J. Cohen, 1978). One problem of the moderated regression analysis approach is the lack of power (Aiken & West, 1991; Alexander & DeShon, 1994; Stone-Romero & Anderson, 1994). Therefore, I used a liberal significance criterion of .10 for B_4 (as was done in other studies, e.g., House & Wells, 1978; La Rocco et al., 1980; Winnubst et al., 1982) and recommended by Pedhazur (1982). Others (e.g., Weede, 1977) even suggested using a 1% increase of explained variance as a criterion.

It should be added that partialing out the initial level of psychological and psychosomatic dysfunctioning contributes to making the test of the buffer hypothesis conservative. For example, psychosomatic complaints at T1 may already be the result of the interaction of prior stressors and social support. If stressors and social support are relatively stable over time, removing the effects of psychosomatic complaints at T1 therefore reduces the impact of the interaction term on psychosomatic complaints at T2 considerably.

Results

Table 2 presents the longitudinal intercorrelations of the main variables.¹ As one would expect, there were positive relationships between stressors and psychological dysfunctioning and negative ones between social support and psychological dysfunctioning. Although these bivariate relationships are not the primary focus of this article, they replicate what is typically found in other studies on stressors and social support at work (e.g., Caplan et al., 1975).

Table 3 presents the increments of R^2 of the interaction terms. Note that the R^2 increment for the interaction term was measured after the prior dependent variable and the linear and single effect of stressors and social support were introduced into the hierarchical regression analyses. There were 33 (out of 128 computed) significant interaction terms. There were 55 interaction terms that constituted an increase of explained variance at least 1% or higher (43% of all the computed interaction terms). Thus, the results favor the moderator hypothesis of social support. However, there are not only buffer effects in Table 3 but also five significant enhancer (or negative buffer) effects (presented in parentheses).

In the following, the significant moderator effects are described in a bit more detail and with regard to the specific hypotheses. First, the significant interaction effects were fairly evenly distributed across the

different sources. This was true of buffer as well as of enhancer effects.

The match hypothesis (Hypothesis 2) suggests that social stressors should be more often buffered. This is clearly the case; Social Stressors were involved in seven buffer effects and one enhancer effect. Thus, there were more significant moderator effects involving this stressor than any other stressor. Psychological Stressors also showed many buffer effects that were evenly distributed between the more "objective" group and the more "subjective" perceived measures. However, there was little indication of a buffer effect for Observed Psychological Stressors.

The ratio of buffer to enhancer effects was lowest in the case of Physical Stressors; there were 10 significant buffer and 3 enhancer effects involving all three levels of Physical Stressors. Possibly, giving support when physical stressors are present may even highlight problems because they draw attention to the stressor situation without rendering adequate help (Peeters, 1994).

Our extended match hypothesis (Hypothesis 3) argues that there should be more significant buffer effects for Irritation/Strain and Anxiety than for Psychosomatic Complaints and Depression. Figure 1 presents this graphically. The two social types of dysfunctioning, Irritation/Strain and Anxiety, were most strongly affected by the moderator effect of Social Support. In contrast, the less socially oriented Psychosomatic Complaints was not much influenced by the moderator effect of Social Support. Depression was the only variable that showed more enhancer ($n = 3$) than buffer ($n = 1$) effects.

Although clear moderator effects appeared in the data, they appear not to be very large (significant R^2 increments were around 3% or 4% increased explained variance). This is in line with other research (Uchino et al., 1996). Practical interventions are only feasible if the effects are sizable (e.g., training supervisors to give social support or group training for work groups). For space limitations, not all of the effects can be translated into figures; therefore, two different ways of presenting the importance of the moderator effect must suffice. Figure 2 shows the effect when participants with one standard deviation above and below the mean of Social Stressor and Social Support were plotted. For Figure 3, the highest 25% on Psychosomatic Complaints have been arbitrarily selected. Social Support and Psychological Stressors were dichotomized at the median. The

¹ To save space, I did not include the cross-sectional correlations of the variables. A table reporting these results can be obtained from me.

Table 2
Longitudinal Correlations of Main Variables (Time 1 With Time 2)

Time 1 variable	Time 2															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Stressors																
Psychological																
1. Subjective	79**	58**	28**	29**	-18	05	36**	22*	-23*	04	-08	-06	48**	44**	22*	20*
2. Group	62**	64**	44**	17	-36**	-13	21*	07	00	06	-16	-07	37**	25*	05	16
3. Observed	31**	44**	41**	00	-26*	-02	-02	04	03	31**	18	11	20*	26**	14	11
Physical																
4. Subjective	22*	-08	16	65**	26*	37**	24*	03	-15	-17	-14	-12	31**	24*	01	13
5. Group	-07	-55**	06	46**	24*	42**	08	01	-11	-28**	-25*	-20*	12	-08	03	-04
6. Observed	-12	-32**	-01	27**	34**	45**	05	-02	-06	-18*	-11	-02	-10	-19*	-08	-09
7. Social	44**	28*	11	12	-12	20	50**	25**	-33**	-16	-19*	-08	39**	26**	36**	16
8. Leisure	31**	11	07	25*	04	23*	21*	51**	-26**	00	01	12	45**	34**	40**	29**
Social Support																
9. Supervisor	-10	-04	-20*	-17	-09	-23*	-20*	-24*	44**	26**	28**	17	-20*	-21*	-20*	-23*
10. Coworkers	-10	23	-02	-02	-06	-07	-10	-25**	13	40**	-01	-04	-23*	-24*	-22*	-04
11. Wife	00	-05	-01	-07	11	-21*	-15	-25*	11	12	54**	43**	-15	-25*	-23*	-14
12. Others	00	-07	01	-22*	00	-05	-13	-05	21*	25**	47**	60**	-02	-05	03	01
Dysfunctioning/Well-being																
13. Psychosomatic	25**	14	10	27**	-10	08	25**	18*	-23*	-15	-16	-18*	72**	50**	55**	39**
14. Irritation	37**	23*	12	21*	-08	05	30**	30**	-12	-14	-07	01	56**	61**	43**	37**
15. Anxiety	00	01	-15	-03	04	17	21*	11	-21*	-24*	-29**	-17	33**	23*	64**	32**
16. Depression	14	26*	-07	01	-08	01	20*	16	-27**	02	-03	03	37**	35**	43**	58**

Note. Decimal points omitted.
* $p < .05$. ** $p < .01$.

important information of Figure 3 is contained in the right half comparing a high with a low degree of Social Support, given high Observed Psychological Stressors. More than 50% of those with low Social Support showed high Psychosomatic Problems, whereas only less than 20% of those with high Social Support suffered from Psychosomatic Problems. Figure 3 suggests that relatively small explained variance effects can translate into important effects when one looks at subgroups with high psychosomatic complaints (Rosenthal & Rubin, 1982).

Discussion

This study tested the moderator effects of social support at work. There is evidence for the buffer hypothesis that the relationships between stressors and psychological and psychosomatic dysfunctioning are higher when social support is low and lower when social support is high. Thus, social support buffers the effect of stressors on ill-health. However, the buffer effects were specific and did not appear across the board. The match hypothesis fared rather well as the social stressors were buffered most frequently. Moreover, the social types of dysfunctioning—social anxiety and irritation/strain—were more highly affected by the buffers than were psychosomatic complaints and depression. Thus, overall, the social arena was influenced most strongly by a buffer effect of social support at work.

Although there were buffer effects for physical stressors, the enhancer effects were concentrated there. Enhancer effects have been reported by others as well (e.g., Ganster et al., 1986; Winnubst et al., 1982). Enhancer effects in the present study showed up for physical stressors and mainly predicted depression as the dependent variable. Although these effects are very small, they merit attention because Winnubst et al. (1982) also found two of their four enhancer effects with regard to depression as the dependent variable. Similarly, the composite dependent variable used by Kaufman and Beehr (1986) and leading to enhancer effects loaded very highly on depression. It may be useful to speculate about the processes that could produce enhancer effects (see House, 1981, pp. 96–97 for other speculations). Possibly, social support increases depression given certain stress situations. One might argue that the emotional support component of social support does not change the objective stress situation. This is particularly true for physical stressors. Support might even accentuate the stressor situation without being able to help deal with it. In addition, one gets more

Table 3
Moderator Effects of Social Support (R^2 Increments for Interaction Terms)

Stressor	Psychosomatic complaints _{T2}						Anxiety _{T2}						Irritation/Strain _{T2}						Depression _{T2}					
	S	C	W	O	S	C	W	O	S	C	W	O	S	C	W	O	S	C	W	O	S	C	W	O
Psychological																								
Observed _{T1}	.018†	(.029*)	.004	.041*	.007	.009	.002	.004	.003	.000	.003	.014	.000	.003	.003	.014	.022	.025	.026	.000	.000	.000	.000	.000
Group _{T1}	.005	(.001)	.000	.002	.078*	.010	.017	.034*	.032*	.013	.029†	.000	.013	.029†	.000	.000	.015	.001	.007	.014	.000	.000	.000	.000
Perceived _{T1}	.002	.000	.000	.002	.026†	.008	.038*	.001	.041*	.006	.027†	.001	.006	.027†	.001	.001	.003	.002	.007	.000	.000	.000	.000	.000
Physical																								
Observed _{T1}	.000	.035*	.002	.002	(.044*)	.019†	.049**	.002	.000	.014	.013	.032*	.000	.014	.013	.032*	.024†	.025†	.001	.001	.001	.001	.001	.001
Group _{T1}	.005	.024†	.007	.011	.007	.059**	.060**	.015	.001	.000	.024†	.011	.000	.000	.024†	.011	.001	.030†	.001	.001	.002	.002	.002	.002
Perceived _{T1}	.000	.005	.000	.016	.000	.007	.023†	.002	.006	.004	.013	.001	.004	.004	.013	.001	.006	.010	.000	.000	.000	.000	.000	.000
Social _{T1}	.007	.014	.002	.000	.044*	.030*	.035*	.025†	.046**	.028†	.042*	.003	.003	.028†	.042*	.003	.004	.010	.033†	.000	.000	.000	.000	.000
Leisure time _{T1}	.021†	.007	.002	.003	.002	.003	.009	.006	.016	.009	.016	.011	.009	.009	.016	.011	.001	.000	.013	.000	.000	.000	.000	.000

Note. T1 = Time 1; T2 = Time 2; S = Social Support/Supervisor; C = Social Support/Coworkers; W = Social Support/Wife; O = Social Support/Other. Buffer effect indicated with no parentheses; enhancer effect indicated in parentheses.

† $p < .10$. * $p < .05$. ** $p < .01$.

Number of significant interactions

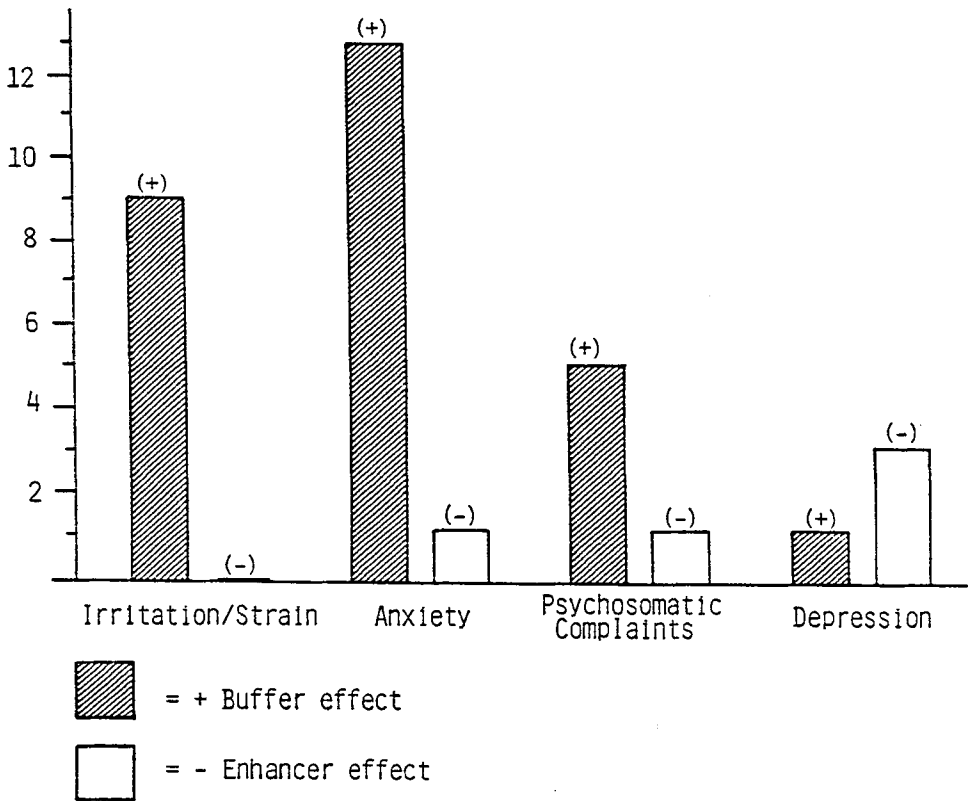


Figure 1. Significant interactions of stressors and social support broken down according to dependent variables (longitudinal study).

social support when one openly shows some need for help. In the sense of secondary gain from illness, one is prone to get support when one makes it publicly known how badly one suffers from the stressors. Depression is one of the best ways of making this known. In the short term, this may very well lead to social support that buffers the effects of stress. However, in the long run, people get less social support when they show continued depression (Strack & Coyne, 1983). This may lead to two effects: First, to get the same amount of social support, one has to increase the degree of expressed depression. Second, the dependency on social support makes it obvious to the person that he or she is helpless, thus increasing depression (Peeters, 1994). Obviously, this is a highly speculative account. The enhancer effects merit closer attention in future studies to check whether these

results can be replicated in another longitudinal study.²

Overall, the results reaffirm the conclusion of other studies on finding a buffer effect. House and Wells (1978), LaRocco et al. (1980), and Winnubst et al. (1982) showed buffer effects using similar social support measures. In all of these studies, significant buffer effects made up around 10% to 25% of the interactions. Thus, by no means were all stressors buffered, nor did buffering affect all dependent variables. The buffer effect exists but is not extremely strong. However, there are reliable buffer effects on

² Because this is a longitudinal study, the causal hypothesis for this enhancer effect suggested by Kaufman and Beehr (1986) can be ruled out: Seeking social support is not a result of strain.

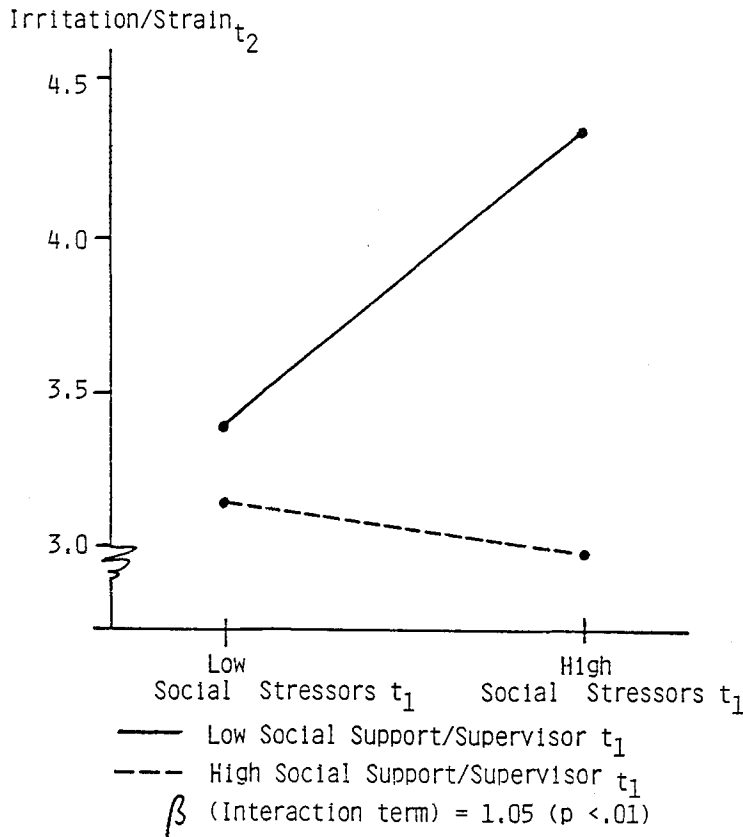


Figure 2. A graphical presentation of a buffer effect (longitudinal study). t_1 = Time 1; t_2 = Time 2.

work stress in different countries, and with the present study it can be shown to exist in a longitudinal study as well.

Some studies did not show a buffer effect (Blau, 1981; Dignam & West, 1988; Ganster et al., 1986; Jayaratne & Chess, 1984; LaRocco & Jones, 1978). LaRocco et al. (1980) noted with reference to LaRocco and Jones (1978) that job-related strains (e.g., the measures of job satisfaction used by LaRocco and Jones) may lead to main but not to moderator effects whereas ill-health variables showed buffer effects. These comments also apply to Blau's (1981) study on job satisfaction. Ganster et al.'s (1986) study did not use any socially oriented dependent measures, only satisfaction, depression, and psychosomatic complaints. Because the present study did not find many buffer effects for depression and psychosomatic complaints as well, these results are compatible. The buffer effects in the present study

occurred with anxiety and irritation/strain as dependent variables. Jayaratne and Chess (1984) differentiated between different dependent variables; nevertheless, they only found 2 significant buffer effects out of 28 tested (and 1 significant enhancer effect). One problem may have been that they only used two stressors that were worded quite subjectively (role ambiguity and conflict). One of them, role ambiguity, was very highly correlated with social support. Thus, there may have been a confounding of social support and stressors in the wording of their stressor variables.

Dignam and West's (1988) longitudinal study also did not find any evidence for a buffer effect of social support. However, they did not test for any buffer effects that examined the match hypothesis because there were no social stressors and social types of dysfunctioning in their analysis. In addition, the time lag was only 3 months. This may not be time enough

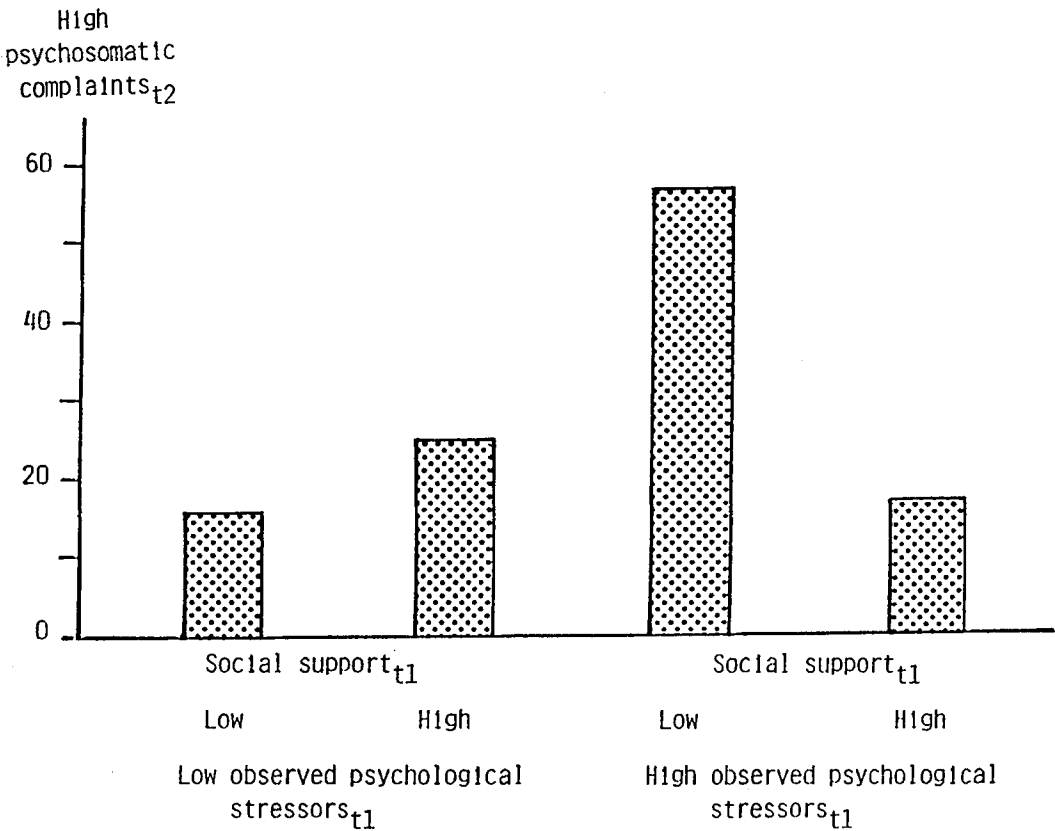


Figure 3. A high degree of psychosomatic complaints as a result of the interaction between stressors and social support (longitudinal study). t1 = Time 1; t2 = Time 2.

to develop dysfunctioning as a result of the interaction of stressors and social support, as they noted themselves.

One might question the usefulness of this study because it was done on stressors in blue-collar work. One might argue that blue-collar work is of reduced importance and that the workplaces have changed considerably since the time of data collection. I disagree with such a viewpoint. First, although blue-collar work may not be as frequent in the Western countries as in the past, more industrial jobs are added in developing countries. Second, a study by Frese and Zapf (1987) examined whether blue-collar work (including the stressors) had significantly changed between 1979 and 1985 as a result of technological changes. However, no evidence was found for this viewpoint. Finally, I tend to think of the match hypothesis as a general law independent of the specifics of the work situation or of blue-collar ver-

sus white-collar work (S. Cohen & Wills, 1985). Evidence for this general lawful nature exists in the fact that the correlations of stressors, social support, and dysfunctioning are rather similar in the various studies (and they are also similar across the United States of America and Germany).

There are obvious limitations in this study, the most important one being that there is an unfavorable ratio of participants to variables and a lack of power. Although there is the danger of overfitting, I had a priori hypotheses on the interaction effects of social support and stressors; moreover, lack of power should actually make it more difficult to get significant interaction effects because its conservative nature is well known (Aiken & West, 1991). Despite these shortcomings, I view the results with some confidence, precisely because I could get significant results in this area with a small number of participants and because the results are based on a longitudinal design.

There is a lack of such studies, particularly none that combine it with observational measures of stressors, possibly because these studies are very costly.

In general, one can take more stock in the results of a longitudinal study such as this than in cross-sectional studies. Because the initial level of dysfunctioning is partialled out, potential confoundings between reports on stressors and social support on the one hand and dysfunctioning on the other hand (see L. H. Cohen et al., 1988) are controlled for. Problems such as negative affectivity do not play a role because of partialing out prior dysfunctioning. Moreover, in cross-sectional studies, the causal structure is always unclear. One can, for example, argue that dysfunctioning may lead to a concurrent increase of stressors and decrease of social support, which would show up as buffer effects of stressors and social support in such a cross-sectional study. Both for theory and for practice, longitudinal evidence is therefore important. As discussed in the introduction, I also think that longitudinal studies may produce moderator effects more reliably than cross-sectional studies. A final strength of this study was that all of the variables were very carefully constructed and validated, which has been called for repeatedly by social support researchers.

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