



Support provider's appraisal detection bias and the efficacy of received support in medical students preparing for an exam

Nina Knoll^{1*}, Ute Schulz², Ralf Schwarzer³
and Hans Peter Rosemeier¹

¹Charité – Universitätsmedizin Berlin, Germany

²Preventive Medicine Research Institute, Sausalito, CA, USA

³Free University Berlin, Germany

Matching social support to the recipient's needs requires diagnostic sensitivity on the part of the provider. In particular, support needs to be responsive to the recipient's stress-related appraisals to be maximally effective. To assess the impact of bias in interpersonal stress assessment, medical students in 43 dyads reported on their own and each other's stress appraisals, social support, affect and performance during a 5-day preparation period culminating in a multiple choice examination. Less biased perceptions of loss appraisals by support providers within dyads were followed by support transactions associated with lower negative affect and better exam performance among recipients. More biased perceptions of threat appraisals were followed by increases in the recipients' negative affect. Results therefore suggest that support is more effective when the provider understands the recipient's concerns.

There is accumulating evidence indicating that actually receiving social support may be a double-edged sword (e.g. Revenson, Schiaffino, Majerovitz, & Gibofsky, 1991). Most of this work has shown that receiving social support may have adverse effects on health and well-being or may have no effects at all (e.g. Bolger, Foster, Vinokur, & Ng, 1996; Bolger, Zuckerman, & Kessler, 2000; Glynn, Christenfeld, & Gerin, 1999; Itkowitz, Kern, & Otis, 2003; Kaufmann & Beehr, 1986).

On the other hand, there is also evidence connecting favourable outcomes with received support. For instance, the classic study by Kulik and Mahler (1989) that employed objective measures of received support (i.e. observed numbers of visits to a patient's hospital bed) shows that another person's presence during stressful times may in fact speed up certain aspects of recovery. Moreover, Steptoe (2000) reported that

* Correspondence should be addressed to Nina Knoll, Charité Campus Mitte, Institute of Medical Psychology, Luisenstrasse 57, 10117 Berlin, Germany (e-mail: nina.knoll@charite.de).

well-supported teachers did not show increases in heart rate and blood pressure during work-related stressful episodes.

A number of attempts have been made to explain these contradictory findings (e.g. Bolger *et al.*, 2000). In terms of possible counterproductive effects of received support, Dunbar, Ford and Hunt (1998) noted that actual support transactions might be associated with a number of drawbacks, including higher initial distress (e.g. Barrera, 1986), costs to self-esteem (Bolger *et al.*, 2000; Dunbar *et al.*, 1998), or inappropriate support (e.g. Coyne, Wortman, & Lehman, 1988). One way of extending understanding of the contradictory outcomes of received support is to consider how such faulty support transactions evolve as part of more inclusive coping processes.

Embedding social support in transactional models of stress and coping

Many researchers have investigated dyadic or systemic forms of coping within interpersonal relationships (e.g. Barbee, 1990; Bodenmann, 1995, 1997; Coyne & Smith, 1991; DeLongis & O'Brien, 1990). Aside from other coping strategies, supportive interactions are considered one of many forms of dyadic coping (e.g. Bodenmann, 1995; Coyne & Smith, 1991). Nearly all of these theories (Barbee, 1990; Bodenmann, 1995, 1997; Coyne & Smith, 1991; De Longis & O'Brien, 1990) embed support processes in the classical transactional framework on stress and coping proposed by Lazarus (e.g. Lazarus & Folkman, 1984, 1987).

In Lazarus' transactional model, two important factors determine the onset and course of the stress process: appraisals and coping. Lazarus defines two different classes of appraisal: primary (situational) appraisals and secondary (resource) appraisals. Primary appraisals refer to the individual's view of the present situation. In the classic application of Lazarus' transactional model, these primary appraisals lead a person to characterize a situation as either not involving stress at all or as involving harm-loss, threat or challenge. Harm-loss appraisals are likely to occur in situations in which an individual has already suffered a loss or experienced some sort of damage. Threat appraisals involve anticipated loss or damage that has yet to occur. Challenge appraisals pertain to subjective ratings of situations that involve a certain amount of effort (or even strain) but hold the promise of a positive outcome. It is important to note that most stressful encounters should result in mixed appraisals. As an example, consider an upcoming exam. The possibility of failing the exam may be associated with threat appraisals in that it includes anticipated harm. However, this situation also entails loss aspects; for example, it greatly restricts recreational time due to preparatory efforts.

Secondary appraisals, on the other hand, involve subjective evaluations of one's own personal resources for coping with a situation. According to Lazarus' transactional stress model, the balancing and combination of these two interdependent classes of appraisals determines whether or not the person 'enters' the stress process. How the stress process is dealt with is represented by the second important mediator in the transactional model, namely, coping. The two main functions of coping are emotion regulation (emotion-focused coping) and dealing more directly with the problem at hand (problem-focused coping).

Bodenmann (1995) provides the most detailed extension of the transactional model (Lazarus & Folkman, 1984, 1987) to a dyadic level. Bodenmann's model underscores the relevance of primary and secondary individual and dyadic appraisals as antecedents of dyadic coping, including supportive interactions. Bodenmann assumes that the development of dyadic stress through situational and resource appraisals may evolve not

only from problems concerning both partners at the same time, but also from problems that were originally appraised as such by only one member of the dyad. Some level of agreement between partners in the appraisal of the situation is a necessary antecedent to arrive at dyadic coping strategies.

Considering this theoretical framework for the stress process, cognitive appraisals are key explanatory variables. Defining actual social support transactions as one of many forms of dyadic coping, stress-related appraisals by both members of a support dyad should yield important information concerning the initiation, course and outcome of a supportive interaction.

Hobfoll (1988) and Keinan and Hobfoll (1989) suggested that situations appraised as stressful (e.g. involving harm-loss or threat) by both recipient and provider should elicit support transactions more easily. By extension, this might also in part be true for the provider's guess on the recipient's situational appraisal. Keinan and Hobfoll (1989) found that supportive actions are most useful when they are qualitatively consistent with the situational and personal requirements of the recipient.

Considering instances when supportive actions fail to help or even worsen a recipient's situation, part of this outcome should be explained by misconceptions and misunderstandings early in the stress process, that is, in the appraisal phase. If a potential support provider fails to adequately detect the appraisals of the potential recipient, then this should have consequences for the outcome of the support interaction. This should be especially true for ambiguous situations that are not associated with shared expectations about the implications of threat or loss. By contrast, the implications of some situations, such as hospital stays following myocardial infarctions, as studied by Kulik and Mahler (1989), may be more obvious.

Appraisal detection bias and social support

Not much is specifically known about appraisal detection bias to date. However, superordinate constructs, such as 'mind reading' or empathic accuracy, which are considered the '*quasine qua non* of successful human relationships', have been the subject of a number of studies (Ickes, 1993; Thomas & Fletcher, 2003). Ickes (1993) argues that empathic accuracy entails two core elements: in strictly theoretical terms it entails the ability to accurately infer thoughts and feelings of another person, that is, empathic understanding. Regarding its operational definition, however, empathic accuracy should also entail empathic expression, that is, the ability to express these inferred thoughts and feelings.

Studies on how biases in the detection of other persons' thoughts might influence dyadic interaction or, more specifically, the support process are rare (Bodenmann, 1995; Dunkel-Schetter, Folkman, & Lazarus, 1987). Ickes, Stinson, Bissonette and Garcia (1990) found correlates of empathic accuracy among two strangers to include the amount of behavioural involvement and the percentage of partner attributions and partner-relevant thoughts by the perceiver. More support-related findings by Dunkel-Schetter and colleagues (1987) suggest that appraisals of a situation as highly stressful enhance the amount of support received. Participants reported that they received more support for highly stressful encounters as opposed to low-stress situations. If a situation is perceived as highly stressful, an interaction partner's biased detection of the recipient's appraisal might become less likely, due to enhanced behavioural cues from the potential recipient (cf. Funder, 1995), presumably also enhancing the provision and, thus, the receiving of support. However, Dunkel-Schetter and co-workers' (1987) study

did not provide detailed answers to the efficacy of the more frequent support transactions in terms of whether or not they helped to reduce stress.

The present study

Of central concern to the present study was the primary appraisal process proposed by Lazarus and Folkman (1984, 1987) for individuals and by Bodenmann (1995) for dyads. Our interest was focused on self-rated (potential recipient) and partner-rated (potential provider) stress-related appraisals (i.e. threat appraisals and harm-loss appraisals) and how their degree of overlap might moderate the support-outcome associations for support recipients. In other words, do effective support transactions partly depend on the provider's unbiased detection of the recipient's concerns about a situation at hand? This question was addressed with a sample of co-student dyads facing a demanding situation. To our knowledge, the influence of provider-rated appraisal bias on the support process has not been addressed in research on support so far.

A mildly stressful context that was expected to permit variability in partner-rated loss- and threat-appraisal bias among the co-student dyads was chosen as a study setting. Second-year medical students, who were enrolled in 5-day intensive medical psychology courses culminating in a written examination, participated in the study. The exam was presumed to be a low-impact stressor because of low rates of failure in past exams and a fairly high predictability of preparatory effort needed to pass the exam. Participation in medical psychology classes is mandatory in German medical schools. Students are required to pass the class and the exam.

Due to mandatory all-day attendance during the seminar and the additional requirement of giving an oral presentation, preparatory study for the exam was limited to the evenings for most students. Therefore, changes in positive and negative affect were predicted because exam preparation was likely to interrupt students' personal lives and spare time, especially towards the end of the course.

With regard to relationships between social support and outcomes, a moderating role of partner-rated stress (i.e. loss and threat) appraisal bias within support dyads was hypothesized for different outcome criteria. Participants with a partner who gave unbiased ratings of their stress-related appraisals were expected to benefit from support transactions more than participants with partners who produced biased appraisal ratings. It was assumed that a better understanding of stress-related appraisals within dyads would lead to support transactions that were better targeted (in quantity and quality) and, hence, more efficacious, leading to improved affect and better examination performance among support recipients.

Method

Procedure

Data were collected at noon on four successive days during the courses: t1 was on the first day, t2 on the second day, t3 on the fourth day and t4 was on the fifth day of classes when the final examination took place. Questionnaires were distributed to the medical students at t1, t2 and t3 and the number of mistakes made in the written examination were recorded at t4.

At t1, the students were asked to pair up with one of their fellow class participants. Pairing was based on self-selection and most students had known each other since their first year of medical school. Student dyads were instructed to remain in this

constellation for the entire assessment period. Each measurement occasion was divided into two parts. During the first part, students were asked to complete self-report questionnaires. During the second part, students were instructed to complete a questionnaire rating their chosen partner.

Participants

A total of 94 medical students participated in the study. Of these, 8 (9%) did not have a partner in their respective courses or their partners failed to provide data at all measurement points in time. These participants were excluded from further analyses. The remaining 86 students (91%; 43 dyads) had a mean age of 23 years ($SD = 3.25$) and were currently in their second year of medical school. Twenty-one students were men (24.4%) and 65 were women (75.6%). Most of the students were single ($N = 71$; 82.6%), the others were married or lived in a stable relationship ($N = 15$; 17.4%).

Only 15 dyads contained both a male and a female participant. The partners had known each other for a mean of 15.56 months ($SD = 11.55$ months). Students were asked to rate their level of friendship quality with their partner on a scale ranging from dislike (-4) to close/friendly ($+4$). The average rating was 2.35 ($SD = 1.28$) and the extent of within-dyad agreement assessed using intra-class correlation was $ICC r = .67$ ($p < .001$).

Measures

Positive and negative affect

Self-reported affect was assessed using the Positive and Negative Affect Schedule (PANAS) by Watson, Clark and Tellegen (1988) in its German translation by Krohne, Egloff, Kohlmann and Tausch (1996). The positive (PA) and negative affect scales (NA) consisted of ten adjectives each. Participants were asked to rate their own mood *on the respective day* by indicating answers on a 4-point scale for each adjective. Possible endorsements were: *not at all*, *a little*, *quite a lot* and *very much*. Affect was assessed at three points in time (t1 through t3). The internal consistencies were satisfactory, with an average Cronbach's $\alpha = .90$ for positive affect and an average Cronbach's $\alpha = .79$ for negative affect. Positive and negative affect were unrelated at most measurement points in time, except for the third measurement when both scales correlated at $r = -.22$ ($p < .05$).

Mistakes in the exams

The numbers of mistakes made in the written exams were assessed directly following the exam. Because exams differed in the five seminars, the numbers of mistakes were standardized for each exam version.

Loss and threat appraisals and partner-rated bias in appraisals

Loss and threat appraisals (self report and partner ratings) were assessed at three points in time (t1 through t3) using a shortened and adapted version of Jerusalem's (1990) scale. To approximate a longitudinal design, the present study only used t1 data as predictors of subsequent support and affect. The four adapted scales consisted of three items each; for example: 'The upcoming exam limits my personal life now to a great extent' (harm/loss appraisal, self report), 'She/He believes the upcoming exam limits her/his personal life now to a great extent' (harm/loss appraisal, partner rating); 'I don't think I'll come to terms with the exam' (threat appraisal, self report), 'She/He does not think she/he'll come to terms with the exam' (threat appraisal, partner rating);

original items were German). Participants were instructed to appraise their own and their partner's situation *at that moment*. Items were rated on 4-point Likert-type scales ranging from *does not apply at all* (0) to *applies exactly* (3). Cronbach's alphas were satisfactory in both self-report ($\alpha_{\text{loss}} = .78$, $\alpha_{\text{threat}} = .69$) and partner-rated versions ($\alpha_{\text{loss}} = .83$, $\alpha_{\text{threat}} = .81$). Pearson correlations between self-reported and partner-rated appraisals were low at $r = .26$ ($p < .05$) for harm/loss and $r = .10$ (*ns*) for threat. The self-rated appraisals of individual dyad partners did not show a significant overlap as indicated by a low and insignificant intra-class correlation (ICC loss $r = .20$, *ns*; ICC threat $r = .17$, *ns*).

To determine partner bias in appraisals, difference scores were computed, subtracting partner-rated appraisals (e.g. person Y rates person X) from self-rated appraisals (of person X) and recoding the scores into their absolute values. Difference scores were chosen as a measure of bias in this instance because alternative bias or accuracy indices that are based on correlations, such as profile agreement or variable-by-variable agreement, either do not tend to capture differences in mean placement of each variable between other- and self-descriptions or cannot be applied to the present data structure (Funder & Colvin, 1997). A large percentage of participants (50 to 75%) were either accurately (zero mean difference: loss $n = 24$, threat $n = 23$) or nearly accurately (loss: $M_{\text{diff}} = 0.36$, $SD_{\text{diff}} = 0.08$, $n = 31$; threat: $M_{\text{diff}} = 0.33$, $SD_{\text{diff}} = 0.00$, $n = 25$) rated on their appraisals by their respective partners at t1. This led to highly skewed distributions of the absolute differences and a higher number of univariate and multivariate outliers, resulting in unstable model solutions. It was thus decided to recode the absolute differences into three groups each, representing high ($M_{\text{diff}} = 1.05$, $SD_{\text{diff}} = 0.49$, $n = 31$), medium ($M_{\text{diff}} = 0.36$, $SD_{\text{diff}} = 0.08$, $n = 31$) and low bias ($M_{\text{diff}} = 0.00$, $SD_{\text{diff}} = 0.00$, $n = 24$) of loss appraisals and high ($M_{\text{diff}} = 0.97$, $SD_{\text{diff}} = 0.33$, $n = 38$), medium ($M_{\text{diff}} = 0.33$, $SD_{\text{diff}} = 0.00$, $n = 25$) and low bias ($M_{\text{diff}} = 0.00$, $SD_{\text{diff}} = 0.00$, $n = 23$) of threat appraisals. The recoded threat and loss appraisal biases at t1 were not significantly associated before or after their respective main effects (i.e. self- and partner-rated loss and threat appraisals) were partialled out. Only 8 participants were able to rate their partners accurately both on their t1 loss and t1 threat appraisals. In other words, the 'cross-appraisal' consistency of the bias measures was very low.

Received emotional and instrumental support

Support indicators were assessed at two points in time (t2 and t3) using an adapted and shortened version of the Berlin social support scales (BSSS) by Schulz and Schwarzer (2003). Each scale consisted of three items. Received emotional support items were: (1) She/he has shown that she/he likes me, (2) She/he assured me that the exam won't be so difficult and (3) She/he inquired about my well-being. Received instrumental support items were: (1) She/he provided me with preparatory texts for the exam, (2) She/he informed me about the exam and (3) She/he copied preparatory material for me. Participants were instructed to report whether they had received support during the last 2 days (t2) and during the last 24 hours (t3). Items were rated on 4-point Likert-type scale ranging from *does not apply at all* (0) to *applies exactly* (3). Internal consistencies of the received instrumental support scale were Cronbach's $\alpha = .69$ (t2) and $\alpha = .86$ (t3) and consistencies of the received emotional support scale were $\alpha = .68$ (t2) and $\alpha = .80$ (t3). Intercorrelations between emotional and instrumental support scales were medium in size (t2 $r = .52$, $p < .001$; t3 $r = .48$, $p < .001$).

Analyses

Data were analysed using repeated measurements analyses of variance as well as multi-level or hierarchical linear modelling due to non-independence in within-dyad variables (HLM 5.05; Raudenbush, Bryk, & Congdon, 2001). According to suggestions by Campbell and Kashy (2002) regarding these specific forms of actor-partner interactions that require accounting for non-independence, no specific level-2 predictors were specified in these models and level-2 slopes were fixed. For each analysis, all main effects and interaction terms (if of interest) were included in the Level 1 model that represents the analysis model for each dyad:

Bias moderating the support - outcome relationship:

$$Y_t = b_0 + b_1(\text{Recipient's Sex}) + b_2(\text{Received Support}_t) + b_3(\text{S-R Appraisal}_t) \\ + b_4(\text{P-R Appraisal}_t) + b_5(\text{Bias}_t) + b_6(\text{Received Support}_t \times \text{S-R Appraisal}_t) \\ + b_7(\text{Received Support}_t \times \text{P-R Appraisal}_t) + b_8(\text{Received Support}_t \times \text{Bias}_t) + r,$$

where Y_t is the respective outcome at a specified point in time or its change (i.e. affect or mistakes); $\text{Received Support}_t$ is the respective support measure at a specified point in time (i.e. emotional or instrumental); S-R Appraisal_t is the respective self-rated appraisal at a specified point in time; P-R Appraisal_t is the respective partner-rated appraisal at a specified point in time; Bias_t is the grouped absolute difference score of the respective self- and partner-rated appraisals at a specified time point; and $(\text{Received Support}_t \times \text{S-R Appraisal}_t)$, $(\text{Received Support}_t \times \text{P-R Appraisal}_t)$ and $(\text{Received Support}_t \times \text{Bias}_t)$ are the respective interactions between support indicators, the respective self- and partner-rated appraisals and the bias measure at specified points in time. R refers to the residual component of the respective outcome. To obtain estimates of these effects, a maximum likelihood (ML) approach was used. Except for recipient's sex, all Level 1 predictors were centred on their grand means (Aiken & West, 1991; Campbell & Kashy, 2002).

To approximate a longitudinal prediction and to ascertain that the respective appraisal ratings preceded the actual support transaction, we chose to use the t1 appraisal bias measures along with the t2 support indicators to predict outcomes of later measurement points in time. In this manner, the partner-rated appraisal bias pertained to t1. Because of the necessary retrospective assessment, the support measures indicated received assistance from t1 through t2. The outcomes generally pertained to later points in time. In most analyses, when changes between measurement points were of interest as outcomes, the so-called 'residualized-change' approach was chosen by controlling for the respective previous assessment of the variable of interest while predicting the later outcome (Cohen & Cohen, 1983). Sex of the potential recipient was controlled in analyses when it shared variance with either predictors or outcomes.

Results

Results are divided into two parts. The first part yields descriptions of levels and changes in the affect outcomes and the received support indicators for different measurement points in time. Furthermore, intra-class correlations were tested to investigate possible non-independence within dyads. The second part then describes analyses that test

the hypotheses on the efficacy of received support in dyads where partner ratings of the loss and threat appraisals show different degrees of bias compared to the recipient's self-rating.

Change and intra-class correlations in affect measures and number of mistakes

To test our expectation that t3 affect scores would differ significantly from scores at t2, we used a one-way repeated measurements analyses of variance. Concerning negative affect, the overall time effect was significant at the 10%-level only (TIME: $F(1, 84) = 3.02, p < .10, \eta^2 = .04$). On the day before the exam, participants' negative affect increased slightly (see Table 1). Also, men tended to report higher negative affect than women ($F(1, 84) = 3.52, p < .10, \eta^2 = .04$). Regarding positive affect, overall mean changes from t2 to t3 were in accordance with expectations (TIME: $F(1, 85) = 5.39, p < .05, \eta^2 = .06$; see Table 1). Sex was unrelated to positive affect at all times and, thus, not included in the analyses. Intra-class correlations in positive and negative affect were low and insignificant for t2 and t3 except for positive affect at t3 (ICC $r = .29, p < .10$)¹. At the first measurement point, however, ICCs were significant or marginally significant for both positive (ICC $r = .26, p < .10$) and negative affect (ICC $r = .34, p < .05$), indicating an overlap in variance within the dyads.

The non-standardized mean of number of mistakes made was 2.80 ($SD = 1.78$), values ranged from zero mistakes to a maximum of seven mistakes in the multiple choice questions. A significant intra-class correlation emerged using the standardized scores (ICC $r = .39, p < .01$), indicating a medium degree of overlap in the student dyads' performances in the final exam.

Changes and intra-class correlations in the support measures

The means of both support indicators, that is, received emotional support and received instrumental support, did not change from t2 to t3 (see Table 1). At t2, intra-class correlations for received support were ICC $r = .19$ (*ns*) for instrumental and ICC $r = .49$ ($p < .01$) for emotional support. At t3 the associations were ICC $r = .29$ ($p < .10$) for instrumental and ICC $r = .55$ ($p < .001$) for emotional support. Thus, to avoid problems due to non-independence of the data, all further analyses involving the support indicators were conducted using the 2-level approach in which individuals (Level 1) were nested within dyads (Level 2).

Bias moderates the relationship between received support and change in affect

Actors' sex, stress-related appraisal bias and its main effects (at t1), a t2 support indicator and all other two-way and three-way interaction terms were included in the models to test a possible moderating role of bias in partner-rated appraisals on the support-affect relationship (see Table 2). To account for non-independence in the support indicators, two level models were computed, nesting individuals (Level 1) in dyads (Level 2).

Loss-appraisal bias as a moderator

Two significant interactions emerged predicting level (t3) and change in negative affect (t2 to t3). Participants who received much emotional support and had a partner who accurately rated their loss appraisals early in the course reported the lowest negative

¹ To account for the non-independence in positive affect at t3, we retested the TIME effect of the repeated-measures ANOVA using a 3-level model, nesting repeated measures (Level 1) in individuals (Level 2) in dyads (Level 3). Results indicated a significant decrease in positive affect from t2 to t3.

Table 1. Means and standard deviations for the central variables

	Time 1		Time 2		Time 3	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Negative affect	0.33	0.36	0.30	0.28	0.36	0.35
Positive affect	1.25	0.57	1.26	0.51	1.14	0.63
S-R Loss Appraisal	0.43	0.58	–	–	–	–
P-R Loss Appraisal	0.51	0.61	–	–	–	–
S-R Threat Appraisal	0.59	0.52	–	–	–	–
P-R Threat Appraisal	0.57	0.53	–	–	–	–
Received emotional support	–	–	1.68	0.76	1.68	0.84
Received instrumental support	–	–	0.63	0.73	0.63	0.78

Note. *N* = 86. S-R Appraisal: Self-rated appraisal; P-R Appraisal: Partner-rated appraisal.

affect (t3), confirming the hypotheses. Unsupported participants with accurate partner appraisals, however, showed relatively higher levels of negative affect. Follow-up analyses indicated that received emotional support had a significant effect on negative affect at t3 within the group of accurately rated participants only.

Concerning change in negative affect from t2 to t3 (see Figure 1), a similar picture emerged. Emotionally well-supported and accurately rated participants' negative affect decreased, whereas unsupported but accurately rated participants' negative affect increased. Follow-up analyses once again indicated that received emotional support (t2) had a significant effect on change of negative affect from t2 to t3 within the accurately rated group at t1 only. With regard to positive affect, no interaction between received emotional support and partner-rated bias of loss appraisals (t1) was found.

Threat-appraisal bias as a moderator

In the next step, the same models were tested using the threat appraisal bias measures as moderators. In light of the small sample size, the minimal overlap between the loss bias and threat bias measures and to avoid too many predictors in the models, we decided to run separate analyses for each bias measure but predicted the same outcomes (i.e. levels and changes of the affect measures).

Two significant interaction terms emerged, involving the t1 threat appraisal bias measure and received instrumental support (t2) predicting the level (t3) and change (t2 to t3, see Figure 2) of negative affect. In both instances, follow-up analyses indicated that there were significant effects of received instrumental support in the inaccurately rated participants only, that is, those inaccurately rated participants who received much support had higher levels (t3) and higher increases of negative affect (t2 to t3). The interaction predicting change in negative affect from t2 to t3 is depicted in Figure 2. As with the t1-loss bias measure, the t1-threat bias indicator did not moderate the support-positive affect relationship.²

² We reconducted the analyses using the respective t2 bias indicators as moderators between the respective supports received at t3 and positive affect at t3. In both analyses, individuals who had received the respective supports (t3) and had a partner who accurately judged their loss or threat appraisals at t2 also reported more positive affect at t3.

Table 2. Moderating effects of partner-rated loss and threat appraisal bias on the support – outcome relationships: Participants' negative affect and number of mistakes

	NA t3			Change in NA t2 to t3			Number of mistakes		
	b	t(df)	p	b	t(df)	p	b	t(df)	p
Intercept	0.49	2.90 (42)	<.01	0.34	2.18 (42)	<.04	1.03	1.93 (42)	.06
NA t2	–	–	–	0.40	3.48 (76)	<.01	–	–	–
Recipient's sex	–0.08	–0.93 (77)	.35	–0.06	–0.77 (76)	.44	–0.63	–2.20 (77)	.03
Received support t2 (A)	–0.04 ^a	–0.69 (77) ^a	.49 ^a	–0.03 ^a	–0.48 (76) ^a	.63 ^a	–0.00 ^b	–0.02 (77) ^b	.98 ^b
S-R Loss Appraisal t1 (B)	0.29	4.40 (77)	<.01	0.19	2.30 (76)	.02	–0.40	–2.34 (77)	.02
P-R Loss Appraisal t1 (C)	–0.15	–2.40 (77)	.02	–0.11	–2.04 (76)	.04	–0.04	–0.21 (77)	.84
Bias t1 (D)	0.03	0.55 (77)	.58	0.02	0.45 (76)	.66	–0.15	1.10 (77)	.27
A × B	–0.06 ^a	–0.45 (77) ^a	.66 ^a	–0.04 ^a	–0.24 (76) ^a	.81 ^a	–0.16 ^b	–0.81 (77) ^b	.42 ^b
A × C	0.00 ^a	0.05 (77) ^a	.96 ^a	0.02 ^a	0.18 (76) ^a	.86 ^a	–0.03 ^b	–0.12 (77) ^b	.90 ^b
A × D	0.16 ^a	2.01 (77) ^a	.05 ^a	0.16 ^a	2.09 (76) ^a	.04 ^a	0.49 ^b	2.66 (77) ^b	.01 ^b
Intercept	0.73	4.24 (42)	<.01	0.45	2.48 (42)	.02	–	–	–
NA t2	–	–	–	0.53	5.46 (76)	<.01	–	–	–
Recipient's sex	–0.21	–2.30 (77)	.02	–0.15	–1.65 (76)	.10	–	–	–
Received support t2 (A)	.14 ^b	2.88 (77) ^b	.01 ^b	0.11 ^b	2.56 (76) ^b	.01 ^b	–	–	–
S-R Threat Appraisal t1 (B)	0.05	0.87 (77)	.39	0.03	0.56 (76)	.57	–	–	–
P-R Threat Appraisal t1 (C)	0.05	0.83 (77)	.41	–0.01	–0.10 (76)	.92	–	–	–
Bias t1 (D)	0.01	0.30 (77)	.76	0.02	0.61 (76)	.54	–	–	–
A × B	0.10 ^b	1.13 (77) ^b	.26 ^b	0.11 ^b	1.30 (76) ^b	.20 ^b	–	–	–
A × C	–0.10 ^b	–1.11 (77) ^b	.27 ^b	–0.12 ^b	–1.63 (76) ^b	.11 ^b	–	–	–
A × D	0.18 ^b	3.20 (77) ^b	<.01 ^b	0.14 ^b	3.21 (76) ^b	<.01 ^b	–	–	–

Note. N = 86. S-R: Self-rated appraisal. P-R: Partner-rated appraisal. Bias: Lower values indicate high accuracy.

^aEffect of received emotional support or interaction term including received emotional support.

^bEffect of received instrumental support or interaction term including received instrumental support.

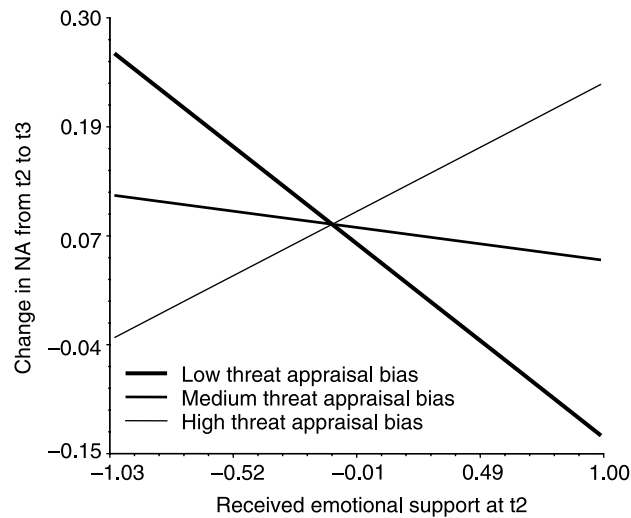


Figure 1. Bias in provider-rated loss appraisals moderates the relationship between received emotional support and change in negative affect from 2 days (t2) to 1 day before the final exam (t3; residual score; $N = 86$).

Bias moderates the relation between received support and number of mistakes

Only partner-rated loss appraisal bias moderated the relationship between received instrumental support and number of mistakes made in the exam (see Table 2). The relationship is depicted in Figure 3. Follow-up analyses indicated that accurately rated but less instrumentally supported participants made more mistakes than accurately rated and well-supported participants who made fewer mistakes than all other groups.

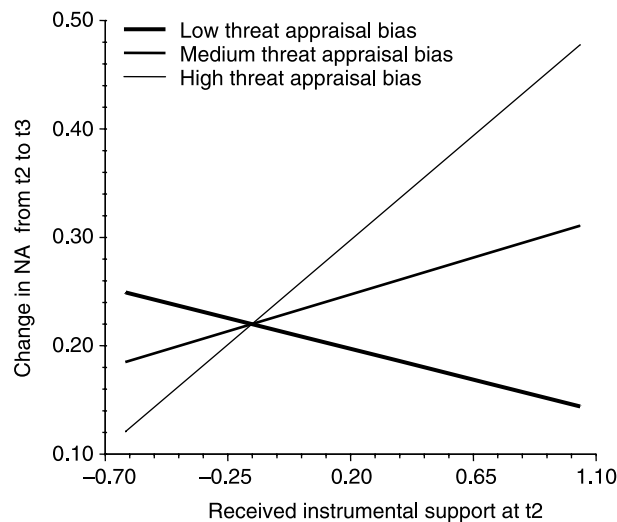


Figure 2. Bias in provider-rated threat appraisals moderates the relationship between received emotional support and change in negative affect from 2 days (t2) to 1 day before the final exam (t3; residual score; $N = 86$).

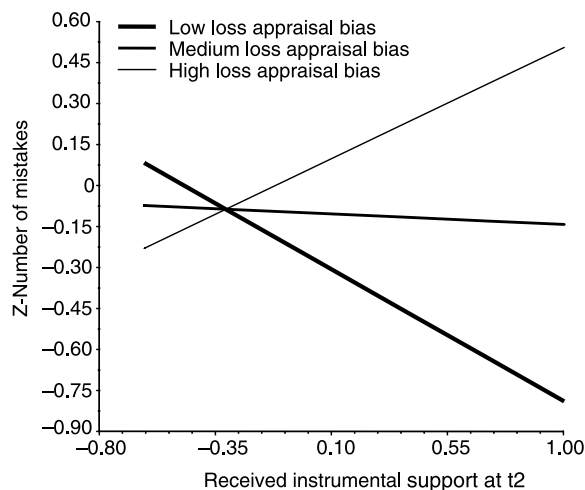


Figure 3. Bias in provider-rated loss appraisals moderates the relationship between received instrumental support and number of mistakes made in the final exam (t_4 ; $N = 86$).

Discussion

The central interest in this study was to test whether less bias in the provider-rated loss appraisals contributed to more favourable outcomes of received support for the recipient. The data largely confirmed the expectations for different outcomes.

Stress, appraisals and support indicators: Changes and overlaps

Taking part in the final exam of the mandatory medical psychology class was not associated with marked increases in stress indicators. Affect measures changed in the expected direction but changes were weak and approached significance in one instance only. The marked time constraints during the course week were probably the most demanding factors in this context.

We expected that less severe stressors would open a platform for differences in partner-related appraisal bias in that they provided less obvious situational and behavioural cues to the psychological processes of the rated person (cf. Funder, 1995). This explanation was supported by the data in the fairly low within-dyad overlaps between self-rated and partner-rated appraisals and affect outcomes.

A fairly high degree of overlap was observed for received emotional support at both measurement points in time. Regarding instrumental support, only the t_3 intra-class correlation towards the end of the courses was significant. This might be explained by the lower costs of emotional compared with instrumental support (cf. Hobfoll, Freedy, Lane, & Geller, 1990; McGuire, 2003). Inquiring about one's well being, providing reassurance and generally being concerned does not involve as much effort as helping a person in more tangible ways, such as tutoring or sharing textbooks. Reciprocity and other-sensitivity in support transactions might then at least partly depend on associated costs for the individual (Dunkel-Schetter & Skokan, 1990; McGuire, 2003).

Concerning the significant ICCs in the numbers of mistakes in the exam, a concerted preparation within dyads might have led to similar levels of competence in dyad members and thus led to overlapping exam outcomes.

Partner-rated appraisal bias: A moderator of the support-outcome relationship?

Turning to the central findings of this study, data largely suggested that received support is of more help when the provider correctly detects the concerns of the recipient (or the lack thereof). Partners' loss- and threat-appraisal biases were largely unrelated suggesting a certain domain-specificity in detecting an acquaintance's concerns. Presumably, within more intimate forms of relationships, this domain-specificity is less pronounced as more intimate partners have both more practice and better feedback with regard to their partner appraisals.

Loss-appraisal bias

Receiving emotional support only acted as a buffer on negative affect when providers rated recipients' loss appraisals in an unbiased way. In participants whose partner read their concerns without bias but failed to provide emotional support, negative affect increased prior to the exam. Although we did not find a mechanism of mediation for this latter finding, we presume that an explanation might reside in the later developments of the relationship of accurately rated but unsupported participants. Accurate partner-ratings of stress-related appraisals do not by definition involve a commitment to provide support. However, according to Batson (1991), perspective taking is a major component of empathy. An understanding of the situation combined with feelings of empathic concern may then provide the motive to act in order to reduce the other's distress. A missing empathic response or other subsequent accounts of emotional support despite apparent understanding may have elicited the observed increased negative affect.

For participants whose partners were biased in their reading of loss-related concerns, receiving support showed no relation with negative affect. This is consistent with the hypothesis that detecting a person's concerns (or lack thereof) is an important first step in a successful support transaction.

The moderating effect of bias on partner-rated loss appraisals also emerged in a performance-related outcome: the number of mistakes in the exam. Accurately rated participants who had received more instrumental support made fewer errors. However, receiving instrumental support did not make any difference to participants whose partners' interpersonal appraisal ratings were biased. Thus, a provider's unbiased detection of a recipient's problems apparently improved their targeting of remedial action (i.e. instrumental support). Although instrumental support was generally associated with worse affect, it seemed to bring at least some positive consequences in the performance domain, mainly for recipients whose loss-appraisals were assessed with less bias.

Threat-appraisal bias

Findings also indicated a moderator role of threat-appraisal bias in the support-outcome relationship. However, unlike the loss-appraisal bias results, here the accurately rated and well supported participants did not show decreases in negative affect prior to the exam. Instead, the inaccurately rated participants who were well supported increased in negative affect whereas the other groups remained on the same level. While this evidence does not completely contradict our predictions, it does not fully support them either.

A provider's overestimation of a recipient's appraisal of threat may have resulted in him or her providing support when it was not required, sending a negative ego-relevant

message to the recipient. Having one's perceived threat underestimated might have led to increased stress because of the indirect validation of one's initial concerns or because one was given the wrong kind of support (i.e. regarding quantity and/or quality).

Why then should reduced bias in loss-appraisal ratings be more closely associated with successful provision of support than reduced bias in threat-appraisal ratings? Dunkel-Schetter and Skokan (1990) suggest that loss assessments provide a potential helper with clearer or more obvious possibilities to intervene. It is likely that support efforts to reduce *already present* loss damage or harm yield relatively straightforward possibilities for instrumental as well as emotional help, such as offering to collaborate, pointing out social or temporal comparisons, or making information available. However, offering support to ameliorate perceived threats, that is, uncertain damage, loss, or harm that might or might not occur in the future, should require a more detailed assessment of the appraiser's state of mind because the source of concern has not yet occurred and in some cases the likelihood of its occurrence might be questionable.

Limitations and suggestions for future research

The present study explored a very mildly stressful episode. Would appraisal detection play out the same if the underlying situation had more impact on stress indicators? It is assumed that variance in appraisal detection decreases when the impact of a stressor increases. But even in a more limiting situation a potential for misunderstanding in dyads of acquaintances seems possible. Impression-management strategies by a potential support recipient might act as distractors to accurate appraisal detection by the provider or the quality of the relationship might moderate the detection-support process above and beyond impression-management attempts. In this study, relationship quality as appraised by participants and their partners failed to predict significant outcome shares as it was controlled in preliminary analyses. This might be due to a lack of variance in the measure and might be addressed in more heterogeneous dyad populations.

Using larger samples with more balanced proportions of same-sex and mixed dyads would facilitate the investigation of gender issues which could not be appropriately addressed in this framework. Support transactions have been known to differ among men and women (Knoll & Schwarzer, 2002; Schwarzer & Leppin, 1992). Also, there are gender differences with regard to the degree of empathic accuracy that suggest higher general accuracy in women (Thomas & Fletcher, 2003), especially when participants are aware that they need to perform an empathy-relevant task (Ickes, Gesn, & Graham, 2000). How do cultures of support transactions differ with respect to the constellation of gender within the dyads? Also in preliminary analyses, we partly accounted for this question by including dyad composition as a dyad-level control to the analyses reported here. Whereas it did not affect the reported results, this might have been due to the under-representation of the mixed dyad constellations in the present study.

Another limitation of this study concerns the operationalization of detection bias as a simple mean-difference score between self- and partner-rated loss appraisals. Although difference scores tend to confound several aspects of accuracy, as noted before, alternative approaches based on correlation do not capture the same information and were, thus, not suited for the present analyses (Funder, 1980; Funder & Colvin, 1997).

Furthermore, the present study addresses only end-point outcomes in the hypothesized support transactions yet several potentially important mediators are neglected. For instance, which parts of the eventually received supports are unsolicited and how does the mobilization of support affect changes in stress indicators (cf. Monroe & Steiner, 1986)? The list of open questions may be long but, in light of the present results, seem worth addressing using larger samples in various types of more or less stressful encounters.

Conclusions

Are successful support transactions related to the degree of a provider's more or less biased perception of the recipient's concerns? The findings suggest that this may be the case as support recipients with more accurately rated stress appraisals showed both better affect and better performance within a demanding academic setting.

Acknowledgements

Preparation of this manuscript was supported, in part, by an Alexander von Humboldt research fellowship awarded to Ute Schulz. We wish to thank Kati Albert, Rolf Kienle, Petra Stephan and Isolde Daig for their help with data collection.

References

- Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.
- Barbee, A. P. (1990). Interactive coping: The cheering up process in close relationships. In S. Duck (Ed.), *Personal relationships and social support* (pp. 46–65). London: Sage.
- Barrera, M., Jr. (1986). Distinctions between social support concepts, measures and models. *American Journal of Community Psychology*, 14, 413–445.
- Batson, C. D. (1991). *The altruism question*. Hillsdale, NJ: Erlbaum.
- Bodenmann, G. (1995). A systemic-transactional conceptualization of stress and coping in couples. *Swiss Journal of Psychology*, 54(1), 34–49.
- Bodenmann, G. (1997). Dyadic coping – a systemic-transactional view of stress and coping among couples: Theory and empirical findings. *European Review of Applied Psychology*, 47, 137–140.
- Bolger, N., Foster, M., Vinokur, A. D., & Ng, R. (1996). Close relationships and adjustment to a life crisis: The case of breast cancer. *Journal of Personality and Social Psychology*, 70, 283–294.
- Bolger, N., Zuckerman, A., & Kessler, R. C. (2000). Invisible support and adjustment to stress. *Journal of Personality and Social Psychology*, 79, 953–961.
- Campbell, L., & Kashy, D. A. (2002). Estimating actor, partner and interaction effects for dyadic data using PROC MIXED and HLM: A user-friendly guide. *Personal Relationships*, 9, 327–343.
- Cohen, J., & Cohen, P. (1983). *Applied multiple regression/correlation analysis for the behavioral sciences*. Hillsdale, NJ: Erlbaum.
- Coyne, J. C., & Smith, D. A. F. (1991). Couples coping with myocardial infarction: A contextual perspective on wives' distress. *Journal of Personality and Social Psychology*, 61, 404–412.
- Coyne, J. C., Wortman, C. B., & Lehman, D. R. (1988). The other side of support: Emotional overinvolvement and miscarried helping. In B. H. Gottlieb (Ed.), *Marshaling social support: Formats, processes and effects* (pp. 305–330). Thousand Oaks, CA: Sage.
- DeLongis, A., & O'Brien, T. (1990). An interpersonal framework for stress and coping: An application to the family of Alzheimer's patients. In M. A. P. Stephens, J. H. Crowther, S. E. Hobfoll, & D. L. Tennenbaum (Eds.), *Stress and coping in later life families* (pp. 221–240). New York: Hemisphere.

- Dunbar, M., Ford, G., & Hunt, K. (1998). Why is the receipt of social support associated with increased distress? An examination of three hypotheses. *Psychology and Health, 13*, 527-545.
- Dunkel-Schetter, C., Folkman, S., & Lazarus, R. S. (1987). Correlates of social support receipt. *Journal of Personality and Social Psychology, 53*, 71-80.
- Dunkel-Schetter, C., & Skokan, L. A. (1990). Determinants of social support provision in personal relationships. *Journal of Social and Personal Relationships, 7*, 437-450.
- Funder, D. C. (1980). On seeing ourselves as others see us: Self-other agreement and discrepancy in personality ratings. *Journal of Personality, 48*, 473-493.
- Funder, D. C. (1995). On the accuracy of personality judgment: A realistic approach. *Psychological Review, 102*, 652-670.
- Funder, D. C., & Colvin, C. R. (1997). Congruence of other's and self-judgements of personality. In R. Hogan & J. A. Johnson (Eds.), *Handbook of personality psychology* (pp. 617-647). San Diego: Academic Press.
- Glynn, L. M., Christenfeld, N., & Gerin, W. (1999). Gender, social support and cardiovascular responses to stress. *Psychosomatic Medicine, 61*, 234-242.
- Hobfoll, S. E. (1988). *The ecology of stress*. Washington, DC: Hemisphere.
- Hobfoll, S. E., Freedy, J. R., Lane, C., & Geller, P. (1990). Conservation of social support resources: Social support resource theory. *Journal of Social and Personal Relationships, 7*, 465-478.
- Ickes, W. (1993). Empathic accuracy. *Journal of Personality, 61*, 587-610.
- Ickes, W., Gesn, P. R., & Graham, T. (2000). Gender differences in empathic accuracy: Differential ability or differential motivation? *Personal Relationships, 7*, 95-109.
- Ickes, W., Stinson, L., Bissonette, V., & Garcia, S. (1990). Naturalistic social cognition: Empathic accuracy in mixed-sex dyads. *Journal of Personality and Social Psychology, 59*, 730-742.
- Itkowitz, N. I., Kern, R. D., & Otis, J. D. (2003). Support and coronary heart disease: The importance of significant other responses. *Journal of Behavioral Medicine, 26*, 19-30.
- Jerusalem, M. (1990). Temporal patterns of stress appraisals for high and low-anxious individuals. *Anxiety Research, 3*, 113-129.
- Kaufmann, G. M., & Beehr, T. A. (1986). Interactions between job stressors and social support: Some counterintuitive results. *Journal of Applied Psychology, 71*, 522-526.
- Keinan, G., & Hobfoll, S. E. (1989). Stress, dependency and social support: Who benefits from husband's presence in delivery? *Journal of Social and Clinical Psychology, 8*, 32-44.
- Knoll, N., & Schwarzer, R. (2002). Gender and age differences in social support: A study on East German refugees. In G. Weidner, M. Kopp, & M. Kristenson (Eds.), *Heart disease: Environment, stress and gender. NATO Science Series* (Vol. 327, pp. 198-210). Amsterdam: IOS Press, Series I: Life and behavioural sciences.
- Krohne, H. W., Egloff, B., Kohlmann, C. -W., & Tausch, A. (1996). Untersuchungen mit einer deutschen Version der Positive and Negative Affect Schedule (PANAS). [Investigations with a German version of the Positive and negative affect schedule (PANAS)]. *Diagnostica, 42*, 139-156.
- Kulik, J. A., & Mahler, H. I. M. (1989). Social support and recovery from surgery. *Health Psychology, 8*, 221-238.
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal and coping*. New York: Springer.
- Lazarus, R. S., & Folkman, S. (1987). Transactional theory and research on emotions and coping. *European Journal of Personality, 1*, 141-169.
- McGuire, A. M. (2003). It was nothing - Extending evolutionary models of altruism by two social cognitive biases in judgements of costs and benefits of helping. *Social Cognition, 21*, 363-395.
- Monroe, S. M., & Steiner, S. S. (1986). Social support and psychopathology: Interrelations with preexisting disorder, stress and personality. *Journal of Abnormal Psychology, 95*, 29-39.
- Raudenbush, S., Bryk, A., & Congdon, R. (2001). HLM 5.05. *Hierarchical linear and non-linear modeling*. Chicago: Scientific Software International.
- Revenson, T. A., Schiaffino, K. M., Majerovitz, S. D., & Gibofsky, A. (1991). Social support as a double-edged sword: The relation of positive and problematic support to depression among rheumatoid arthritis patients. *Social Science and Medicine, 33*, 807-813.

- Schulz, U., & Schwarzer, R. (2003). Soziale Unterstützung bei der Krankheitsbewältigung: Die Berliner social support skalen (BSSS) [Social support and coping with illness: The Berlin social support scales (BSSS)]. *Diagnostica*, *49*, 73–82.
- Schwarzer, R., & Leppin, A. (1992). Possible impact of social ties and support on morbidity and mortality. In H. O. F. Veiel & U. Baumann (Eds.), *The meaning and measurement of social support* (pp. 65–83). Washington, DC: Hemisphere.
- Stephoe, A. (2000). Stress, social support and cardiovascular reactivity over the working day. *International Journal of Psychophysiology*, *37*, 299–308.
- Thomas, G., & Fletcher, G. J. O. (2003). Mind-reading accuracy in intimate relationships: Assessing the roles of the relationship, the target and the judge. *Journal of Personality and Social Psychology*, *85*, 1079–1094.
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, *54*, 1063–1070.

Received 15 October 2004; revised version received 5 June 2005