

Rethinking the Effects of Stressors: A Longitudinal Study on Personal Initiative

Doris Fay and Sabine Sonnentag
University of Amsterdam

This study examined the relationship between stressors at work and personal initiative (PI), one proactive concept of extra-role performance. Using a control theory framework to describe the stress process, the authors hypothesized that stressors should be positively related to PI. This departs from findings of negative relationships between stressors and other types of performance. Furthermore, curvilinear relationships were tested. The analyses, based on 4 measurement waves of a longitudinal field study with 172 to 193 participants, showed that stressors were positively related to subsequent changes in PI; there was no support for a curvilinear relationship.

There is a large amount of theorizing and empirical literature about organizational stress and its effects on health and well-being. Although of no less importance, the number of studies on the impact of organizational stress on performance is comparatively smaller. At least two recent trends should draw our attention to the stress–performance issue. First, in the face of an increasing pressure for high performance as a result of increasing worldwide globalization and

competition, the stress–performance relationship is of practical importance. On the one hand, continuous high performance requirements could make individuals more susceptible to stress-related mental and physical health impairments; on the other hand, actually performing successfully might have a positive impact on health.

Second, the performance concept has lately broadened considerably. In less than two decades, the performance concept has been enlarged and now includes various forms of extra-role performance, for example, personal initiative (PI; Frese, Fay, Hilburger, Leng, & Tag, 1997). Up to now, our knowledge on stress and the newly considered performance aspects is rather limited; this is especially true of the relationship between organizational stress and proactive forms of extra-role performance. Devoting attention to this relationship should be a worthwhile effort because this relationship may be different from the relationship of organizational stress with in-role performance.

The objective of this article is to contribute to this area by studying the relationship of organizational stress and PI, which is one important type of proactive extra-role performance. A control theory approach is used to describe the relationship between stress and PI.

PI: One Aspect of a Multidimensional Performance Concept

Performance is a multidimensional concept (Campbell, McCloy, Oppler, & Sager, 1993; Murphy, 1990). On a very general level, one can differentiate between in-role and extra-role performance (Borman & Motowidlo, 1993). In-role performance refers to those types of behavior explicitly required or ex-

Doris Fay and Sabine Sonnentag, Department of Psychology, University of Amsterdam, Amsterdam, the Netherlands.

Sabine Sonnentag is now at the Department of Psychology, Technical University of Braunschweig, Braunschweig, Germany.

This research is based on the Project AHUS (Aktives Handeln in einer Umbruchsituation [Active Actions in a Radical Change Situation]), which was supported by the Deutsche Forschungsgemeinschaft (DFG No. Fr 638/6–6; principal investigator: Professor Michael Frese). Thanks are also due to the two firms Bayerische Hypotheken und Wechsel Bank and Tabacco Reynolds, as well as the “Hundertjähre Stiftung” of the Ludwig-Maximilians-University in Munich; they all helped in the beginning of the project.

We thank the members of the project—D. Fay, H. Garst, S. Hilligloh, C. Speier, T. Wagner, and J. Zempel—and the students who participated in the study. We also wish to thank Michael Frese, Elizabeth Wolfe Morrison, and anonymous reviewers for their helpful comments on earlier versions of this article.

The following publications used data of one or several waves of the study and analyzed the sample or a subset of it: Dormann and Zapf (1999); Fay and Frese (2000a, 2000b, 2001); Fay and Lange (1997); Frese, Fay, Hilburger, Leng, and Tag (1997); Frese, Kring, Soose, and Zempel (1996); Garst, Frese, and Molenaar (2000); and Speier and Frese (1997).

Correspondence concerning this article should be addressed to Doris Fay, who is now at the Department of Psychology, University of Giessen, Otto-Behagel-Strasse, 10F, 35394 Giessen, Germany. E-mail: doris.fay@psychol.uni-giessen.de

pected by supervisors, coworkers, and role descriptions. Extra-role performance refers to actions shown voluntarily, not explicitly demanded by supervisors, and not specified in role descriptions. In the last decade, concepts referring to extra-role performance gained increasing interest. This is rooted in the idea that organizational effectiveness depends not only on in-role performance but to some degree on workers' voluntarily showing extra-role performance (Katz, 1964); this notion has been empirically supported (Baer & Frese, 2002; Koys, 2001; Podsakoff, Ahearne, & MacKenzie, 1997; Zempel, 1999; cf. Podsakoff, MacKenzie, Paine, & Bachrach, 2000).

Previous research has shown that in-role and extra-role performance are distinct concepts and are predicted by different groups of variables (Motowidlo, Borman, & Schmit, 1997; Motowidlo & van Scotter, 1994). Similarly, one can assume that the stressor-performance relationship is likely to vary in strength and type depending on the aspect of performance under consideration (Fried & Tieg, 1995).

There is a wide variety of concepts referring to extra-role performance (Brief & Motowidlo, 1986; Borman & Motowidlo, 1993; Frese, Kring, Soose, & Zempel, 1996; George & Brief, 1992; Morrison & Phelps, 1999; Organ, 1988; Van Dyne & LePine, 1998). Van Dyne and colleagues suggested that extra-role concepts can be ordered along two dimensions: affiliative-challenging and promotive-prohibitive (Van Dyne, Cummings, & Parks, 1995; Van Dyne & LePine, 1998). The first dimension refers to the degree to which the behavior is oriented toward preserving relationships (affiliative) versus focusing on substantive issues while taking the risk of damaging relationships. Most facets of organizational citizenship behavior (OCB; Organ, 1988) are typical examples of affiliative behaviors. The second dimension refers to the degree to which a behavior is proactive and "causes things to happen" (Van Dyne & LePine, 1998, p. 108) versus being protective and preventative. Extra-role performance concepts that focus on challenging and promotive behaviors refer to actions that go beyond the processes presently implemented within the organization. Examples of these concepts are personal initiative (Frese et al., 1996, 1997), voice (Van Dyne & LePine, 1998), and taking charge (Morrison & Phelps, 1999). In this article, we concentrate on personal initiative.

Frese et al. (1996) defined personal initiative, or PI, as "a behavior syndrome resulting in an individual's taking an active and self-starting approach to work and going beyond what is formally required in a given job" (p. 38). PI implies that an individual sets

and pursues a personal and work-related goal that reflects a long-term focus. Typical examples of PI are taking preparatory steps for future demands and taking measures to increase efficiency in the long run. Beyond its self-starting and proactive nature, Frese et al. defined PI by two further attributes. First, when taking initiative, one is often confronted with barriers and setbacks, for example, colleagues or a supervisor might be reluctant to support an intended change; these barriers demand persistence. Second, only actions that are in accordance with the organization's overall mission are considered as initiatives.

An example illustrates our idea of PI. After the opening of a retirement residence, a cashier of one of the local supermarkets observes an increasing number of elderly customers. The cashier notes that the elderly people have other needs than their regular customers: They need more help packing their shopping, they demand goods usually not stocked, or they ask for help in other ways. If this cashier develops ideas about how one could respond to the needs of these elderly customers (e.g., by offering a home delivery service) to make the supermarket more attractive than other shops around and tries to implement the ideas, the cashier would take initiative. This action is self-started and goes beyond the job requirements; additionally, it is proactive and pro-organizational as the cashier would anticipate a competitive advantage over other shops as a consequence of his or her doing.

Theoretically, PI is one specific aspect of a broad performance concept. Correspondingly, several studies showed that PI contributes to overall organizational effectiveness and that the individual benefits from showing PI (for a recent overview, see Fay & Frese, 2001). For example, several studies on small-scale businesses showed that the owners' PI is related to their company's success. This has been replicated in different economic environments such as Germany (Zempel, 1999), Uganda (Koop, De Reu, & Frese, 2000), and Zimbabwe (Krauss, Frese, & Friedrich, 2001).

Stressors and Performance

In general, stressors are assumed to impair performance. Whereas some authors have suggested a negative linear relationship, others have argued for an inverted U-shaped relationship (cf. Kahn & Byosiere, 1991; McGrath, 1976). The negative linear relationship between stressors and performance can be explained by both direct and indirect effects. Direct impairment of performance occurs when, for exam-

ple, an organizational stressor such as inadequate or broken tools and equipment hinders successful task execution. Pace of working can sometimes be increased to make up for time lost (e.g., needed for mending the broken tool), but this can require a trade off with regard to quality issues. Noise can similarly reduce performance directly when high background noise masks signals relevant for task accomplishment. Stressors can furthermore impair performance indirectly when they tax regulation capacity required for task execution. Humans' regulatory capacity is limited; stressors consume regulation capacity and therefore have the potential to impair performance (cf. Hockey & Hamilton, 1983; Kahneman, 1973).

There is some—although weak—empirical evidence for a negative linear relationship of stressors and performance; role stressors in particular have been studied extensively. Meta-analyses have reported small negative relationships between performance on the one hand and role conflict and role ambiguity on the other (Abramis, 1994; Jackson & Schuler, 1985; however, their results also indicated that there should be moderators). Jamal (1985) found negative effects of role overload; in contrast, in a study with secretaries, no relationship between the secretaries' reports of workload and their supervisors' performance ratings was found, but the secretaries' reports of constraints and role ambiguity were negatively related with performance (Spector, Dwyer, & Jex, 1988). Focusing on a typical supervisory task, Fried and Tieg (1995) found that supervisors' role stressors decreased the accuracy with which they made performance ratings of their subordinates: Role conflict was positively associated with actual performance ratings, indicating a leniency error. For three different levels of managers of a convenience store organization, O'Connor et al. (1984) reported a negative relationship between situational constraints and performance ratings. Similar results were found in a financial services company (Steel & Mento, 1986).

Drawing from the Yerkes-Dodson law, other researchers have suggested a curvilinear relationship between stressors and performance (McGrath, 1976). This notion presupposes that a moderate level of arousal is required to keep an individual alert and focused on the task. When there is too little arousal, performance is diminished. As stressors have an activating function, they can increase arousal to a level optimal for performance; but once arousal exceeds this optimal level, performance deteriorates, resulting in an inverted U-shaped curve. Empirical support for the inverted U-shaped relationship outside the laboratory is limited (e.g., Anderson, 1976; Srivastava &

Krishna, 1991); often, there is more evidence for a linear negative relationship than for a curvilinear relationship between stressors and performance (Jamal, 1984, 1985). However, this is not surprising considering that the optimal level of arousal depends on the type of task and on the individual (McGrath, 1976, p. 1353).

We argue that the role of stressors for challenging and proactive types of extra-role behaviors is different than for in-role behaviors. We propose a control theoretical approach to explain how stressors affect challenging and proactive types of extra-role behaviors such as PI.

Stressors and PI: A Control Theory Approach

We conceptualize stressors within a control theory framework that describes human behavior in a cybernetic model (Carver & Scheier, 1982, 1998). Important components of such a model are an input function (i.e., the individual's perception of his or her own state or of the environment); a reference value (i.e., the individual's desires, values, or goals); a comparator, which compares the input function with the reference value; and an output function (i.e., behavior). The output function is activated when a discrepancy between the input function and the reference value is detected. Such a discrepancy can result from a disturbance within the environment or from a change in the reference value. The output function aims at resolving this discrepancy.

Edwards (1992, 1998) drew on control theory for developing a cybernetic model of the stress process. According to this model, stress occurs when the individual experiences a discrepancy between the input function and the reference value, given that the sensed discrepancy is important for the individual. This discrepancy negatively affects psychological well-being and activates coping, which is equivalent to the above-named output function. Coping seeks to restore well-being by influencing the determinants of stress or influencing well-being directly.

In this article, we want to enlarge Edwards's (1992) model to get a more complete picture of the stress process. In Edwards's model, individuals react to stress or sensed discrepancies. We argue that the stress process can be more fully understood if we shift the focus from a reactive model to a more active one by including PI as an output function. Humans have the capacity to think about the future and are therefore able to anticipate future discrepancies. An individual who suffers repeatedly from a given stressor that threatens goal achievement is able to predict

that this stressful situation is likely to reoccur. This anticipation allows the individual to take measures against the stressor, to prevent the occurrence of a discrepancy altogether. This implies that the model needs to be enlarged by an additional, delayed output function. In other words, it suggests that the model can be enlarged by an additional output function that is proactive and long-term oriented.

For example, a machine operator falls behind with his or her work because the machine he or she works at breaks down several times during a shift; it takes time to find the repair person and to restart the machine. This person perceives the number of pieces produced (i.e., input function). The comparison of the number of pieces produced with the work goals (i.e., reference value) leads to sensing a discrepancy (the individual perceives that he or she is behind with work and might get into trouble). According to Edwards's model, the sensed discrepancy activates coping; for example, the person could try to speed up to make up for lost time (i.e., output function).

The anticipation that this problem will happen again can stimulate an additional output function: The individual can proactively try to prevent such a situation. For example, the machine operator can ask the repair person to teach him or her how to repair the machine, or he or she could tell the foreman that this machine needs to be replaced or needs thorough overhauling. This type of proactive action implies taking initiative: The person acts in a self-starting manner, shows a long-term perspective, and exceeds his or her job role.

PI as an output function in the stress process departs from traditional control theoretical approaches in two respects with regard to the time dimension. First, PI implies a long-term focus. PI focuses rather on the prevention of a looming or reoccurring stressor than on acute stressor handling. Second, initiative taking does not necessarily take place in the presence of an extant stressor due to constrained cognitive resources. One of the highest priorities at work is the achievement of work goals. PI is a nonroutine activity (see Fay, Sonnentag, & Frese, 1998) that requires to some extent conscious planning and thinking, that is, cognitive processes that rely on resources. In the presence of stressors, resources are taxed and most likely invested in the achievement of in-role performance goals. Therefore, we propose that initiative is taken in a moment when stressors are not acute. In the case of the example given above, this means that the person tries to achieve work goals despite the stressors and talks to the repair person or foreman at an appropriate time.

A central variable in the outlined cybernetic approach is the experience of a personally relevant discrepancy, which is equivalent to experienced stress (Edwards, 1992). The role of work *stressors* was not made explicit in Edwards's model. In contrast to stress, which refers to the individual's subjective experience, a stressor is "external" to the individual, that is, not evaluated by the individual with regard to its personal relevance. For example, noise of 60 dB(A) in an office is a stressor, but this noise does not necessarily cause stress within a given individual, if the individual is used to it and the noise does not interfere with any work or personal goals.

We suggest that work stressors are related to the input function in two ways. First, a stressor can be equated with the input function. For example, being yelled at frequently by one's supervisor (i.e., input function) can lead to a discrepancy as one desires to be treated correctly (i.e., reference value). Second, a stressor can have an impact on the input function. This is the case when, for example, work interruptions lead to reduced performance. A discrepancy evolves if the perception of one's (impaired) performance serves as an input function, which is then compared with the desired performance level. The second function of stressors is similar to the "disturbance" in the original cybernetic model of Carver and Scheier (1982). This implies that the discrepancy can refer to different aspects of the working situation; the most relevant ones are presumably discrepancies between the performance targets and perceived performance and discrepancies between desired and actual working conditions.

In this framework, a stressor—leading in one way or other to a sensed discrepancy—can be regarded as a *signal* indicating that a process, procedure, or design is below an optimal level (see the model by Fay et al., 1998). Looking at stressors from this perspective implies that stressors may actually increase initiative taking. The stressor does not directly *cause* the action but points to a faulty circumstance, for which a change for the better could be made. The improvement can be made by taking initiative. Therefore, we predict that stressors should have a positive effect on PI.

We conducted our study in the former East Germany, a country in transition from a socialist plan economy to a market economy. We gathered our data in the period from 1991 to 1995, a transformation phase in which the most substantial and far-reaching changes occurred. In this study, we did not assess Edwards's (1992) model completely but focused on stressors as primary causes of discrepancies. Specif-

ically, we studied stressors frequently encountered in organizations in transition from inert bureaucratic organizations, which is typical of the socialist plan economy, to organizations more fit to survive in the flexible and dynamic market economy. Therefore, we focused on two types of stressors: situational constraints and time pressure.

Situational constraints refer to the malfunctioning of organizational processes and to inadequacy of tools, equipment, materials, or supplies. Examples are computer breakdowns, being dependent on material of suboptimal quality, and other blockages of the working process. When these situational constraints are confronted, smooth and efficient working is not possible, and the achievement of performance goals is at risk. An act of initiative can help to get rid of this stressor to ensure in-role performance and to reduce the discrepancy between desired and actual organizational processes. The machine operator (described in the earlier presented example) can ask the repair person to teach him or her the tricks of how to quickly get the machine to work again. Accordingly, we assume that situational constraints are positively related to PI.

Time pressure refers to a situation in which the amount of work to be done exceeds the amount of time available for task accomplishment. As a consequence, one experiences the necessity to hurry up and to work hard and fast. Thus, high time pressure is related to a discrepancy between the actual and desired speed of task accomplishment. Furthermore, time pressure can also force the individual to reduce performance quality, which implies another discrepancy. Discrepancies are experienced as unpleasant; this can stimulate the individual to find ways to reduce them or to prevent them in the future. For example, the individual can try to identify and suggest a more efficient way of performing the job, which in turn will reduce the discrepancy. Another option would be to identify means to improve one's skills (i.e., follow a training course), which in turn will allow one to work more efficiently. Thus, we assume that time pressure is positively related to PI.

Hypothesis 1: Situational constraints are positively related to PI.

Hypothesis 2: Time pressure is positively related to PI.

In line with theoretical models on the stressor–performance relationship (McGrath, 1976), one might argue that stressors such as situational constraints or time pressure are not always positively related to PI. Particularly in situations characterized

by an extremely high level of stressors, PI might suffer. This suggests an inverted U-shaped curve. We argued that, to show PI, one needs some leeway (if ever so little) to think about alternatives, develop a goal, plan an action, and so forth. In a situation with a very elevated level of stressors, however, most resources will be consumed for the accomplishment of in-role performance goals. Furthermore, to develop ways of dealing with the stressor, one needs a long-term focus on work and to explore the environment. This is reduced in extremely stressful situations (see Frese & Zapf, 1994). For example, it has repeatedly been shown that stress can cause cognitive and perceptual tunneling (see Anderson, 1976; Wickens, 1996). Focusing only on the most relevant task cues may, depending on the task, facilitate task performance but is not useful for taking initiative. This suggests that stressors at a high level could have a detrimental effect on PI. This would imply a curvilinear relationship between stressors and PI in the form of an inverted U-shaped curve.

At the same time, a high degree of stressors also causes a large discrepancy, which in turn is a strong threat to well-being. Then, resolving the discrepancy is even more urgent (in comparison with a medium level of stressors with a less marked discrepancy). This implies a linear relationship between stressors and PI, despite possible resource constraints. Both types of relationship appear theoretically sound; therefore, on an exploratory basis, we test beyond the linear effect (implied in Hypotheses 1 and 2), also a curvilinear effect.

Hypothesis 3: Stressors (time pressure and situational constraints) show a curvilinear (inverted-U shaped) relationship with PI.

Rationale of the Study

Our model makes an important assumption about the time frame of the relationship between stressors and PI. It is unlikely that a person will show initiative in the very moment of a stressful situation (e.g., under high time pressure) because in such a situation accomplishing the in-role performance goal has the highest priority, and this demands a high amount of resources. Thus, PI will not be shown concurrently with the occurrence of high stressors. Nevertheless, stressors point to a discrepancy and the necessity that something has to be changed. This implies that individuals subsequently will engage in PI. Framed differently, we expect that stressors present at a given point in time will be related to future PI. To test this assumption, we need a longitudinal study design.

Table 1
Means, Standard Deviations, and Intercorrelations Among Study Variables for Analyses Based on Wave 3 and Wave 4

Variable	M	SD	1	2	3	4	5	6	7	8	9
1. Age	40.63	10.75	—								
2. Gender ^a	1.47	0.50	-.09	—							
3. SES ^b	2.05	0.89	.14	.30**	—						
4. Job qualification	3.44	0.82	.19*	-.04	.62**	—					
5. Job complexity (Wave 3)	3.53	0.70	.07	-.02	.29**	.38**	(.67)	—			
6. Situational constraints (Wave 3)	2.05	0.74	-.11	-.17*	-.08	-.06	-.08	(.88)	—		
7. Time pressure (Wave 3)	3.47	0.75	.06	.23**	.19*	.08	.36**	-.05	(.77)	—	
8. Personal initiative (Wave 3)	2.14	0.73	-.07	.06	.27**	.25**	.25**	.12	.21**	(.69)	—
9. Personal initiative (Wave 4)	2.33	0.83	-.03	.10	.29**	.33**	.23**	.01	.28**	.36**	(.75)

Note. 169 ≤ n ≤ 172. Cronbach's alphas are in parentheses on the diagonal. SES = socioeconomic status.

^a Male = 1, female = 2. ^b Low SES = 1, high SES = 3.

* p ≤ .05. ** p ≤ .01.

More specifically, we study the effects of stressors present at Time *i* on PI shown at Time *i* + 1. We control for PI shown at Time *i*. Previous research on PI suggested that an individual's socioeconomic status (SES), level of qualification, and complexity at work might affect PI (Frese & Hilligloh, 1994; Frese et al., 1996). Therefore, we also control for these variables.

Method

Participants and Procedure

We tested the hypotheses with data from a longitudinal study with six measurement waves.¹ Study participants were a representative sample of citizens of Dresden, capital of Saxonia in the former East Germany. The relationship between stressors and PI was analyzed using those four consecutive waves in which the PI measure relevant for this study was assessed. The first three waves used in this study were carried out between 1991 and 1993 (Waves 3, 4, and 5) with a lag of 1 year each. The last wave followed with a lag of 2 years in 1995 (Wave 6). Number of participants in each wave ranged between 478 and 543 (including people without work, e.g., retired or unemployed people, and individuals on long-term maternity leave). In each wave, study participants took part in a structured interview in which PI was assessed. After the interview, participants obtained a questionnaire that they were asked to fill in and that was picked up by the interviewer after 1 or 2 weeks.

Hypotheses were tested repeatedly, each time using data from two consecutive waves. In each separate analysis, we included only those participants who had the same employment in both analyzed waves. Overall, data presented here are based on a total of 292 participants. The sample size in the analyses ranged between 172 and 193 (analysis based on Wave 3 and Wave 4: *n* = 172; Wave 4 and Wave 5: *n* = 193; and Wave 5 and Wave 6: *n* = 184). In the analyses, pairwise deletion of cases was used. Of the sample, 37% were unskilled, semiskilled, and skilled workers; 22% were white-collar workers, including lower professionals and administrative workers; and 41% were higher professionals and managers. Fifty-two percent of the sample were male. Half of the sample used in this study was employed in the public service (e.g., hospitals, education, and public administration), and the remainder worked in the manufacturing industry (16%), building industry (10%), trade, hotel, and catering industry (10%), and miscellaneous (finance, utility, transportation, etc).

¹ One goal of this longitudinal effort was to document work-related changes after the unification of East and West Germany. The onset of the study was in 1990 after the monetary unification. Rate of change was expected to slow down over time; therefore, the time lags between the early waves were shorter, increasing to a 2-year lag between Wave 5 (1993) and Wave 6 (1995). The PI measure relevant for this study was first applied in Wave 3 (1991).

Measures

Both interview-based and questionnaire measures were used. A 5-point Likert format was used for questionnaire items and for rating items based on the interview. All items were in German. Tables 1, 2, and 3 present means, standard deviation, zero-order correlations, and reliability information of all study variables, separated for the different analyses.

PI. General PI at work is a measure of past initiative at work, assessed with an interview procedure (see Frese et al., 1996). Interviewers posed four questions on past initiative, for example, "Can you remember a situation during the last year in which you have searched for causes for something that did not function correctly?" If the participant answered in the affirmative, the interviewer probed further to find out whether the action was self-started. For example, the participant was asked whether the activity was part of his or her job or an additional job assignment and whether other people in his or her job did the same thing. Participants' answers were written down as verbatim as possible. After the interview, the interviewer and a second rater rated the reported actions with respect to quantitative and qualitative initiative. *Quantitative initiative* applies to the amount of effort and energy that went into the initiative taken; *qualitative initiative* refers to the degree to which the content of the initiative action differed from what was normally done in the job. Ratings of quantitative and qualitative initiative were made using a 5-point Likert scale. We computed the mean of the eight rating items for each rater to calculate the interrater reliability. Interrater agreement ranged between $r = .76$ and $r = .87$ ($p < .01$).

To compute a personal initiative scale, we proceeded as follows. For each initiative question (see above), we collapsed the two ratings for quantitative initiative; the same was done with the two ratings for qualitative initiative. This way, eight items resulted. The mean of those eight items made the scale Personal Initiative at Work; Cronbach's alpha of the scale ranged from .69 to .83. There is a significant positive relationship between this PI measure (based on the interview on past work behaviors) and a spouse/partner rating of global proactivity. Further evidence of construct validity of personal initiative is described in Fay and Frese (2001).

Stressors. Two stressors at work were assessed (Semmer, 1984; adaptation by Zapf, 1991, 1993): *Time pressure* and concentration demands consisted of five items; a sample item is "How often do you have time pressure?" *Situational constraints* measured problems caused by shortage of or defective equipment, tools, or working kit (eight items). An example is "How good is the quality of your equipment?" (reverse scored). The measures have adequate validity (see Semmer, Zapf, & Dunckel, 1999).

Control variables. Variables that could have a confounding effect were controlled for in all analyses. These variables were age, gender, SES, job qualification, and job complexity. SES was an index obtained by assigning participants' employment level to one of three categories: (a) unskilled, semiskilled, and skilled workers; (b) primarily white-collar workers, such as lower professionals and administrative workers; and (c) higher professionals and managers. Job qualification was a rating done by the interviewer

after an in-depth interview. Job complexity was measured with four items; a sample item is "Do you get special tasks that are unusual and exceptionally difficult?" (Semmer, 1984; adaptation by Zapf, 1991, 1993; on the validity of this measure, see Semmer et al., 1999).

Results

The proposed positive effect of stressors on PI was tested with hierarchical regression analyses (Cohen & Cohen, 1983). For each analysis, we used two consecutive measurement waves and tested whether stressors at a given wave (Time i) significantly predicted changes in PI in the next wave (Time $i + 1$), holding Time i values of PI constant. In Step 1, we entered control variables (age, gender, SES, job qualification, and job complexity) and prior PI (Time i) into the regression equation. As in Step 1 prior PI was partialled out, variables entered in the subsequent step predicted the changes of PI from Time i to Time $i + 1$. In Step 2, we entered the two stressors, time pressure and situational constraints (each from Time i). The increment in R^2 in Step 2 indicated how much variance of changes in PI was accounted for by the two stressors.

Table 4 shows the results. Variables entered in Step 1 explained between 20% and 22% of variance in PI. In two of three analyses, stressors entered into the equation in Step 2 explained a significant proportion of variance of changes in PI, with an increment of explained variance of 4%. Significant betas were always positive, implying that stressors were positively related to changes in PI. This finding supported the prediction. Specifically, time pressure predicted changes in PI from Wave 3 to Wave 4, whereas situational constraints predicted changes in PI from Wave 5 to Wave 6. To explore this pattern of findings further, we examined changes in stressors over time with analyses of variance with wave as a repeated measure. Analyses showed that time pressure increased over time, $F(2, 468) = 3.99$, $p < .05$ (Wave 3: $M = 3.44$, $SD = 0.72$; Wave 4: $M = 3.54$, $SD = 0.73$; and Wave 5: $M = 3.53$, $SD = 0.65$),² whereas situational constraints decreased over time, $F(2, 426) = 15.57$, $p < .001$ (Wave 3: $M = 2.01$, $SD = 0.73$; Wave 4: $M = 1.89$, $SD = 0.70$; and Wave 5: $M =$

² Post hoc t tests indicated a significant increase in time pressure from Wave 3 to Wave 4, $t(234) = -2.79$, $p < .01$; the increase came then to a halt because there was no significant difference between Wave 4 and Wave 5, $t(234) = 0.35$, ns ; time pressure at Wave 5 was also higher than at Wave 3, $t(234) = -2.15$, $p < .05$.

Table 2
Means, Standard Deviations, and Intercorrelations Among Study Variables for Analyses Based on Wave 4 and Wave 5

Variable	M	SD	1	2	3	4	5	6	7	8	9
1. Age	42.21	9.90	—								
2. Gender ^a	1.45	0.50	-.11	—							
3. SES ^b	2.09	0.90	.06	.17*	—						
4. Job qualification	3.46	0.84	.11	-.07	.63**	—					
5. Job complexity (Wave 4)	3.55	0.70	.04	-.04	.40**	.43**	(.64)				
6. Situational constraints (Wave 4)	1.90	0.67	-.13	-.22**	-.02	-.00	-.05	(.85)			
7. Time pressure (Wave 4)	3.59	0.70	.03	.08	.19**	.17*	.46**	-.05	(.73)		
8. Personal initiative (Wave 4)	2.37	0.88	-.03	-.01	.35**	.45**	.31**	.01	.21**	(.78)	
9. Personal initiative (Wave 5)	1.91	0.77	-.08	.03	.29**	.34**	.12	.03	-.02	.41**	(.83)

Note. $191 \leq n \leq 193$. Cronbach's alphas are in parentheses on the diagonal. SES = socioeconomic status.

^a Male = 1, female = 2. ^b Low SES = 1, high SES = 3.

* $p \leq .05$. ** $p \leq .01$.

1.80, $SD = 0.66$).³ This finding indicates that stressors were related to changes in PI when they were at a comparably lower level.

To test for the curvilinear effect implied in Hypothesis 3, in Step 3 of the hierarchical regression analyses we entered two quadratic terms (squared values of the stressors) into the equation (see Cohen & Cohen, 1983). In none of the regression analyses did a significant increment of R^2 emerge. Hence, there is no support for an inverted U-shaped curve.

Discussion

Summary and Implications

This study examined the relationships between stressors and PI. Results indicated that stressors at work were positively associated with changes in PI. Drawing on data from a longitudinal study allowed for replication and showed the stability of study findings across two of three analyses. Furthermore, as the central variables were obtained from different sources—PI was an interview-based measure and stressors were assessed with a questionnaire—we avoided common-method variance.

We regard the positive relationship of stressors and changes in PI as consistent with Edwards's (1992) cybernetic model of the stress process. We argued that work stressors cause discrepancies that are, according to Edwards's model, experienced as stressful. We furthermore suggested that not only do individuals seek to reduce stress the moment it is experienced, but, because of humans' ability to anticipate the future and the future reoccurrence of stressful situations, they can act to prevent this. Hence, we argued for an output function that could be characterized as long-term oriented, proactive behavior, or what we term personal initiative. This self-starting action presumably develops some time after stressful situations have occurred repeatedly. The results support the idea that PI can be regarded as one output function in the stress process. This adds to Edwards's model, which does not consider delayed and proactive behaviors in the cybernetic model. Hence, this supports the notion that stressors contribute to taking initiative (see Fay et al., 1998).

³ Post hoc t tests showed that there was a continuous decrease in situational constraints over time: from Wave 3 to Wave 4, $t(213) = 2.98, p < .01$; from Wave 4 to Wave 5, $t(213) = 2.87, p < .01$; accordingly, constraints were also higher in Wave 3 than Wave 5, $t(213) = 5.13, p < .001$.

Alternative explanations for our results would refer to job complexity and job qualification as variables that have a positive effect on both stressors and PI, producing a spurious relationship. As we controlled for complexity and qualification, we can rule out these explanations.

On an exploratory basis, we tested for a curvilinear relationship between stressors and changes in PI. There was no support for an inverted U-shaped curve: Even a high level of stressors did not impair PI. Two mechanisms might have accounted for this. The presumed reason for stressors having the potency to impair PI is that PI is a resource-dependent action, and resources are heavily taxed under stressors. However, as a high level of stressors makes taking initiative even more urgent and important, individuals may find a way to take initiative despite the constraints. Alternatively, our respondents may not have been experiencing excessively high levels of stress. Our analysis of variance findings support this interpretation. In other words, our results on the effects of stressors on initiative may only reflect the upward slope of an inverted U-shaped relationship. A possible reason might be that individuals withdrew from situations in which stress was excessive (i.e., they left the organization). This is in line with the notion of withdrawal or disengagement suggested by Carver and Scheier (1982). Furthermore, there may be mechanisms within the organization that help to fix excessive stress: Once stressors reach a level at which they impair in-role performance, there is a need for the organization to intervene. However, for this study we lack the data to lend support to one or the other presumption.

A stressor may point to malfunctions at the workplace, indicating that an aspect of one's work should be improved. If an individual interprets a stressor this way, two different kinds of actions can follow. The person who encountered the stressor can take initiative to *remove this stressor*. Another way to deal with the stressor is to *change a different aspect* of the work situation to compensate for a reoccurring stressor. Imagine someone who has to meet deadlines regularly. When this person is working under time pressure, it becomes obvious that the computer network is not very well organized, because retrieving relevant information is rather slow. One could take initiative and reorganize the network. Then the original stressor—the deadlines and the associated time pressure—is not removed, but the stressor would nonetheless be the cause for taking initiative. Our relatively global measure of PI does not allow a definitive conclusion of whether (a) stressors lead to

Table 3
Means, Standard Deviations, and Intercorrelations Among Study Variables for Analyses Based on Wave 5 and Wave 6

Variable	M	SD	1	2	3	4	5	6	7	8	9
1. Age	41.49	9.57	—								
2. Gender ^a	1.48	0.50	-.08	—							
3. SES ^b	2.06	0.88	.10	.15*	—						
4. Job qualification	3.41	0.85	.11	-.02	.64**	—					
5. Job complexity (Wave 5)	3.52	0.71	-.00	-.17*	.20**	.32**	—				
6. Situational constraints (Wave 5)	1.76	0.64	-.17*	-.13	-.06	-.01	.03	—			
7. Time pressure (Wave 5)	3.57	0.63	.06	.05	.14	.15*	.50**	-.08	—		
8. Personal initiative (Wave 5)	1.85	0.72	-.03	-.01	.18*	.31**	.26**	.09	.13	—	
9. Personal initiative (Wave 6)	1.97	0.79	-.07	.05	.25**	.32**	.25**	.19**	.21**	.36**	—
										(.81)	(.76)

Note. $N = 183-184$. Cronbach's alphas are in parentheses on the diagonal. SES = socioeconomic status.

^aMale = 1, female = 2. ^bLow SES = 1, high SES = 3.

* $p \leq .05$. ** $p \leq .01$.

Table 4
Hierarchical Regression Analyses Predicting Personal Initiative From Stressors

Step	Variables entered	Personal initiative (Time <i>i</i> + 1)								
		1		2		3				
		R ²	ΔR ²	β	R ²	ΔR ²	β	R ²	ΔR ²	β
Step 1	Control variables, ^a personal initiative (Time <i>i</i>)	.21**	.21**		.22**	.22**		.20**	.20**	
Step 2	Stressors (Time <i>i</i>)	.25**	.04*		.23**	.01		.24**	.04*	
	Time pressure			.21**			-.12			.13
	Situational constraints			.01			.02			.18**
Step 3	Stressors: Squared term (Time <i>i</i>)	.25**	.00		.23**	.00		.24**	.00	
	Time pressure			-.35			-.15			.63
	Situational constraints			.15			-.02			.01

Note. Pairwise deletion of cases was used. Column 1: predicting personal initiative Wave 4, 169 ≤ N ≤ 172; column 2: predicting personal initiative Wave 5, 191 ≤ N ≤ 193; column 3: predicting personal initiative Wave 6, N = 183–184.

^a Control variables: age, gender, socioeconomic status (dummy-coded), job qualification, and job complexity.

* p ≤ .05. ** p ≤ .01.

actions that remove the specific stressor or (b) stressors lead to actions that improve compensatorily other aspects of the work situation. Here, further research is needed.

Each of the two stressors was significantly related to PI in one of the analyses. This means that both working under time pressure and enduring situational constraints were positively associated with changes in PI. But the two stressors were never significant in the same wave. One reason for this could be the specific characteristics of our study context. Data were collected in the former East Germany, a country in which the whole economy and each individual workplace underwent enormous changes since the onset of the transition from bureaucratic socialism to capitalism in 1990. In the adaptation process necessary to survive in capitalism, many work characteristics changed, among them the stressors studied here. For example, situational constraints such as defective tools or shortages of working equipment and material were widespread and central problems in East Germany (Voskamp & Wittke, 1990) and have improved significantly since the beginning of the transformation process (cf. Fay & Frese, 2000b; Fay & Lange, 1997). In the time period examined in this study, the ubiquitous stressor of situational constraints changed to become less frequent, whereas time pressure increased. This changing pattern of stressors over time might imply that the reactions to the stressors also changed. We assume that a stressor that one encounters everyday is less likely to be perceived as an option for initiative than a stressor that occurs more seldom. From research on controlled versus automatic processing (Shiffrin & Schneider, 1977), one can conclude that individuals address stressors that they encounter rarely on a *conscious* level, whereas they deal with stressors *automatically* that occur on a regular basis. The post hoc analyses on the changes of the stressors indicate that a stressor was a significant predictor of changes in PI when the stressor had a comparatively low level. We argue that a lower level makes it more likely that a stressor is processed consciously; we furthermore suggest that conscious thinking about a stressor is more likely to be associated with taking initiative to change the situation than an automatic, routinized reaction to a frequent stressor. Thus, across time, different stressors presented themselves as options for initiative and were therefore differentially related to PI.

In contrast to satisfaction, in-role performance, and health, for which a detrimental effect of stressors has repeatedly been shown, PI is not negatively affected

by stressors. Thus, stressors at work did not reduce PI. However, because we used a global measure of PI, this should only be seen as a preliminary answer. Stressors could have simultaneously positive and negative effects. If the PI-enhancing effect of stressors was stronger than the detrimental effect, it may have masked the negative effect. For example, it is possible that nonstressor-related initiative activities (such as anticipating future demands and taking measures for it) are given up under highly stressful conditions and replaced by initiatives that remove stressors. Future research should look into this question. For this, a more fine-grained measure of PI is needed that allows to separate actions taken against specific stressors from actions that are unrelated to stressors.

Results from this study diverge from the findings of research on stressors and other types of extra-role performance. It has been argued that extra-role performance concepts differ in the degree to which they emphasize challenge and proactivity (Van Dyne & LePine, 1998). Whereas this study focused on a concept to which challenge and proactivity are central, previous research on stressors and extra-role behaviors concentrated on other extra-role concepts to which affiliation is central, such as OCB (Organ, 1988) and some facets of contextual performance (Borman & Motowidlo, 1993). Those behaviors are seen to “lubricate the social machinery of the organization” (Smith, Organ, & Near, 1983, p. 654); they help to make the best out of a given situation. Those behaviors respond to current needs, for example, helping a coworker, but do not seek to change the reason for which the coworker got into trouble; they are prosocial rather than challenging in their orientation.

So far, there has been only limited explicit elaboration about the relationship of prosocial extra-role behaviors with stressors, but they differ from our results: Similar to in-role performance, stressors were found to be negatively related to prosocial types of extra-role performance. Time pressure was detrimental for OCB in a laboratory experiment with student participants (Hui, Organ, & Crooker, 1994), although no significant effect emerged in a field study (Organ & Hui, 1995). Motowidlo, Packard, and Manning (1986) reported negative relationships between subjective stress and several measures of prosocial behavior. A similar result was found in a meta-analysis on the effects of role ambiguity and role conflict on the five aspects of OCB: There were negative relationships between role stressors and three forms of OCB (sportsmanship, courtesy, and altruism), whereas the relationships with two other forms of

OCB (civic virtue and conscientiousness) were not significant (Podsakoff, MacKenzie, & Bommer, 1996). Kruse (1995, cited in Jex, 1998) found a similar pattern of results for different types of organizational stressors.

It has even been argued that stressors should impair those types of extra-role behavior to a higher degree than in-role performance (Kruse, 1995, cited in Jex, 1998, p. 54). Extra-role performance is shown voluntarily; therefore, individuals can easily sacrifice this behavior when faced with stressors. This is possible to a much lesser degree for in-role performance; when individuals reduce their in-role performance, they risk sanctions, for example, from the supervisor. It might be that stressors have a negative effect on actions from which an individual does not benefit himself or herself directly (e.g., OCB) but that stressors foster actions from which an individual expects an improvement of his or her work situation (e.g., PI).

Theoretically, the results can be seen as a preliminary evidence for differential relationships of different aspects of extra-role performance with stressors. This fits into a picture of a multidimensional performance concept that differentiates between various aspects of extra-role performance.

Direction for Future Research and Practical Implications

In our study, we concentrated on the effects of stressors on PI. In addition to the main effects detected in our study, an investigation of interaction effects might be interesting. For example, high organizational commitment or supervisor support could increase the relationship between stressors and PI.

Moreover, it would be interesting to examine whether PI is successful in alleviating the negative effects of stressors on individual health and well-being. It may be that PI increases individual strain in the short run but prevents stressors to show negative consequences in the long run. In addition, PI is possibly only beneficial for individual health if an individual experiences sufficient control at work (Parker & Sprigg, 1999). Without control, acts of PI are more prone to failure, which enhances the likelihood to develop learned helplessness (Seligman, 1975).

With respect to practical implications, there seems to be a dilemma: Stressors have a stimulating effect on PI but are, at the same time, well known for having a negative impact on well-being and mental health (Kahn & Byosiere, 1991; Sonnentag & Frese, in press). Therefore, workplace interventions aiming

at a reduction of stressors might be a double-edged sword. Individual-level interventions have been shown to effectively improve individual health and well-being in stressful working situations. For example, stress management interventions have positive effects on affective reactions and well-being (Saunders, Driskell, Johnston, & Salas, 1996). Improving affective reactions to stress does not imply that other discrepancies that emerge in the stress process are improved as well. For example, there will still be a discrepancy between actual and desired working conditions. We assume that an effective individual-level intervention will reduce negative reactions within the person but does not simultaneously reduce initiative taking. An additional approach for solving this dilemma could be to encourage employees to anticipate stressors and find ways to prevent them. Future research will have to look into this issue.

References

- Abramis, D. J. (1994). Work role ambiguity, job satisfaction, and job performance: Meta-analysis and review. *Psychological Reports, 75*, 1411–1433.
- Anderson, C. R. (1976). Coping behaviors as intervening mechanisms in the inverted-U stress–performance relationship. *Journal of Applied Psychology, 61*, 30–34.
- Baer, M., & Frese, M. (2002). *Innovation is not enough: Climate for initiative and psychological safety, process innovation, and firm performance*. Manuscript submitted for publication.
- Borman, W. C., & Motowidlo, S. J. (1993). Expanding the criterion domain to include elements of contextual performance. In N. Schmitt & W. C. Borman (Eds.), *Personnel selection in organizations* (pp. 71–98). San Francisco: Jossey-Bass.
- Brief, A. P., & Motowidlo, S. J. (1986). Prosocial organizational behaviors. *Academy of Management Review, 10*, 710–725.
- Campbell, J. P., McCloy, R. A., Oppler, S. H., & Sager, C. E. (1993). A theory of performance. In N. Schmitt & W. Borman (Eds.), *Personnel selection in organizations* (pp. 35–70). San Francisco: Jossey-Bass.
- Carver, C. S., & Scheier, M. F. (1982). Control theory: A useful conceptual framework for personality—social, clinical, and health psychology. *Psychological Bulletin, 92*, 111–135.
- Carver, C. S., & Scheier, M. F. (1998). *On the self-regulation of behavior*. Cambridge, England: Cambridge University Press.
- Cohen, J., & Cohen, P. (1983). *Applied multiple regression correlation analysis for the behavioral sciences*. Hillsdale, NJ: Erlbaum.
- Dormann, C., & Zapf, D. (1999). Social support, social stressors at work, and depressive symptoms: Testing for main and moderating effects with structural equations in a three-wave longitudinal study. *Journal of Applied Psychology, 84*, 874–884.
- Edwards, J. R. (1992). A cybernetic theory of stress, coping, and well-being in organizations. *Academy of Management Review, 17*, 238–274.
- Edwards, J. R. (1998). Cybernetic theory of stress, coping, and well-being. In C. L. Cooper (Ed.), *Theories of organizational stress* (pp. 122–152). New York: Oxford University Press.
- Fay, D., & Frese, M. (2000a). Conservative at work: Less prepared for future work demands? *Journal of Applied Social Psychology, 30*, 171–195.
- Fay, D., & Frese, M. (2000b). Working in East German socialism in 1980 and in capitalism 15 years later: A trend analysis of a transitional economy's working conditions. *Applied Psychology: An International Review, 49*, 636–657.
- Fay, D., & Frese, M. (2001). The concept of personal initiative: An overview of validity studies. *Human Performance, 14*, 97–124.
- Fay, D., & Lange, I. (1997). Westdeutsche Unternehmen in den Neuen Bundesländern: Garant für bessere Arbeitsgestaltung? [West German companies in East Germany: Guarantee for better job design?]. *Zeitschrift für Arbeits- und Organisationspsychologie, 41*, 82–86.
- Fay, D., Sonnentag, S., & Frese, M. (1998). Stressors, innovation, and personal initiative: Are stressors always detrimental? In C. L. Cooper (Ed.), *Theories of organizational stress* (pp. 170–189). New York: Oxford University Press.
- Frese, M., Fay, D., Hilburger, T., Leng, K., & Tag, A. (1997). The concept of personal initiative: Operationalization, reliability and validity in two German samples. *Journal of Occupational and Organizational Psychology, 70*, 139–161.
- Frese, M., & Hilligloh, S. (1994). Eigeninitiative am Arbeitsplatz im Osten und Westen Deutschlands: Ergebnisse einer empirischen Untersuchung [Initiative at work in East and West Germany: Results of an empirical study]. In G. Trommsdorf (Ed.), *Psychologische Aspekte des sozial-politischen Wandels in Ostdeutschland [Psychological aspects of the socio-political change in East Germany]* (pp. 200–215). Berlin, Germany: DeGruyter.
- Frese, M., Kring, W., Soose, A., & Zempel, J. (1996). Personal initiative at work: Differences between East and West Germany. *Academy of Management Journal, 39*, 37–63.
- Frese, M., & Zapf, D. (1994). Action as the core of work psychology: A German approach. In H. C. Triandis, M. D. Dunnette, & L. M. Hough (Eds.), *Handbook of industrial and organizational psychology* (2nd ed., Vol. 4, pp. 271–340). Palo Alto, CA: Consulting Psychologists Press.
- Fried, Y., & Tieg, R. B. (1995). Supervisors' role conflict and role ambiguity differential relations with performance ratings of subordinates and the moderating effect of screening ability. *Journal of Applied Psychology, 80*, 282–291.
- Garst, H., Frese, M., & Molenaar, P. C. M. (2000). The temporal factor of change in stressor–strain relationships: A growth-curve model on a longitudinal study in East Germany. *Journal of Applied Psychology, 85*, 417–438.
- George, J. M., & Brief, A. P. (1992). Feeling good—doing good: A conceptual analysis of the mood at work—organizational spontaneity relationship. *Psychological Bulletin, 112*, 310–329.
- Hockey, R., & Hamilton, P. (1983). The cognitive pattern-

- ing of stress. In R. Hockey (Ed.), *Stress and fatigue in human performance* (pp. 331–362). Chichester, England: Wiley.
- Hui, C., Organ, D. W., & Crooker, K. (1994). Time pressure, Type A behavior, and organizational citizenship behavior: A laboratory experiment. *Psychological Reports, 75*, 199–208.
- Jackson, S. E., & Schuler, R. S. (1985). A meta-analysis and conceptual critique of research on role ambiguity and role conflict in work settings. *Organizational Behavior and Human Decision Processes, 36*, 16–78.
- Jamal, M. (1984). Job stress and job performance controversy: An empirical assessment. *Organizational Behavior and Human Performance, 33*, 1–21.
- Jamal, M. (1985). Relationship of job stress to job performance: A study of managers and blue-collar workers. *Human Relations, 38*, 409–424.
- Jex, S. M. (1998). *Stress and job performance*. Thousand Oaks, CA: Sage.
- Kahn, R. L., & Byosiore, P. (1991). Stress in organizations. In M. D. Dunnette & L. M. Hough (Eds.), *Handbook of industrial and organizational psychology* (2nd ed., Vol. 3, pp. 571–650). Palo Alto, CA: Consulting Psychologists Press.
- Kahneman, D. (1973). *Attention and effort*. Englewood Cliffs, NJ: Prentice Hall.
- Katz, D. (1964). The motivational basis of organizational behavior. *Behavioral Science, 9*, 131–146.
- Koop, S., De Reu, T., & Frese, M. (2000). Sociodemographic factors, entrepreneurial orientations, personal initiative and environmental problems in Uganda. In M. Frese (Ed.), *Success and failure of microbusiness owners in Africa: A psychological approach* (pp. 55–76). Westport, CT: Quorum Greenwood.
- Koys, D. J. (2001). The effects of employee satisfaction, organizational citizenship behavior, and turnover on organizational effectiveness: A unit-level, longitudinal study. *Personnel Psychology, 54*, 101–114.
- Krauss, S. I., Frese, M., & Friedrich, C. (2001). *Entrepreneurial orientation: A psychological model of success among South African small business owners*. Manuscript submitted for publication.
- McGrath, J. E. (1976). Stress and behavior in organizations. In M. D. Dunnette (Ed.), *Handbook of industrial and organizational psychology* (pp. 1351–1395). Chicago: Rand McNally.
- Morrison, E. W., & Phelps, C. C. (1999). Taking charge at work: Extrarole efforts to initiate workplace change. *Academy of Management Journal, 42*, 403–419.
- Motowidlo, S. J., Borman, W. C., & Schmit, M. J. (1997). A theory of individual differences in task and contextual performance. *Human Performance, 10*, 71–83.
- Motowidlo, S. J., Packard, J. S., & Manning, M. R. (1986). Occupational stress: Its causes and consequences for job performance. *Journal of Applied Psychology, 71*, 618–629.
- Motowidlo, S. J., & van Scotter, J. R. (1994). Evidence that task performance should be distinguished from contextual performance. *Journal of Applied Psychology, 79*, 475–480.
- Murphy, K. R. (1990). Job performance and productivity. In K. R. Murphy & F. J. Saal (Eds.), *Psychology in organizations: Integrating science and practice* (pp. 157–176). Hillsdale, NJ: Erlbaum.
- O'Connor, E. J., Peters, L. H., Pooyan, A., Weekley, J., Frank, B., & Erenkrantz, B. (1984). Situational constraint effects on performance, affective reactions, and turnover: A field replication and extension. *Journal of Applied Psychology, 69*, 663–672.
- Organ, D. W. (1988). *Organizational citizenship behavior: The good soldier syndrome*. Lexington, MA: Lexington.
- Organ, D. W., & Hui, C. (1995). Time pressure, Type A syndrome, and organizational citizenship behavior: A field study replication of Hui, Organ, and Crooker (1994). *Psychological Reports, 77*, 179–185.
- Parker, S. K., & Sprigg, C. A. (1999). Minimizing strain and maximizing learning: The role of job demands, job control, and proactive personality. *Journal of Applied Psychology, 84*, 925–939.
- Podsakoff, P. M., Ahearne, M., & MacKenzie, S. B. (1997). Organizational citizenship behavior and the quantity and quality of work group performance. *Journal of Applied Psychology, 82*, 262–270.
- Podsakoff, P. M., MacKenzie, S. B., & Bommer, W. H. (1996). Meta-analysis of the relationships between Kerr and Jermier's substitutes for leadership and employee job attitudes, role perceptions, and performance. *Journal of Applied Psychology, 81*, 380–399.
- Podsakoff, P. M., MacKenzie, S. B., Paine, J. B., & Bachrach, D. G. (2000). Organizational citizenship behaviors: A critical review of the theoretical and empirical literature and suggestions for future research. *Journal of Management, 26*, 513–563.
- Saunders, T., Driskell, J. E., Johnston, J. H., & Salas, E. (1996). The effect of stress inoculation training on anxiety and performance. *Journal of Occupational Health Psychology, 1*, 170–186.
- Seligman, M. (1975). *Helplessness: On depression, development and death*. San Francisco: Freeman.
- Semmer, N. (1984). *Stressbezogene Tätigkeitsanalyse* [Stress-oriented activity analysis: Psychological research on the analysis of stress at work]. Weinheim, Germany: Beltz.
- Semmer, N., Zapf, D., & Dunckel, H. (1999). Instrument zur Stressbezogenen Tätigkeitsanalyse ISTA [Instrument for stress-related task analysis]. In H. Dunckel (Ed.), *Handbuch psychologischer Arbeitsanalyseverfahren* [Handbook of psychological work analysis] (pp. 179–204). Zurich, Switzerland: vdf.
- Shiffrin, R. M., & Schneider, W. (1977). Controlled and automatic human information processing: II. Perceptual learning, automatic attending, and a general theory. *Psychological Review, 84*, 127–190.
- Smith, C. A., Organ, D. W., & Near, J. P. (1983). Organizational citizenship behavior: Its nature and antecedents. *Journal of Applied Psychology, 68*, 653–663.
- Sonnentag, S., & Frese, M. (in press). Stress in organizations. In W. C. Borman, D. R. Ilgen, & R. J. Klimoski (Eds.), *Comprehensive handbook of psychology: Vol. 12. Industrial and organizational psychology*. New York: Wiley.
- Spector, P. E., Dwyer, D. J., & Jex, S. M. (1988). Relation of job stressors to affective, health, and performance outcomes: A comparison of multiple data sources. *Journal of Applied Psychology, 73*, 11–19.
- Speier, C., & Frese, M. (1997). Generalized self-efficacy as a mediator and moderator between control and complexity at work and personal initiative: A longitudinal field

- study in East Germany. *Human Performance*, 10, 171–192.
- Srivastava, A. K., & Krishna, A. (1991). A test of inverted “U”-hypothesis of stress–performance relationship in the industrial context. *Psychological Studies*, 36, 34–38.
- Steel, R. P., & Mento, A. J. (1986). Impact of situational constraints on subjective and objective criteria of managerial job performance. *Organizational Behavior and Human Decision Processes*, 37, 254–265.
- Van Dyne, L., Cummings, L. L., & Parks, J. M. (1995). Extra-role behaviors: In pursuit of construct and definition clarity. In B. M. Staw & L. L. Cummings (Eds.), *Research in organization behaviors* (pp. 215–285). Greenwich, CT: JAI Press.
- Van Dyne, L., & LePine, J. A. (1998). Helping and voice extra-role behaviors: Evidence of construct and predictive validity. *Academy of Management Journal*, 41, 108–119.
- Voskamp, U., & Wittke, V. (1990). Fordismus in einem Land: Das Produktionsmodell der DDR [Fordism: The GDR’s production model]. *Sozialwissenschaftliche Information*, 3, 170–180.
- Wickens, C. D. (1996). Designing for stress. In J. E. Driskell & E. Salas (Eds.), *Stress and human performance* (pp. 279–295). Mahwah, NJ: Erlbaum.
- Zapf, D. (1991). Stressbezogene Arbeitsanalyse bei der Arbeit mit unterschiedlichen Bürosoftwaresystemen [Stress-related job analysis of work with various office software systems]. *Zeitschrift für Arbeits- und Organisationspsychologie*, 35, 2–14.
- Zapf, D. (1993). Stress-oriented analysis of computerized office work. *European Work and Organizational Psychologist*, 3, 85–100.
- Zempel, J. (1999). Selbständigkeit in den Neuen Bundesländern [Self-employment in the New German countries]. In K. Moser, B. Batinic, & J. Zempel (Eds.), *Unternehmerisch erfolgreiches Handeln [Successful entrepreneurship]* (pp. 69–92). Göttingen, Germany: Verlag für Angewandte Psychologie.