

RESEARCH REPORT

The Effect of Positive Events at Work on After-Work Fatigue: They Matter Most in Face of Adversity

Sven Gross, Norbert K. Semmer, Laurenz L. Meier,
Wolfgang Kälin, and Nicola Jacobshagen
University of Bern and Swiss National Center for
Affective Sciences

Franziska Tschan
University of Neuchâtel and Swiss National Center for
Affective Sciences

There is evidence that daily negative events at work enhance fatigue. In contrast, positive events may trigger processes that increase, but also processes that decrease, energetic resources. Accordingly, results regarding a main effect of positive events on fatigue have been mixed. However, a clearer pattern between positive events and fatigue can be expected under adverse circumstances (i.e., accumulation of negative events, high chronic stressors). Positive events may facilitate coping and accelerate recovery processes and, thus, reduce resource drain due to daily negative events and chronic stressors. Predicting fatigue in a diary study with 76 employees, we investigated interactions between daily positive events and (a) daily negative events and (b) chronic social stressors. Multilevel modeling revealed that negative but not positive events were associated with increased end-of-work fatigue. However, positive events interacted with negative events and with chronic social stressors. As expected, positive events were negatively associated with fatigue only on days with many negative events, but not so on days with few negative events. Analogously, positive events were negatively associated with fatigue only among employees with high, compared with low, chronic social stressors. We conclude that the beneficial short-term effects of positive events on energetic resources are largely confined to adverse circumstances.

Keywords: affective events, social stressors, fatigue, resources, multilevel

Fatigue is a state of reduced alertness and energy due to depleted resources; it can be described with terms such as *spent*, *exhausted*, or *in need for recovery* (cf. Zijlstra & Sonnentag, 2006; Zohar, Tzischinski, & Epstein, 2003). End-of-work fatigue indicates the extent to which energetic resources require replenishment after the work day (i.e., recovery; Geurts & Sonnentag, 2006; Sluiter, de Croon, Meijman, & Frings-Dresen, 2003). The greater the fatigue after work, the less likely it is that recovery will be sufficient. If recovery from work-related fatigue is repeatedly insufficient, chronic health problems may arise (Meijman & Mulder, 1998; van Amelsvoort, Kant, Bültmann, & Swaen, 2003). Fatigue, therefore, may be regarded as a potential precursor of severe problems; this implies that understanding

predictors of short-term fluctuations in fatigue may offer opportunities to intervene before serious consequences have developed.

Apart from job demands in general (e.g., time pressure; Sonnentag & Zijlstra, 2006), affective events are likely to influence fluctuations in energetic resources. Affective events refer to “changes in circumstances” at work that are appraised as either beneficial or detrimental for personal well-being and, thus, elicit positive or negative affective reactions (Weiss & Cropanzano, 1996, p. 31).¹ Hence, events are seen as the “proximal causes of affective reactions,” such as emotions or changes in mood (Weiss & Beal, 2005, p. 4; for empirical support see Grandey, Tam, & Brauburger, 2002; Miner, Glomb, & Hulin, 2005).

Research consistently has found that negative events drain energetic resources and, hence, predict increased fatigue (Parrish, Zautra, & Davis, 2008; Zohar, 1999; Zohar et al., 2003). However, the effect of positive events on fatigue is much less clear, both

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Sven Gross, Norbert K. Semmer, Laurenz L. Meier, Wolfgang Kälin, and Nicola Jacobshagen, Department of Psychology, University of Bern, Bern, Switzerland, and Swiss National Center for Affective Sciences, Geneva, Switzerland; Franziska Tschan, Institut de Psychologie du Travail et des Organisations, University of Neuchâtel, Neuchâtel, Switzerland, and Swiss National Center for Affective Sciences.

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Correspondence concerning this article should be addressed to Sven Gross, Department of Psychology, University of Bern, Muesmattstrasse 45, CH-3000 Bern 9, Switzerland. E-mail: sven.gross@psy.unibe.ch

¹ In accordance with this definition, throughout this article the terms *negative events* and *positive events* refer to events that elicit negative or positive affect (i.e., affective events in terms of affective events theory; Weiss & Cropanzano, 1996). Negative events are equivalent to daily hassles (i.e., acute or momentary stressors), and positive events are equivalent to daily uplifts (Kanner, Coyne, Schaefer, & Lazarus, 1981). Hence, if employees report negative or positive events at work (and we analyzed only work-related events), we proceed on the assumption that negative or positive affect was experienced following the event. Therefore, we also integrate literature on positive and negative affect throughout the article.

theoretically and empirically (Beal, Weiss, Barros, & MacDermid, 2005). One can argue that positive events deplete energy because they also demand attention (Beal et al., 2005), or because people capitalize on new opportunities (i.e., raising performance standards; Latham & Locke, 1991; Zohar et al., 2003), which, in turn, requires resources. Alternatively, Folkman and Moskowitz (2000) proposed that positive affective experiences offer a psychological “respite,” helping people to regain energetic resources. Thus, hypotheses regarding main effects of positive events are contradictory, and so are empirical results (Parrish et al., 2008; Zohar et al., 2003).

Several theories suggest that the effects of positive events on outcomes such as fatigue might depend on circumstances. In particular, the frameworks by Fredrickson (e.g., 2001, 2003), Folkman (2008), and Hobfoll (2001) imply that many effects of positive events on fatigue are tied to adverse circumstances. For instance, positive events may facilitate coping with negative events (Folkman, 2008), and they may accelerate cardiovascular recovery from negative emotional arousal (undoing effect; Fredrickson, Mancuso, Branigan, & Tugade, 2000). Note, however, that these effects come into play only under adverse circumstances; otherwise, they are irrelevant. Thus, positive events may lead to a (at least relative) resource gain by interrupting or reducing the resource drain caused by negative events; this interaction effect may occur even in the absence of a main effect of positive events on energetic resources.

Such a “net gain” in resources that is caused by positive events during adverse conditions so far has been investigated with regard to momentary adverse conditions, mostly in the laboratory (e.g., Fredrickson et al., 2000). However, the phenomenon may be more general, referring not only to momentary events: Positive events may also buffer resource drain due to adverse circumstances of a more enduring character (i.e., chronic stressors). A positive event may act as a contrast against a chronic aversive work environment and attenuate the resource drain caused by the chronic adverse conditions. Such an effect has yet to be tested, however.

In sum, research has shown that negative events are associated with increased fatigue, but it is not clear if positive events increase or decrease fatigue. Several theoretical frameworks suggest that positive events might buffer the resource depletion caused by adverse circumstances. The main aim of this study is to test this mechanism, both with regard to daily negative events and with regard to chronic stressors. A better understanding of such processes is important for understanding the dynamics of fatigue build-up, and it enables supervisors to devise interventions on a situational level (what Beal et al., 2005, called microinterventions), for instance, by expressing concern for a subordinate in a difficult situation.

Affective Experiences Affect Limited Resources

Given the aforementioned definition of affective events and the empirical results by Grandey et al. (2002), the basic premise of our study refers to the affective experiences (emotions) triggered by affective events and to the effect of these experiences on resources.

Work demands, including affective events, draw on limited resources (see Beal et al., 2005; Kanfer & Ackerman, 1989; Meijman & Mulder, 1998). Additional or *compensatory* effort is required to keep up performance if extra demands arise (Meijman

& Mulder, 1998; Robert & Hockey, 1997). Affective events may be a source of such extra demands (Beal et al., 2005; Zohar et al., 2003). However, affective events have to be distinguished with regard to their quality. There is agreement that negative events drain energetic resources. The way in which positive events influence energetic resources is, however, not yet clear (cf. Beal et al., 2005; Zohar et al., 2003).

Negative Events Deplete Resources

Dealing with negative events requires self-control (Lavalley & Campbell, 1995), for instance, controlling one’s attention and regulating one’s affect (Beal et al., 2005; Gross, 2008). Self-control is a limited resource that is diminished each time it is drawn upon, which implies that self-control strength will be lower in subsequent episodes (Muraven & Baumeister, 2000). Negative affect often induces an *off-task focus* (Beal et al., 2005; Kanfer & Ackerman, 1989), which may continue for an extended period of time (Brosschot, Pieper, & Thayer, 2005). This off-task focus necessitates dealing with information, such as worrying about potential failure or ruminating about angering experiences; therefore, it is costly in terms of energetic resources. Consequently, negative events have been related to increased daily fatigue in a nonwork sample (Parrish et al., 2008) and in two work samples (Zohar, 1999; Zohar et al., 2003). Hence, our first hypothesis is the following:

Hypothesis 1: The number of daily negative events will be positively associated with end-of-work fatigue.

Do Positive Events Deplete Resources or Build Resources?

Although the reasoning for negative events is straightforward and plausible, matters are much more complicated for positive events. There are arguments for the resource-building, but also for the resource-depleting, effect of positive events.

Arguments for resource building. Positive events may build resources by facilitating cognitive processing and decision making (Aspinwall, 1998; Isen, 2004) and effective allocation of cognitive resources (Isen & Reeve, 2005); they may broaden thought–action repertoires, thus facilitating creativity (e.g., trying out new ways to reach a work goal) and flexibility, as suggested by broaden-and-build theory (Fredrickson, 2001); they may increase self-efficacy (Baron, 1990; Tsai, Chen, & Liu, 2007), decrease self-focused attention (Green, Sedikides, Saltzberg, Wood, & Forzano, 2003), and replenish self-control strength, leading to improved self-regulation (Tice, Baumeister, Shmueli, & Muraven, 2007). Positive events may have energizing effects (Zohar et al., 2003) and provide psychological respites from work demands that can be used to replenish energetic resources (Folkman & Moskowitz, 2000). If positive affect arises directly from the task itself, it may allow one “to stay focused on the task while expending a minimum of regulatory resources” (Beal et al., 2005, p. 1063).

Arguments for resource depletion. Like negative events, positive events demand attention, often implying an off-task focus (e.g., dwelling on successes or on positive feedback received; Beal et al., 2005). Furthermore, in some situations positive events may require emotion regulation in social interactions (e.g., with clients

or colleagues; Totterdell & Holman, 2003; Tschan, Rochat, & Zapf, 2005; Zapf & Holz, 2006). It is even possible that the resource-building effects of positive events imply a momentary drain of energetic resources. Thus, Fredrickson (2001) suggested that positive affect may induce behaviors such as exploring or searching for additional information. Such behaviors build resources in the long run, but these long-term gains may come at the expense of momentary energy expenditure, resulting in more fatigue in the short term. Also, people may raise performance standards when experiencing positive affect (Ilies & Judge, 2005). Thus, short-term fatigue may result as a side effect of positive events, inducing changes in work strategies and goals that require more effort. Altogether, an argument can be made for a fatigue-increasing effect of positive events, and such an argument has been advanced by several authors (Beal et al., 2005; Zohar et al., 2003).

Research on positive events. Research on the main effects of positive affective events is rare and has yielded diverging results. Zohar et al. (2003) found no main effect of task-related positive events on end-of-day fatigue. In contrast, Parrish et al. (2008) found a negative association between positive interpersonal events and fatigue. More indirect evidence stems from findings that positive affective states, across the day, were related to lower levels of cortisol, which may be interpreted as a physiological marker of energy expenditure (Steptoe, Wardle, & Marmot, 2005), and from findings that reflecting positively about one's job during the weekend reduced feelings of exhaustion after the weekend (Fritz & Sonnentag, 2005).

Conclusion. With very few studies available, it remains unclear how positive events relate to end-of-work fatigue. It seems likely that resource-draining and resource-enhancing processes operate simultaneously. As a result, they may cancel each other out, yielding no, or only weak, main effects. Although indications are somewhat stronger for a preponderance of resource gain, we refrain from stating a hypothesis regarding a main effect of positive events but rather test this effect in an exploratory manner.

Interaction Between Negative Events and Positive Events

Whereas the situation is unclear with regard to main effects of positive events, there is reason to believe that positive events reduce the resource drain caused by negative events. Folkman (2008) suggested that positive affect restores coping resources, helps to sustain coping attempts, and increases the likelihood of meaning-focused coping. This proposition is supported by empirical evidence (e.g., Folkman & Moskowitz, 2000; Fredrickson & Joiner, 2002). Furthermore, positive events accelerate recovery from negative emotional arousal (undoing effect; Fredrickson & Levenson, 1998; Fredrickson et al., 2000), and they may improve self-regulation (Aspinwall, 1998). All these effects imply less resource depletion by negative events and, thus, a net gain in energetic resources due to positive events. In addition, the effort-inducing side effects of positive events mentioned above (e.g., raising performance standards) are less likely to occur in the presence of negative events. Note that these effects of positive events are tied to negative circumstances. Therefore, positive events may lead to a net gain in energetic resources only to the extent that one has a "bad day" (i.e., when negative events are numerous), by buffering the effects of negative events on energetic

resources. Such an interactive effect has been reported by Zohar et al. (2003), who found positive events to mitigate end-of-work fatigue on days where work demands were high, compared with low. However, this result ran counter to their hypothesis, and, to the best of our knowledge, it has never been replicated.

Hypothesis 2: Positive events will be negatively related to end-of-work fatigue more strongly on days on which the number of negative events is high, compared with low.

Chronic Stressors

The aforementioned effects of positive events may not be limited to momentary adverse circumstances (i.e., negative events) but may be more general, applying also to adverse circumstances at work with a more enduring character, that is, chronic stressors.

Like negative events, chronic stressors are related to lower daily well-being, including fatigue (Zijlstra & Sonnentag, 2006), and to ruminative thoughts about the stressful conditions (Berset, Elfering, Lüthy, Lüthi, & Semmer, 2010; Brosschot et al., 2005). Thus, just like negative events, chronic stressful conditions drain resources and, hence, increase the need to replenish resources (Hobfoll, 2001). Furthermore, chronic stressors may influence reactions to affective events (Almeida, 2005), acting as so-called *background stressors* (Gump & Matthews, 1999). This notion has not been recognized sufficiently by organizational researchers (see also Johns, 2006). Affective events theory, for instance, focuses on workplace features influencing the likelihood of, but not on the reaction to, affective events. Furthermore, where chronic stressors have been considered in terms of background stressors, they typically have been investigated in conjunction with negative events, but not positive events.

Chronic Social Stressors as Background Stressors

A number of characteristics of the work situation might be candidates for chronic background stressors that alter reactions to affective events (see Gump & Matthews, 1999). However, humans are social beings, and the extent to which one feels accepted and esteemed by others is especially important for well-being (Leary & Baumeister, 2000). Chronic social stressors, such as frequent interpersonal tensions, social animosities, and conflicts with colleagues, therefore should be an especially pertinent background stressor (Almeida, 2005). Chronic social stressors at work have been found to predict health impairments, such as anxiety, depressive symptoms, or lower organization-based self-esteem (Dormann & Zapf, 2002, 2004; Penhaligon, Louis, & Restubog, 2009; Spector & Jex, 1998). The effects of stressors involving a social threat are particularly strong and particularly enduring (Dickerson & Kemeny, 2004).

With regard to personal well-being, conflicts with coworkers are especially important (compared with conflicts with superiors, which are more relevant for organization-related variables, such as organizational commitment; Frone, 2000). Poor social relations in a team (social undermining, mistreatment, etc.) are associated with feeling excluded or ostracized, which is highly stressful (Ferris, Brown, Berry, & Lian, 2008) and impairs self-control (Baumeister, DeWall, Ciarocco, & Twenge, 2005), an important coping resource (Muraven & Baumeister, 2000). Thus, chronic social stres-

sors increase the need to replenish lost resources, as well as the vulnerability to future threats. Therefore, we feel that chronic social stressors are particularly suited to have interactions with day-level affective events.

Chronic Stressors and Positive Events

We argued above that positive events may attenuate the fatigue-inducing effects of negative events. As chronic stressors also lead to increased fatigue, the capacity for positive events to attenuate fatigue should apply also to chronic negative conditions (i.e., chronic social stressors). Positive events should accelerate recovery (Fredrickson et al., 2000), help focus attention on one's tasks (Beal et al., 2005), or improve problem-oriented coping (Folkman, 2008), regardless of whether the effects to be countered stem from negative affective events or from more enduring negative conditions, such as chronic social stressors. Conversely, the effort-inducing side effects of positive events mentioned above (e.g., raising performance standards) are unlikely to occur in the presence of chronic stressors, in which case the processes attenuating resource drain in the face of adversity can operate fully. Therefore, an interaction between positive events and chronic stressors regarding effects on fatigue seems likely. Again, such an interaction does not require a main effect, as an attenuating effect can occur only in the presence of chronic stressors. Consequently, we propose such an interaction with chronic social stressors.

Hypothesis 3: Positive events will be negatively related to end-of-work fatigue more strongly when chronic social stressors are high, compared with low.

Chronic Stressors and Negative Events

The main focus of the present study is on positive events. However, for reasons of completeness, we also investigated whether chronic stressors interact not only with positive but also with negative events. To the extent that chronic stressors undermine coping resources, they increase vulnerability to future threats (i.e., a loss spiral; Hobfoll, 2001). Hence, chronic stressors may exacerbate immediate resource loss due to negative events, resulting in a stronger relationship between negative events and fatigue. A review of 19 studies that tested increased reactivity to negative events (i.e., mostly laboratory stressors) due to enduring stressors yielded predominantly heightened reactivity to chronic stressors; however, a considerable number of studies found reduced reactivity (Gump & Matthews, 1999). Further research on reactivity to negative events in the face of chronic stressors is therefore needed. As argued above, the strong impact of chronic social stressors on well-being and coping resources makes this type of chronic stressor especially suited for increasing vulnerability to negative events.

Hypothesis 4: Negative events will be positively related to end-of-work fatigue more strongly when chronic social stressors are high, compared with low.

Method

Sample and Procedure

The current analyses are based on a diary study, which was part of a larger longitudinal study in a Swiss government agency. We

presented the study to potential participants at several meetings, the attendance of which was voluntary. As an incentive to participate, personal web-based feedback was provided at the end of the study, containing individual results for various variables under study. Agreement to participate was obtained from 76 of the 113 employees who attended one of the meetings² (71% females, 29% males; essentially white-collar workers, such as clerks and administrative staff). Participants were 40.57 years old on average ($SD = 11.59$, range = 17 to 62 years); 4% had completed primary education (9 years), 87% had completed secondary education (mostly in terms of an apprenticeship), and 9% held a college or university degree. Organizational tenure ranged from 0.2 to 35 years, with an average of 6.27 years ($SD = 7.53$).

As mentioned above, the diary study was part of a three-wave longitudinal study, with a time lag between the waves of approximately 6 months.³ At each wave, participants filled out diaries for 2 working days within a week. We limited the study to 2 days mainly because data collection for the study was quite extensive, and we were concerned that a larger number of diaries to be completed would have resulted in high dropout. Research assistants contacted each participant approximately a month before each wave to agree on two specific days of measurement; these were not necessarily consecutive. At the start of each wave, participants received several diary booklets. They were asked to fill out a red-colored diary whenever a negative event happened to them during work hours and a green-colored booklet whenever a positive event occurred. They were asked to make the entry in the diary as soon as possible after the event. At the end of each working day, they completed a short questionnaire measuring state fatigue.

Thus, we collected event-related diaries and state fatigue measures for 6 working days. In addition, participants completed a general questionnaire at the beginning of each wave, before the diary measure started. It contained the measure for chronic social stressors. Three participants dropped out between the second and third waves because they left their jobs. These individuals, however, did not differ from those who participated in all three waves in terms of the variables studied.

² Altogether, about 250 employees worked in the organization at the time of the study. We cannot rule out the possibility of a sampling bias. Given that the level of stressors is linked to the willingness to participate (Barr, Spitzmüller, & Stuebing, 2008), it is possible that employees with particularly high or particularly low chronic social stressors did not participate in our study. To examine this, we benchmarked our sample regarding chronic social stressors with a large sample of Swiss employees from various organizations ($n = 4,636$). Means for the two samples did not differ significantly, making sampling bias unlikely.

³ The larger study was designed for investigating longitudinal effects of work stressors on well-being. The time course of the developments in well-being is still poorly understood, and no consensus exists for choosing appropriate time lags (Zapf, Dormann, & Frese, 1996). A lag of 1 year was chosen because we were interested in potential long-term effects. Because some effects may occur rather quickly (Sonnetag & Frese, 2003), we scheduled an additional wave in between, that is, after 6 months. In addition, pragmatic reasons had to be considered. For instance, a shorter time lag would have created difficulties for the organization. In the present study, we did not consider the longitudinal character of the data because we were interested in relationships at the day level.

Measures

Positive and negative events. Affective work events were assessed by event sampling, using an adapted paper-and-pencil version of the computer-assisted self-observation system COMES (Perrez & Reicherts, 1996). Participants were asked to report any event they considered “straining” or “pleasant.” What they considered straining or pleasant was left to them, but we emphasized that they should record not only major but also minor events. When filling out a diary, participants briefly described the event and then answered several questions about it (e.g., its intensity). The number of negative and positive work events per day was used for testing our hypotheses. Events relating to private matters were excluded from the analyses.⁴

End-of-work fatigue. At the end of work, state fatigue was assessed with a measure by Nitsch (1976), which is widely used in German-speaking countries and is characterized by good psychometric properties (e.g., Sonnentag & Bayer, 2005). Participants rated five adjectives (“spent,” “exhausted,” “in need for recovery,” “rested” [recoded], and “recuperated” [recoded]) on a 6-point Likert scale, indicating how well each adjective represented their momentary state (1 = *barely*, 6 = *completely*). Internal consistencies across the 6 days ranged from .79 to .82.

Chronic social stressors. Chronic interpersonal tensions with colleagues (e.g., conflicts, personal animosities, or unfair behavior) were assessed with a scale by Frese and Zapf (1987). Participants rated five items (e.g., “One has to pay for the mistakes of others,” “With some colleagues there is often conflict”) on a 5-point scale ranging from 1 (*not at all*) to 5 (*very much*). Internal consistency ranged from .77 to .83 across the three waves.

Analyses

Data were analyzed with a multilevel random coefficient model using HLM (Version 6.04; Raudenbush, Bryk, Cheong, & Congdon, 2004). Days (Level 1) are nested within waves (Level 2), which are nested within persons (Level 3). However, as there were too few data points at Level 2, a three-level model had difficulties converging (see Nezlek, 2001). We therefore ran a two-level model (Level 1 = days, Level 2 = persons), controlling for the three study waves with two dummy variables. The measure for chronic social stressors (person level) was aggregated across the three waves, as it is conceptualized as a relatively stable condition of the work environment.⁵ Internal consistency of this aggregated measure was .79.

The main analysis examined the within-person relationship between the number of affective events at work (negative and positive), their interaction, and end-of-work fatigue. These Level 1 predictors were group-mean centered. Thus, significant coefficients for those variables reflect the effect of a person being high or low (e.g., many or few events) relative to his or her own mean for that variable across all days. Group-mean centering avoids the danger of spurious cross-level interactions (Hofmann & Gavin, 1998). Furthermore, we tested whether chronic social stressors moderated the relationship between events and fatigue by predicting the slopes for negative and positive events by chronic social stressors. Chronic social stressors is a person-level variable and was centered around the grand mean. Thus, effects of chronic social stressors are to be interpreted relative to the sample mean.

We also controlled for sex, age, and tenure. We used the restricted maximum-likelihood procedure in HLM to estimate the fixed and random parameters and the robust standard errors for the significance tests (see Hox, 2002). For directional hypotheses, one-tailed tests are appropriate and are indicated as such. To confirm the interaction hypotheses, the coefficients for the interactions had to be significant; in addition, the pattern of the simple slopes had to be as predicted. We calculated simple slope tests using a tool developed by Preacher, Curran, and Bauer (2006). Illustrations were constructed according to Aiken and West (1991). For chronic social stressors, values 1 *SD* below and above the sample mean were chosen. For affective events, we chose one event below and one event above the person mean, which corresponds approximately to the size of the standard deviation of the affective events but is easier to interpret.

Results

Before testing our hypotheses, we calculated a null model to estimate the proportion of variance in the dependent variable that is accounted for at the day and person levels, respectively (Nezlek, 2001). The estimates were .63 for the Level 2 variance and .38 for the Level 1 variance. Thus, 38% of the variance in fatigue was within-person variance, which indicates that multilevel modeling is appropriate.

Means and standard deviations of all variables included in our model and zero-order correlations of variables at the person level are shown in Table 1. Results of the multilevel analyses are displayed in Table 2. With regard to Hypothesis 1, negative events were positively related to fatigue ($\gamma = .11, p < .01$; one tailed). The association between positive events and fatigue, for which we had not advanced a hypothesis, was not significant ($\gamma = -.06, p = .14$). In line with Hypothesis 2, there was a significant interaction between positive events and negative events ($\gamma = -.23, p < .01$; one tailed). Simple slope tests showed that positive events were

⁴ To illustrate the nature of affective events resulting from our event-contingent sampling, we list six translated descriptions.

Examples of negative work events: “Someone asked to delay the start of a budget meeting. This caused time shortage for other issues I needed to handle”; “I had a tense phone call with a candidate for a vacant position in my team”; and “A new coworker started. I had to give her my workstation and had no place for myself this morning.”

Examples of positive work events: “A customer called and expressed her sincere gratitude for the immediate treatment of her case”; “I had the appraisal interview with my supervisor”; and “I managed to finish a task, which I thought I would not complete today.”

Events that were private in nature (e.g., “My husband called to let me know that our joint vacation is booked”) were excluded from all analyses.

⁵ We tested whether this procedure was appropriate by checking for changes in means with a one-way analysis of variance with repeated measures. Furthermore, we tested whether the measures for social stressors at the three time points would yield a single factor by conducting a common factor analysis (CFA) with oblique rotation (using oblimin rotation with $\delta = 0$), following the recommendations by Fabrigar, Wegener, MacCallum, and Strahan (1999). Means did not significantly change over time, $F(2, 144) = 2.16, ns$. The CFA yielded a one-factor solution explaining 71% of the total variance. Therefore, we decided that the person mean across the three waves best represents the true value for chronic social stressors across time.

Table 1
Means and Standard Deviations of Variables Included in the Multilevel Model and Correlations Among Person-Level Variables

Variable	<i>M</i>	<i>SD</i>	1	2	3	4
Person-level measures ^a						
1. Sex ^b	0.29		—	.06	-.10	.14
2. Age	40.57	11.59		—	.48**	-.23*
3. Tenure in years	6.27	7.53			—	-.06
4. Chronic social stressors ^c	1.47	0.48				—
Daily measures ^d						
Fatigue	3.50	1.00				
Negative events	0.90	0.87				
Positive events	0.92	0.85				

^a *N* = 76. ^b 0 = female; 1 = male. ^c Mean over three waves. ^d *N* = 449.

* *p* < .05. ** *p* < .01.

negatively related to fatigue on days with many negative events ($\gamma = -.29, t = 2.93, p < .01$) but not on days with few negative events ($\gamma = .17, t = 1.72, p = .09$). This pattern is in line with Hypothesis 2 (see Figure 1).

Regarding Hypothesis 3, there was a significant cross-level interaction between positive events and chronic social stressors ($\gamma = -.26, p < .01$; one tailed). Simple slope tests revealed that positive events were negatively related to fatigue among employees with high ($\gamma = -.18, t = -3.61, p < .01$) but not low chronic social stressors ($\gamma = .06, t = 0.96, p = .34$). This pattern is in line with Hypothesis 3 (see Figure 2). Moreover, there was a significant cross-level interaction between negative events and chronic social stressors ($\gamma = .20, p < .05$; one tailed). More specifically, negative events were positively related to fatigue among employees with high ($\gamma = .21, t = 3.37, p < .01$) but not low chronic social stressors ($\gamma = .01, t = 0.29, p = .77$). This pattern is in line with Hypothesis 4 (see Figure 3).

Additional Analysis

In response to a reviewer's comments, we tested an analogous model using the intensity of affective events instead of their frequency.⁶ Results did not change meaningfully, and all main effects and interactions showed the same patterns. Comparing the two nonnested models according to Hox (2002), the model with number of events was more parsimonious (*Akaike information criterion* [*AIC*] = 976.3, *Bayes information criterion* [*BIC*] = 1,004.9) than the model with intensity scores (*AIC* = 993.4, *BIC* = 1,022.1). Therefore, it seemed more adequate to use number, rather than intensity, of events. Details about these analyses can be obtained from the authors.

Discussion

The goal of this study was to contribute to the understanding of the daily build-up of fatigue by examining how positive and negative events and chronic stressors relate to end-of-work fatigue. We proposed that negative events deplete energetic resources and, thus, are positively related to fatigue. In contrast, positive events are likely to trigger both resource-enhancing and resource-draining processes, making predictions regarding main effects difficult. However, we argued that given adverse circumstances (in terms of

an accumulation of negative events or in terms of high chronic stressors), positive events should be negatively associated with fatigue. That is, under negative circumstances, positive events are likely to trigger a set of processes that help employees to restore resources and to reduce energy drain due to the negative circumstances. The results of our study support these propositions.

In our view, the most important result is that positive events influence fatigue only in the face of adversity. Positive events did not show a main effect on fatigue; they did, however, reduce fatigue when employees reported having encountered negative events frequently during the day. Furthermore, increases in positive events were associated with decreased fatigue under conditions of high chronic social stressors, but not when chronic social stressors were low. Hence, in this study, the effect of positive events on fatigue was not only stronger under adverse conditions; rather, it was confined to adverse conditions, both in terms of momentary conditions (negative events) and in terms of enduring conditions (chronic social stressors). In addition, these results are in line with the notions that under adverse circumstances, positive events restore coping resources (Folkman, 2008) and accelerate recovery (Fredrickson et al., 2000), reducing the resource drain due to the negative circumstances.

These findings have important theoretical implications. We noted in the introduction that the impact of positive events on energetic resources is far from clear, both theoretically and empirically. Our results suggest that the net gain in energetic resources instigated by positive events lies not so much in generating new energetic resources, as these gains seem to be compensated by their costs in resources in terms of attentional demands. Rather, the net gain seems to lie in decreasing the resource drain instigated by negative circumstances, in terms of both acute events and enduring stressful conditions. Most likely, this is due to individuals redirecting attention away from these adverse conditions and, thus, reducing the processing of worries, hurt feelings, anger, and the like (see Green et al., 2003), thus facilitating problem-oriented coping and accelerating recovery. Note that these effects imply

⁶ Intensity was assessed in terms of how stressful participants rated a negative event and how much they enjoyed a positive event (in both cases 0 = not at all, 6 = very much). These answers were summed over a day for negative and positive events to yield intensity scores.

Table 2
Prediction of End-of-Work Fatigue

Variable	Coeff	SE	t
Effects of Level 1 variables			
Intercept	3.43	0.12	28.12**
Wave 2	0.10	0.08	1.23
Wave 3	0.00	0.10	0.04
Negative events ^a	0.11	0.04	3.08**
Positive events	-0.06	0.04	-1.46
Negative Events × Positive Events ^a	-0.23	0.09	-2.55**
Effects on intercept (Level 2)			
Sex ^b	0.13	0.21	0.60
Age	-0.01	0.01	-0.99
Tenure	0.00	0.01	-0.61
Chronic social stressors	0.43	0.23	1.86 [†]
Effects on slope of negative events (Level 2)			
Chronic social stressors ^a	0.20	0.09	2.25*
Effects on slope of positive events (Level 2)			
Chronic social stressors ^a	-0.26	0.09	-2.83**
Random effects variances			
Level 1 intercept	0.22		
Level 2 intercept	0.78**		
Wave 2 slope	0.25**		
Wave 3 slope	0.48**		

Note. $N = 449$ diary measures (Level 1) of 76 individuals (Level 2). *Coeff* = unstandardized coefficient.

^a One-tailed tests. ^b 0 = female; 1 = male.

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

buffering the impact of adverse conditions and, therefore, presuppose the existence of such adverse conditions. From this perspective, it becomes understandable why no main effect of positive events was found.

The potential of positive events to ameliorate the effects of negative events has, so far, been proposed as one of many advantages of positive events, with regard to a broad number of outcomes (e.g., Folkman, 2008; Fredrickson & Joiner, 2002; Hobfoll, 2001). Our results, if replicated, may help clarify and specify the effects of positive events on a specific outcome, that is, fatigue, in

two respects. First, we suggest that the effect of positive events on fatigue is confined to an interaction with negative events or conditions. Other models suggest the effect of positive events is stronger under adverse circumstances but not absent without adverse circumstances, thus suggesting a main effect (Fredrickson, 2001). Such main effects are likely to exist for other outcome variables, but not for fatigue: Processing positive affective experience is costly in terms of energetic resources; these costs should specifically affect fatigue, but costs in terms of energetic resources should not reduce outcomes like job satisfaction. Second, we show

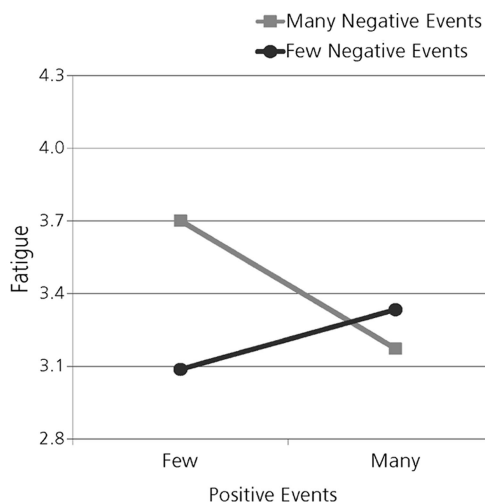


Figure 1. Interaction between positive and negative events predicting fatigue.

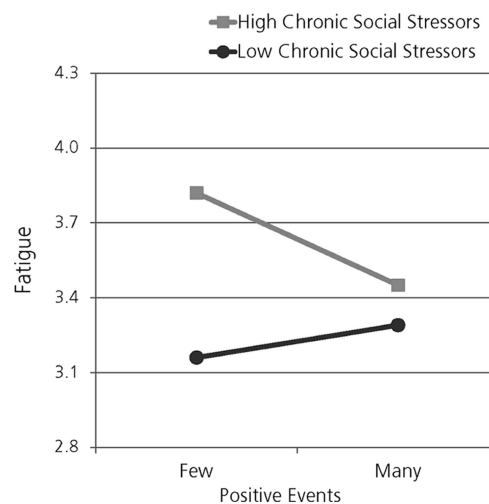


Figure 2. Cross-level interaction between positive events and chronic social stressors predicting fatigue.

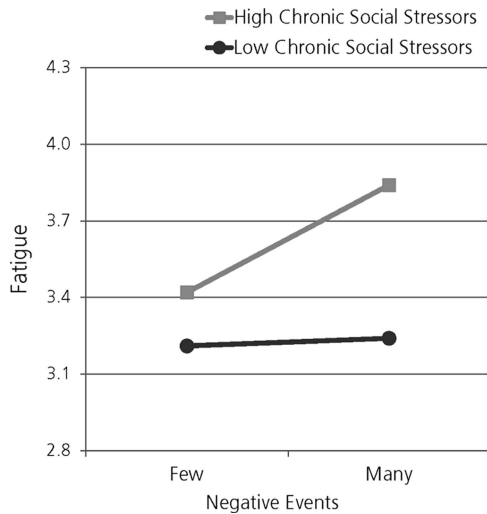


Figure 3. Cross-level interaction between negative events and chronic social stressors predicting fatigue.

that positive events interact not only with momentary conditions (i.e., negative events) but also with enduring work characteristics (i.e., chronic social stressors). Chronic stressors have so far been tested only as moderator of the association between negative events (i.e., acute stressors) and various outcomes, but not as a moderator of the effects of positive events on fatigue. We are the first to show that positive events attenuate the resource drain due to chronic stressors, which results in reduced fatigue when chronic social stressors are high.

Note that we found an interaction of chronic social stressors not only with positive events but also with negative events. Chronic social stressors exacerbated resource drain due to negative events, a pattern that supports the notion that chronic stressors increase vulnerability for future threats (Gump & Matthews, 1999). Somewhat unexpectedly, negative events were not related to fatigue when chronic social stressors were low. In contrast with positive events, however, negative events did show a main effect. This implies that under “normal” conditions (i.e., at the mean of chronic social stressors), negative events do increase end-of-work fatigue. It does seem, however, that especially good social conditions, in terms of very low chronic social stressors, can counteract the effects of negative affective events. All our analyses, therefore, underscore the importance of background conditions in general, and of chronic social stressors in particular.

Limitations

There are several limitations to our study. First, our sample is from a government agency, leaving open the extent to which our results can be generalized to other populations (e.g., private business). Second, all our measures are based on self-report. Note, however, that the pattern of interactions we found is difficult to explain by common method variance. Interactions are notoriously difficult to detect, even more so as the correlation between predictors increases (Aiken & West, 1991). Nevertheless, future studies should employ other measures in addition to self-report (e.g., fatigue ratings by spouses). Third, our event-sampling approach

implied that the decision to report an event was left to the participants. Such a decision may depend on personal thresholds, but possibly also on criteria unrelated to the event, such as the degree to which one felt like reporting anything (see Barr, Spitzmüller, & Stuebing, 2008). Future studies might try to overcome this limitation by using time sampling.

Practical Implications

With regard to short-term resource replenishment, our findings point to the role of positive experiences for employees especially on “tough days” (as indicated by a high number of negative events) or under enduring “tough conditions” (e.g., high chronic social stressors). Therefore, supervisors should be encouraged to provide positive moments for their employees particularly on difficult days or in teams with frequent conflicts and social animosities. For instance, they might give positive feedback about performance; communicate esteem, empathy, and care; or assign tasks that provide opportunities for personal success. These microinterventions, which are not very costly for the supervisor, may provide an opportunity for employees to restore energetic resources, which, in turn, may increase performance (Beal et al., 2005; Binnewies, Sonnentag, & Mojza, 2009) or decrease the risk of occupational accidents (Swaen, van Amelsvoort, Bültmann, & Kant, 2003). Note that such interventions may be helpful even if they are not related to the problems they are meant to ameliorate. Thus, a positive remark does not necessarily have to help solve the current problem an employee is having; it may be totally unrelated, but yet be helpful (see also Sedikides & Gregg, 2008).

Suggestions for Further Research

Apart from replication studies, preferably with different samples, additional measures, and time-sampling designs, we suggest two directions for further research, referring (a) to issues of task relatedness and (b) to different variants of fatigue.

First, we argued that positive events both cost and restore energetic resources and that the two processes may cancel each other out. Weiss and Cropanzano (1996) and Beal et al. (2005) suggested that positive events should require fewer resources if they are related to the task. Such positive events would imply fewer off-task cognitions, and possible energizing effects of positive affect could be channeled directly into task completion. By obtaining finer event descriptions, research could determine the extent to which affective events relate to the task at hand. Possibly, task-related positive events (e.g., making progress, reaching a goal) might yield a main effect in terms of reduced fatigue, whereas non-task-related events (e.g., dwelling on past successes, receiving a general compliment) might not.

Second, we have referred to fatigue as a one-dimensional concept, ranging from high to low, implying low versus high energetic resources. However, there is reason to believe that there are different kinds of fatigue, which Thayer (1996) referred to as *tense-tired* versus *calm-tired*. It would be plausible to hypothesize a main effect of positive events on calm-tiredness but not on tense-tiredness. Calm-tiredness might, in turn, be associated with better sleep and, consequently, more efficient restoration of energetic resources. Such research also could help to clarify the bound-

ary conditions for the interaction that we postulate between positive events and adverse conditions in predicting fatigue.

All in all, our study shows that one cannot simply assume that, with regard to fatigue, negative events are negative and positive events are positive. Rather, they interact with one another and with background conditions in terms of chronic stressors in a rather complex way. Most important, positive events show effects on energetic resources only in the face of adverse conditions, by countering the resource drain associated with these adverse conditions.

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