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Rushed, Unhappy, and Drained: An Experience Sampling Study of Relations Between Time Pressure, Perceived Control, Mood, and Emotional Exhaustion in a Group of Accountants

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Experience sampling methodology was used to examine how work demands translate into acute changes in affective response and thence into chronic response. Seven accountants reported their reactions 3 times a day for 4 weeks on pocket computers. Aggregated analysis showed that mood and emotional exhaustion fluctuated in parallel with time pressure over time. Disaggregated time-series analysis confirmed the direct impact of high-demand periods on the perception of control, time pressure, and mood and the indirect impact on emotional exhaustion. A curvilinear relationship between time pressure and emotional exhaustion was shown. The relationships between work demands and emotional exhaustion changed between high-demand periods and normal working periods. The results suggest that enhancing perceived control may alleviate the negative effects of time pressure.

Commentators widely agree that workplaces are becoming more demanding. Levinson (1996) related contemporary changes at work to an increasing level of pressure that results in more and more people ending up "burned out" from their work: "Today extreme feelings of stress are pervasive and growing worse. Re-engineering, downsizing, and increased competition have multiplied pressures in the workplace" (p. 162). Given this potential for increased pressure within organizations, it is important to understand how employees react to high demands in the workplace and whether this relationship is mediated by other factors. This is the broad aim of this article.

In particular, we present a study of the experiences of a small group of people who were considerably overloaded as a result of downsizing. Our core focus was on their experience of time pressure and how this translates into acute changes in affective responses and into chronic responses, such as emotional exhaustion. Specifically, we examined whether a temporal relationship exists between time pressure, negative mood, and emotional exhaustion. We then extended the investigation to more complex models. First, we examined the influence of perceived control on time pressure, as well as its direct effect on mood and emotional exhaustion. The importance of this analysis lies in the fact that perceived control provides a possible intervention point to alleviate the negative effects of time pressure. Second, we investigated the effect of *month-end*—a sustained period of high workload—on the key variables and their interrelationships. Employees in many occupations experience fluctuating workload, and hence it is important to understand how this variation affects employee experiences. Finally, we conducted analyses to detect the presence of mediating or curvilinear effects between the key variables.

An especially salient feature of our research is the use of experience sampling methodology (ESM; Hormuth, 1986). This is significant because it allows a dynamic, longitudinal, and within-person analysis. We describe this technique in detail after we have outlined the core research questions.

Time Pressure: A Temporal Relationship With Mood and Emotional Exhaustion?

Our first research question concerned the relationship between perceived time pressure, negative mood, and emotional exhaustion. Time-based pressure has been defined as the strain that results from insufficient time to complete job-related tasks (Kinicki & Vecchio, 1994). A sense of time pressure derives in part from objective features of the job, such as the number of work problems, although research suggests that other factors, such as personality, can

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also be an important determinant (e.g., Lee & McGrath, 1995). Several studies have shown that high levels of time pressure are associated with poor well-being (see Glowinkowski & Cooper, 1987). For example, women whose jobs involve intense time pressure have been found to have a greater incidence of health problems, including higher levels of anxiety, depression, and disability (Brisson, Vezina, & Vinet, 1992). Similarly, Bongers, de Winter, Kompier, and Hildebrandt (1993) concluded that time pressure is positively related to the presence of musculoskeletal symptoms. Time pressure has also been reported as a major source of stress by senior medical staff (Perkins, Alley, Petrie, Macfie, & Morrah, 1995).

Nevertheless, the existing research on time pressure contains several methodological limitations (Frese & Zapf, 1988). The major deficiency is that most studies are cross-sectional (i.e., based on differences between people at a certain time) rather than being focused on changes within people over time. It is possible, for example, that third factors (such as personality variables) account for the association between time pressure and well-being. Moreover, no studies have examined how time pressure might translate into more chronic responses, such as burnout. Finally, it is likely that the relationship between time pressure and employee well-being is a dynamic one that cannot be adequately understood by a cross-sectional study or even by a longitudinal study based on a small number of time points.

These difficulties are overcome in this study by using ESM. Specifically, we examined whether time pressure fluctuates together over time with acute affective responses (i.e., negative mood) and chronic affective responses (i.e., emotional exhaustion, which is a core aspect of burnout). In other words, we sought to demonstrate a relationship between time pressure, negative mood, and emotional exhaustion. We discuss these predicted relationships in more detail.

Time Pressure and Negative Mood

Although few studies have looked at the relationship between time pressure and negative mood, a considerable body of research evidence shows an association between fluctuations in other work stressors and mood. For example, Stone (1987) showed that undesirable work-related stressors were associated with negative mood, whereas desirable work features were significantly correlated with positive mood. Similarly, Barling and Kryl (1990) demonstrated evidence for the association between daily work stressors and mood, with job involvement and job satisfaction as significant moderators. The daily work stressors included role ambiguity, role conflict, and overload. A recent study by Alliger and Williams (1993) examined ESM data with respect to variability in task enjoyment and mood states at work. Their study demonstrated the association between immediate work experiences and temporal and task-related perceptions. Specifically, their results showed that previous mood predicts subsequent mood at work and that goal progress is related to positive affect and task skills predict task enjoyment as well as negative affect.

In summary, there is considerable evidence to suggest that daily work stressors affect mood. We therefore predicted that time pressure would fluctuate over time together with negative mood. In other words, higher levels of time pressure would be significantly associated with more negative mood.

Time Pressure and Emotional Exhaustion

Emotional exhaustion is the primary aspect of burnout (Maslach & Jackson, 1981) and is typically considered to be the first stage of a burnout process (Cordes & Dougherty, 1993). Compared to the two other dimensions of burnout—depersonalization and perceived lack of personal accomplishment—emotional exhaustion has the strongest links with negative outcomes (Glass & McKnight, 1996). These outcomes include severe emotional consequences, such as feelings of helplessness and depression and lower self-esteem (Jackson & Maslach, 1982); a detrimental effect on physical health problems (Burke & Deszca, 1986; Kahill, 1988); negative effects on interpersonal functioning (Kahill, 1988; Maslach & Jackson, 1985); and organizational consequences, such as increased turnover and absenteeism and decreased performance quality and productivity (Jackson, Turner, & Brief, 1987; Maslach & Jackson, 1985).

Given the clear negative consequences of burnout, it is important to understand the dynamic processes that lead to its occurrence. There is little, if any, evidence concerning the relationship between time pressure and burnout. However, it is generally agreed that burnout can be a chronic response to work demands and stress (e.g., Shirom, 1989). In particular, evidence suggests that burnout and especially emotional exhaustion are directly linked with high levels of workload (Jackson, Turner, & Brief, 1987; Shirom, 1989). We therefore predicted that emotional exhaustion would be related to levels of time pressure. We could not predict, however, the precise temporal nature of this relationship. Using ESM methodology, we explored whether and how time pressure fluctuates together with emotional exhaustion.

More Complex Models Relating Time Pressure, Negative Mood, and Emotional Exhaustion

After examining the degree to which a temporal relationship exists between time pressure, negative mood, and emotional exhaustion, our next step was to examine these relationships in more detail. We therefore conducted an investigation, using regression analyses, of the relationships between time pressure, perceived control, mood, and emotional exhaustion. Figure 1 shows the specific model examined. We introduce the rationale for the model by first discussing the role of perceived control as a potential influence on time pressure and as a possible determinant of mood and emotional exhaustion.

Time Pressure, Mood, and Emotional Exhaustion: The Role of Perceived Control

Control is considered to be one of the most important work characteristics (e.g., Hackman & Oldham, 1976). Meta-analyses have shown strong and consistent relationships between perceived control over specific work aspects (i.e., autonomy) and outcomes, such as job satisfaction and well-being (e.g., Spector, 1986). A range of intervention studies showed positive effects of increased employee control generated through the implementation of participation in decision-making practices (Jackson, 1983), autonomous work groups (Wall & Clegg, 1981), work schedule autonomy (Pierce & Newstrom, 1983), and employee involvement in systems decision making (Frese, 1987). These studies illustrated that control has positive effects on diverse outcomes such as health, job satisfaction, employee attitudes, transfer of training, and productivity. Similarly, Glass and McKnight (1996) concluded in their review that, despite methodological limitations of many of the studies, a lack of perceived control had a modest but consistent relationship with burnout.

More specifically, it has been suggested that control beliefs play a major role in the relationship between work stressors and psychological outcomes. Ganster and Fusilier (1989) described how a belief in personal control, even if it is not exercised, can significantly lessen experiences of stress in demanding situations. In their demand-control model, Karasek and colleagues proposed that where the demands of the job exceed the control possibilities of the worker, the result is psychological strain (Karasek, 1979; Karasek & Theorell, 1990). However, although there is plenty of evidence that both control and demands affect psychological strain, there is relatively little evidence for an interactive effect (see Warr, 1990).

Thus, considerable research has documented the importance of perceived control in promoting well-being at work, partly through alleviating the negative effect of work stressors. We therefore examined the relationship between perceived control and time pressure, negative mood, and emotional exhaustion. The importance of this analysis is that perceived control provides a potential point of intervention in the relationship between time pressure and well-being. We predicted that perceived control would have direct positive effects on mood and emotional exhaustion, as well as indirect effects through a negative association with time pressure. In subsequent analyses, we examined whether the role of

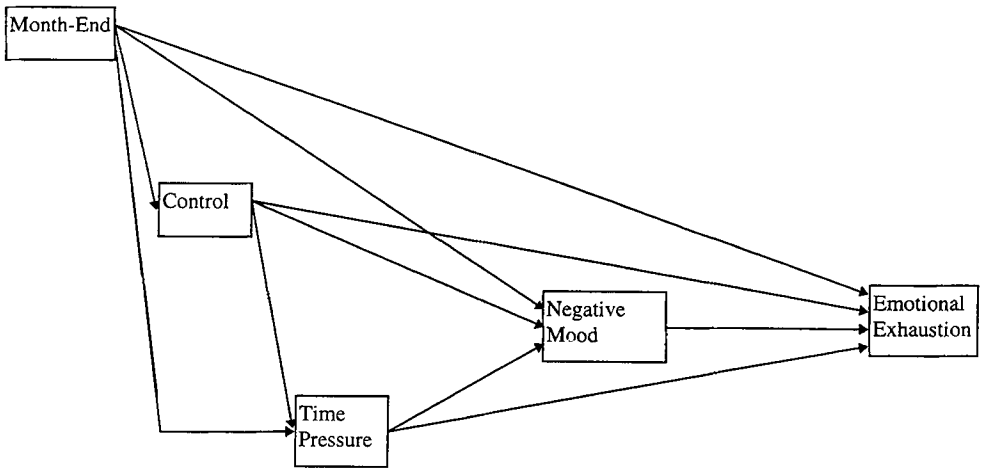

Figure 1. Overall model of hypothesized relations between variables.

perceived control diverges in the two separate working periods reflecting different levels of workload (i.e., month-end versus normal working periods). We discuss this issue next.

The Effect of a Sustained Period of High Workload (Month-End)

The second way in which we extended the core analyses was to consider the effect of a period of sustained workload on time pressure, perceived control, mood, and emotional exhaustion and the relationships between these variables. Many jobs involve systematic fluctuations in workload that can increase the demands on workers at certain times of day, week, month, or even year. The increase in workload can be seasonally related, for example, shop workers are often busier during the Christmas period, but it is more commonly related to job-related deadlines, such as the end of a project or task. Financial accountants are one group of workers that endure a frequent and regular period of sustained workload. Specifically, the accounting process contains a period at the end of each month, known as *month-end,* during which financial accountants are required to complete a large number of tasks in a certain order and with fixed deadlines to bring the accounting process to a close. This process is highly interdependent in that failure to meet one deadline can cause completion problems for other accountants, which can in turn cause problems for other parts of the organization. We examined what effect this period of sustained high workload every month has on the key variables and their associations.

More specifically, we conducted two types of analyses. First, we examined how levels of time pressure, perceived control, negative mood, and emotional exhaustion are affected by the period of sustained workload known as month-end. We expected that the employees would experience higher levels of time pressure during month-end because of the greater number of tasks they are expected to complete within a limited period. We also expected that the employees would experience lower levels of perceived control because the types of tasks are predetermined and because the deadlines for most of these tasks are fixed. Finally, we also expected that employees would experience more negative mood during month-end. Research elsewhere has shown a relationship between fluctuations of workload and mood. For example, Bolger and colleagues (Bolger, DeLongis, Kessler, & Schilling, 1989) found that individuals reported more distressed mood on days with high perceived workload. The same effect occurred during a high workload period within a single day. In a similar vein, Repetti (1993) showed that daily increases in workload are related to changes in mood. Participants reported a more distressed mood and more health complaints, such as headaches or stomach pains, on those days when workload was perceived to be high.

The second way to consider the effects of sustained workload is to examine the patterns of relationships between time pressure, perceived control, negative mood, and emotional exhaustion as a function of month-end. In other words, we examined the model (see Figure 1) during month-end and then compared this to the model during normal working. Although we know of no research that has investigated the issue in this way, it is not difficult to imagine how the effects of time pressure and perceived control might vary in the different situations. For example, it is possible that time pressure will be more detrimental (i.e., have stronger negative associations with well-being) during month-end when workload levels are high and sustained, than during the normal working period when work demands are more relaxed. Alternatively, the associations may actually be stronger during normal working because there is greater possibility for time pressure to vary during this period. It is also possible that perceived control will function differently during periods of high demand. For example, Ganster and Fusilier (1989) argued that perceived control is most important during periods of high stress because it is then that the individual has the greatest opportunity to intervene to reduce the negative consequences of stress. However, it also seems likely that perceived control will not have any effect if demands exceed a certain level, because the individual will then no longer have any opportunity to exert effective control over his or her work processes.

In summary, we predicted that employees would experience more time pressure, less perceived control, more negative mood, and greater emotional exhaustion during month-end. We also expected that there would be different associations between the core variables during month-end compared to normal working periods.

Mediating and Curvilinear Relationships Between Core Variables

So far we have conceptualized the relationship between the core variables as a simple linear one. The third way in which we extended the analyses was to

explore whether the relationships between core variables include mediating effects or curvilinear associations.

Concerning the issue of mediating relationships, our focus was on whether mood mediates the relationship between the work variables (i.e., time pressure and perceived control) and emotional exhaustion. In most studies, emotional exhaustion has been conceptualized as a chronic and stable construct. The usual approach has been to apply cross-sectional research designs to particular target populations (e.g., Jackson, Turner, & Brief, 1987; Russell, Altmaier, & Van Velzen, 1987). However, an important exception is the study conducted by Barling and MacIntyre (1993), who investigated the effects of daily work role stressors on mood and emotional exhaustion. These researchers conceptualized a model in which mood has a mediating effect on emotional exhaustion. As opposed to the vast majority of research on burnout, the study considered the dynamic aspects of emotional exhaustion in a within-person research design. The findings supported their assumptions in that role overload directly affected emotional exhaustion and mood mediated the effects of both role overload and role ambiguity on emotional exhaustion. In this study, therefore, we expected that mood would mediate the relationship between time pressure and emotional exhaustion and the relationship between perceived control and emotional exhaustion.

Traditionally, work psychology has conceptualized relationships between work characteristics and well-being as linear, as exemplified by the job characteristics model (Hackman & Oldham, 1976). This approach was challenged by activation theorists (Gardner & Cummings, 1988; Scott, 1966) who described the relationship between job scope and both performance-related and affective responses as curvilinear. One of the first studies that provided evidence for curvilinear associations was conducted by Champoux (1980). The study confirmed a curvilinear relationship between job scope and affective response such that increasing job scope beyond an optimal level had negative effects on psychological outcomes, such as general satisfaction, internal work motivation, and growth satisfaction. In the vitamin model of job demands and mental health, Warr (1986) postulated that the presence of certain job characteristics beyond a required level will not further enhance health and may even damage it. Warr (1990) later empirically demonstrated the existence of nonlinear relationships between work demands and job-related well-being. The same study also found a nonlinear relationship between decision latitude and job satisfaction (provided job demands were not included in the model) but not with the anxiety and depression dimensions of well-being. The results of these and other studies (e.g., Gross, 1994) demonstrate that including curvilinear relationships in the analysis of psychological phenomena provides additional and more detailed information about the nature of the relationships involved. We therefore examined whether time pressure and perceived control are curvilinearly related to the affective outcomes of negative mood and emotional exhaustion. Based on previous evidence concerning curvilinear relationships between work characteristics and well-being (see Warr, 1990), we predicted specifically that exceptionally high or low levels of time pressure would be most detrimental to affective outcomes as indicated by mood and emotional exhaustion.

Summary of Research Questions

Our initial focus in this article concerns the relationship between time pressure, mood, and emotional exhaustion. We expected that there would be a temporal relationship between these variables, suggesting that they are causally linked. In regression terms, we expected that time pressure would be significantly associated with negative mood and emotional exhaustion. We then tested a more complex model of the relationship between these and additional variables. This allowed us to investigate the possible mediating role of perceived control. Based on past research, we predicted that perceived control would be associated with more positive mood and reduced levels of emotional exhaustion. We also expected that greater perceived control would reduce the perception of time pressure and therefore would have an indirect positive effect on mood and emotional exhaustion.

We then examined the effect of month-end, a sustained period of high workload. First, regarding the effect of month-end on key variables, we predicted that month-end would be associated with decreased perceived control and increased time pressure, negative mood, and emotional exhaustion. Second, we examined the effect of month-end on the relationships between the variables. That is, in a second stage, we tested two versions of the model in the normal working condition (Submodel 1) and the month-end condition (Submodel 2). No predictions were made for these latter exploratory analyses.

Finally, we investigated the nature of the relationship between the core variables. Based on previous research, we expected that the effect of work factors

(i.e., time pressure, perceived control, month-end) on emotional exhaustion would be mediated by mood. We also expected that time pressure and perceived control would have a curvilinear association with negative mood and emotional exhaustion.

All of these analyses were conducted using a methodology that offers many advantages over the traditional cross-sectional design. We now describe this methodology.

ESM as an Empirical Technique

ESM is a highly intensive approach to data collection that allows an in-depth study of everyday experiences and ongoing behavior in people's natural environment (Hormuth, 1986). This approach attempts to characterize subjective experience by randomly sampling a person's immediate state (Stone & Shiffman, 1992). Hormuth (1986) emphasized that the conceptual base of ESM lies in its ecological validity, because it provides a representative sample of phenomena in the individual's environment.

The use of intensive measurement in ESM also represents a shift from research that treats psychological phenomena as stable and unchanging over time to an approach that emphasizes temporal patterns and change. This should "help solve the problem of causal imputation by capturing information about the dynamics of the processes" (Bolger, DeLongis, Kessler, & Schilling, 1989, p. 808). Within-person analysis over time enables the researcher to partly rule out temporally stable personality and environmental aspects as confounding variables (Bolger et al., 1989) and, therefore, in the present context, should help to reduce the complexity of relationships between work demands and well-being at work.

Warr and Payne (1983) presented a simple but decisive reason for the superiority of the use of intensive measurement methods in research within occupational settings. They conducted a study with a random sample of British workers and found that most people do not experience unpleasant occupational strain every day. Instead, only between 4 and 15% of full-time male employees and between 3 and 10% of full-time female employees reported experiencing stress at work the previous day. These results indicate the necessity of using frequent assessment to capture and to explore the changing and intermittent effects of work stressors. The results of a study by Rehm (1978) also indicate the importance of using a within-person analysis when studying the effects of stressors at work. Specifically, Rehm found no significant correlation between people's average level of events and their average level of mood using an aggregated analysis but found highly significant within-person correlations between changes in events and changes in mood. In other words, mood was affected by whether a person was experiencing more or fewer stressors than usual but not by their average level of stressors. The findings of these studies serve to highlight the importance of using ESM to investigate time pressure as a work stressor.

Method

Participants

The participants in this study worked in the financial accounts department of a chemical processing company. The researchers had a history of collaboration spanning nearly 10 years with this company, their primary role being to provide an independent and longitudinal evaluation of the effects of various organizational development initiatives.

The accounting group consisted of 4 females and 6 males, all of whom initially agreed to participate in the study. However, the manager was on leave for the first 2 weeks of the study due to the birth of his baby, a secretary dropped out of the study because her job was different, and 1 accountant provided insufficient data, so the analysis was confined to 7 participants. The manager was mainly responsible for nonroutine specialized tasks, so his absence would not have greatly affected the work tasks of the other accountants. The ages of the participants ranged from 20 to 55 years.

This group of employees was chosen for two reasons. The first is that the results of an organizational attitude survey conducted approximately 12 months before this study had shown this group to be under considerable strain and pressure. Specifically, according to a standardized and clinically validated measure of psychological well-being (the 12-item General Health Questionnaire [GHQ]; Goldberg, 1972), the accounting group was shown to have a level of strain ($M = 13.92$) that was greater than other employees in the company and was high relative to other United Kingdom samples (e.g., Banks et al., 1980). Repeat administration of the 12-item GHQ immediately before the start of the current study showed that group members still recorded high strain levels on the GHQ-12 ($M = 13.10$), a result that corresponded to reports from the on-site nurse that several accountants had visited the occupational health unit with work strain–related complaints. This strain was probably due to the fact that the group size had been reduced by almost half in the previous 5 years, with no equivalent reduction in workload (indeed, the number of invoices that needed to be processed had escalated and levels of recorded overtime were high). Before downsizing, the accountants' level of strain on the GHQ-12 had been much lower ($M = 8.64$).

The second reason for choosing this group was that the working pattern of the group provided an opportunity to look at the effect of periods of fluctuating workload. Specifically, the working month of the accountants followed a time pattern consisting of two clear parts: the normal working period, which lasted just over 2 weeks, and the month-end period, which also lasted just under 2 weeks. Month-end was reported to be a stressful and demanding

period because of the time pressure and high workload it entailed (levels of recorded overtime were especially high during this time). Thus, the month-end period typically involved a series of tasks that needed to be completed within a clearly defined time-frame, usually in a set order (it was not possible, for example, to start certain key tasks until others had been completed). Although some of these tasks were repeated for each month-end, many were one-off accounting activities that could not be anticipated in advance.

The participants were not told the specific hypotheses of the study but were aware that the study was being conducted because high levels of strain and pressure had previously been identified in the group. The mood data provided by the participants have also been used in a study of mood linkage (Totterdell, Kellett, Teuchmann, & Briner, 1998).

Design

The study used a method known as signal-contingent ESM in which participants describe their immediate experiences when signalled by an auditory signal at random times. Signal-contingent ESM is normally used when the aim is to characterize the general organization of a given day by comparing the relative prevalence and quality of different events (Stone & Shiffman, 1992). Signal-contingent ESM, as opposed to interval-contingent and event-contingent ESM (see Wheeler & Reiss, 1991), is the preferred method when it is important to minimize recall biases and when the focus lies upon a within-day analysis of events.

Procedure

The study took place over a 4-week period so as to capture the group's typical range of work demands. The study started 6 working days before the month-end period (although the 1st day was an introductory day and no data were used from this day) and finished 6 working days after the end of this period. Month-end lasted for 8 working days (although it actually ended a day earlier for 3 participants). This time schedule was intended to capture any differences in subjective experiences before, during, and after month-end. The division of the normal working period into two parts, one before and one after month-end, was also done so that comparisons between demand periods would not be confounded with time into study (to counteract possible practice and study-fatigue effects). The measurement occasions were restricted to three time points during each working day because of the length of time of the recording period. The working day was divided into three equal intervals, and one random auditory signal was sent within each of these intervals. Additionally, the accountants were randomly signalled once in the equivalent time interval after regular working hours in case they were working overtime. No two signals were presented within 30 min of each other.

Research Instrument

The measures were presented and the data were recorded on pocket computers (Psion Organisers, Psion PLC, London, England) that were given to each participant for the duration of the study. This instrument has proved in previous studies to be an "invaluable and practical instrument for repeated measurement of cognitive performance and self-reported affective response" (Totterdell & Folkard, 1992, p. 551). The instrument can be programmed to signal the participants and can accurately record the time at which they respond as well as record the response itself. The data can be automatically downloaded onto a personal computer for analysis.

Measures

An important consideration in selecting measures for an ESM study is the length of time required to complete them. The measures were kept as brief as possible because of the participants' busy work schedule.

All of the key variables (time pressure, perceived control, negative mood, and emotional exhaustion) were measured using visual analogue scales labeled 0 at the extreme left and ++ at the extreme right. The 0 represented no experience and ++ represented maximum experience on a scale with 20 possible positions.

Negative mood. For the assessment of mood, three dimensions were chosen from the UWIST Mood Adjective List (Matthews, Jones, & Chamberlain, 1990). A positive and a negative item were chosen from each of the three dimensions. The items were happy and sad from the hedonic tone dimension, tense and relaxed from the tense arousal dimension, and alert and drowsy from the energetic arousal dimension. An overall negative mood score was calculated by reverse scoring the positive items and computing the mean of the six items (Cronbach's $\alpha = .78$). A high score reflects a more negative mood.

Time pressure. Time pressure was assessed by asking respondents to indicate their current level of time pressure on a visual analogue scale (as described before). As a validity check, participants were also asked to indicate whether time pressure was a current problem (i.e., problem occurrence). As would be expected, problem occurrence was a significant predictor of perceived level of time pressure ($\beta = .19$, $p < .001$). However, it was not a significant predictor of perceived mental demands ($\beta = .07$) or perceived performance satisfaction ($\beta = -.09$), both of which were measured in the same way as perceived time pressure. This provides a valuable validity check for the measure of time pressure.

Perceived control. Perceived control was assessed by asking participants to indicate the extent to which they felt in control of their current situation using a single visual analogue scale (with the format that was described before).

Emotional exhaustion. Emotional exhaustion was assessed by using two questions from the Maslach Burnout Inventory (Maslach & Jackson, 1981). The first question asked participants to what extent they felt emotionally drained by work. The second question asked how much they felt burned out from their work. Responses to these two questions were recorded on visual analogue scales (with the format that was described before). The mean score of these two items was used to measure emotional exhaustion (Cronbach's $\alpha = .92$).

Response Compliance

The cooperation and motivation of participants are important considerations in experience sampling studies,

because participants have to respond several times each day for an extended period. Different strategies were therefore implemented to maintain participants' interest: The participants were involved in the planning of the time schedules and were also asked to provide information concerning their main work tasks. Each participant was contacted several times by telephone during the study and was asked about possible problems. Participants were given the option to negotiate an earlier finish to the study should it create additional pressures. They were also able to temporarily turn the signal off and miss a response point, although they were asked not to make use of this option too often because it would compromise the study.

Seven accountants completed the measures on a total of 254 occasions during normal work hours. Assuming that the participants were signaled three times a day for 19 days, they could have responded a total of 399 times, which represents an average compliance of 63.7%. Although this is lower than the average ESM response frequency of 80% reported by Csikszentmihalyi and Larson (1987), most of their studies required participants to respond twice as frequently for just 1 week.

On average, each participant responded 36 times during normal work hours. The minimum number of responses made by any participant was 24 and the maximum was 48. The accountants also completed the measures on 28 occasions during overtime; 17 of these occasions occurred during month-end.

Chi-square tests on response frequencies showed that participants were no more likely to respond on particular days of the week, $\chi^2(4, N = 399) = 1.12$, *ns*, or at particular times of day during normal work hours, $\chi^2(2, N = 399) = 0.48$, *ns*. Although the total number of responses during month-end (133 responses) and outside of month-end (121 responses) were similar, the participants were more likely to respond during month-end, χ^2 $(1, N = 399) = 97.93$, $p < .01$. If anything, we would have expected participants to respond less frequently during month-end because they are busier during that period.

After finishing the study, the participants rated the measures and the instrument in terms of intrusiveness and distraction from their daily routines on a 5-point scale (1 = *not at all,* 2 = *just a little,* 3 = *a moderate amount,* 4 = *quite a bit,* 5 = *a great deal*). Overall, the ratings suggested that the measures ($M = 1.57$, $N = 7$) and the instrument ($M = 2.29$, $N = 7$) were not perceived as too intrusive. Similarly, the study was not felt to cause major interruptions to daily routines ($M = 2.14$, $N = 7$). This conclusion was verbally confirmed by the individual accountants.

Data Analysis

The first step in the analysis involved aggregating the data points for each day of the study by averaging the participants' data for each day to examine how the variables fluctuated together over time. However, although informative, aggregated data cannot fully exploit the richness of time-series data. Thus, a disaggregated approach was also used. This approach preserves temporal relationships and thus focuses on the analysis of the determinants of change in affective responses. As Eckenrode (1984) argued, "disaggregated analysis yields more valid results concerning the direction and magnitude of the daily relationships than the aggregated analysis" (p. 916).

Analysis of the type of data set used in this study is determined by the particular data structure. In the present study, the small number of participants and large number of time points suggested the use of concomitant time-series analysis that relates two or more series within a given participant assuming that each variable is characterized by a process (see West & Hepworth, 1991). Pooled time-series analysis was therefore applied using a hierarchical least squares dummy variable regression model to test for intraperson relationships.

A number of factors such as between-person variance, serial dependency, trends, and cycles have to be accounted for in the regression model. A least squares with dummy variables approach controls for differences in individuals' intercepts across the N series (West & Hepworth, 1991). Serial dependency was accounted for by including a first-order lag of the dependent variable. A linear response trend was accounted for by using a variable for the day of the study. Day of week effects were accounted for using dummy variables for each day of the week. Thus, for each dependent variable, the following control variables were entered into the regression equation before entry of the independent variables: (a) a set of $n - 1$ dummy variables to represent each participant to control for between-person variance; (b) a variable for the lag of the dependent variable, which is the value of the previous assessment of the dependent variable, to eliminate serial dependency; (c) a variable for the number of days (1–19) into the study to eliminate effects arising from repeated response to a measure; and (d) a set of four $(n - 1)$ dummy variables for each day of the working week to control for differences due to particular days of the week.

The use of dummy variables to control for between-person variance could distort the results if participants systematically provided data at some points but not at others due to workload, for example. In that case, a response that is due to low workload would be attributed to an individual difference and removed by the dummy variable procedure. This would result in a *conservative* estimate of the effect due to workload. However, as already reported, there was no evidence that participants were less likely to comply during high workload, or at different times of day, or on different days of the week.

To compute the correlations between variables, each variable was first residualized using a regression model that contained the four sets of control variables.

The relations between variables were then analyzed using regression models in which both the main effects and the curvilinear associations between work variables (i.e., time pressure, perceived control) and outcomes (i.e., mood, emotional exhaustion) were tested. The first step in the regression model was the entry of the control variables described previously. In the second step, the independent variables were entered. In the third step, the standardized squared factors for the independent variables were entered. In a final step, terms for the interactions between the independent variables (Time Pressure × Perceived Control, Time Pressure × Mood, Perceived Control × Mood) were entered. The interactions were not significant, so they will not be reported any further. Previous studies (e.g., Warr, 1990) have similarly found no evidence for these interactive effects.

The regression models were analyzed using path analysis (see Pedhazur, 1982), which enables evaluation of both the direct as well as the indirect relationships in the model and thus "provides quantitative estimates of the causal connec-

Table 1
Descriptive Statistics for Variables

Variable	Overall		Month-end		Not month-end	
	M	*SD*	*M*	*SD*	*M*	*SD*
Emotional exhaustion	5.94	5.56	7.02	5.90	4.29	4.54
Negative mood	6.57	2.66	6.84	2.48	5.78	2.46
Time pressure	11.26	5.99	12.53	5.57	9.43	6.10
Perceived control	10.68	4.66	10.37	4.09	11.13	5.16

tions between sets of variables" (Bryman & Cramer, 1990, p. 248). Error terms for the variables were calculated using the formula $e = (1 - R^2)^{1/2}$ (see Bryman & Cramer, 1990).

Results

The overall means and standard deviations of the variables and their values during and outside of month-end are shown in Table 1. Time pressure, negative mood, and emotional exhaustion were greater and perceived control was lower during the month-end period.

Fluctuations Over Time

The research question concerning the temporal relationship between time pressure, perceived control, mood, and emotional exhaustion was examined using aggregated data. Figure 2 shows these variables over the days of the study (19 work days excluding

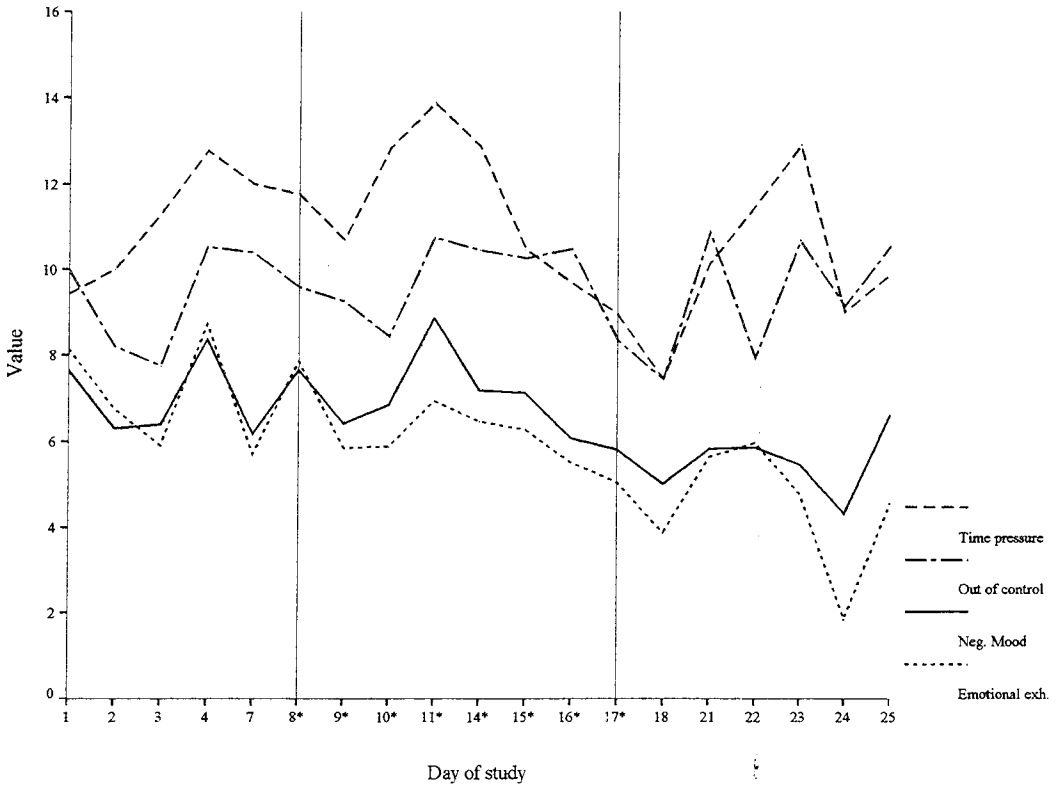

Figure 2. Daily aggregated data of time pressure, mood (negative [Neg.]), perceived control, and emotional exhaustion (exh.) over the days of the study (excludes three weekends). An asterisk indicates month-end.

three weekends in between), starting with 5 working days before month-end (Days 1 to 4 and Day 7), then continuing with the 8-day month-end period (Days 8 to 11 and Days 14 to 17; exact days depend on the person), and ending with 6 working days after month-end (Day 18 and Days 21 to 25).

Figure 2 demonstrates that time pressure, lack of perceived control, negative mood, and emotional exhaustion underwent considerable fluctuations over time, developing in a parallel mode that appeared to reflect the additional demands of month-end. The worsening of mood before month-end (Day 4) was paralleled by an increase in time pressure, a reduction in perceived control, and an increase in emotional exhaustion. Examination of the scores from individual participants showed that emotional exhaustion peaked on the 1st day of month-end in 2 participants, on the 4th in 2 participants, on the 6th in 2 participants, and on the 7th in 1 participant. The peak in negative mood occurred in the middle of month-end (Day 11) at the same time that time pressure peaked and perceived control was at its lowest. Toward the completion of month-end, time pressure, negative mood, and emotional exhaustion decreased, and perceived control increased. Time pressure reached its minimum and perceived control reached its maximum at the start of the period following month-end, whereas negative mood and emotional exhaustion also reached their minima during this period. This pattern suggests a temporal association between time pressure, perceived control, negative mood, and emotional exhaustion.

Figure 3 shows the patterns of change over the duration of the study for the six individual mood item scales. The minimum scores for alert, happy, and relaxed moods and the maximum score for tense mood occurred in the middle of month-end. The maximum score for sad mood also occurred in the middle of month-end considering month-end only. However, drowsy mood showed a general decline during month-end.

Relationships Over Time Within Participants

For each participant, the correlations between time pressure, perceived control, negative mood, and emotional exhaustion were calculated. Table 2 shows the minimum, maximum, and mean (calculated using Fisher's r-to-z transformation) correlations for the participants. The largest mean correlation was between negative mood and emotional exhaustion and the smallest was between perceived control and time pressure. One participant showed a (small) negative correlation between time pressure and negative mood, and another participant showed a positive correlation between time pressure and perceived control. All other participants showed correlations in the same direction as the other participants for all the relationships.

Models of More Complex Relationships

Path analysis was used to investigate the model of the relationships between the variables (see Figure 1). The model was tested by regressing each variable on every factor hypothesized to causally precede it in the model. Figure 4 shows the significant paths in the overall model including the beta weights and the error terms for outcome variables. The error terms indicate that, including the dummy variables, the predictor variables explained 41% of the variance in mood and 64% of the variance in emotional exhaustion. Consistent with the aggregated data analyses, described before, there is a clear relationship between time pressure and negative mood ($\beta = .27, p < .001$) and between time pressure and emotional exhaustion ($\beta = .19, p < .001$).

The influence of perceived control. This research question concerned the influence of perceived control on time pressure and its associations with mood and emotional exhaustion. The path analysis showed that, as expected, perceived control was negatively related to time pressure ($\beta = -.17, p < .01$). In other words, the greater the level of perceived control, the more likely participants were to report feeling less time pressure. Subsequent analyses, which we describe in the next section, showed that the effect of perceived control on time pressure existed only during normal working periods.

As predicted, perceived control also had a strong association with negative mood ($\beta = -.35, p < .001$). The direction of the relationship shows that the greater the perceived control, the more positive the mood. There was no significant direct relationship between perceived control and emotional exhaustion.

The effect of a period of sustained workload. Our next research question concerned the effect of a sustained period of high workload (month-end) on the variables and their interrelationships. First, we investigated the effect of month-end on the core variables. The path analysis showed that, contrary to predictions, month-end had no direct links with emotional exhaustion and had only weak direct links with negative mood ($\beta = .09, p < .06$). However, as expected, month-end was significantly related to perceived control ($\beta = -.15, p < .05$) and to time pressure ($\beta = .11, p < .05$). The direction of results suggests that periods of high sustained workload (i.e.,

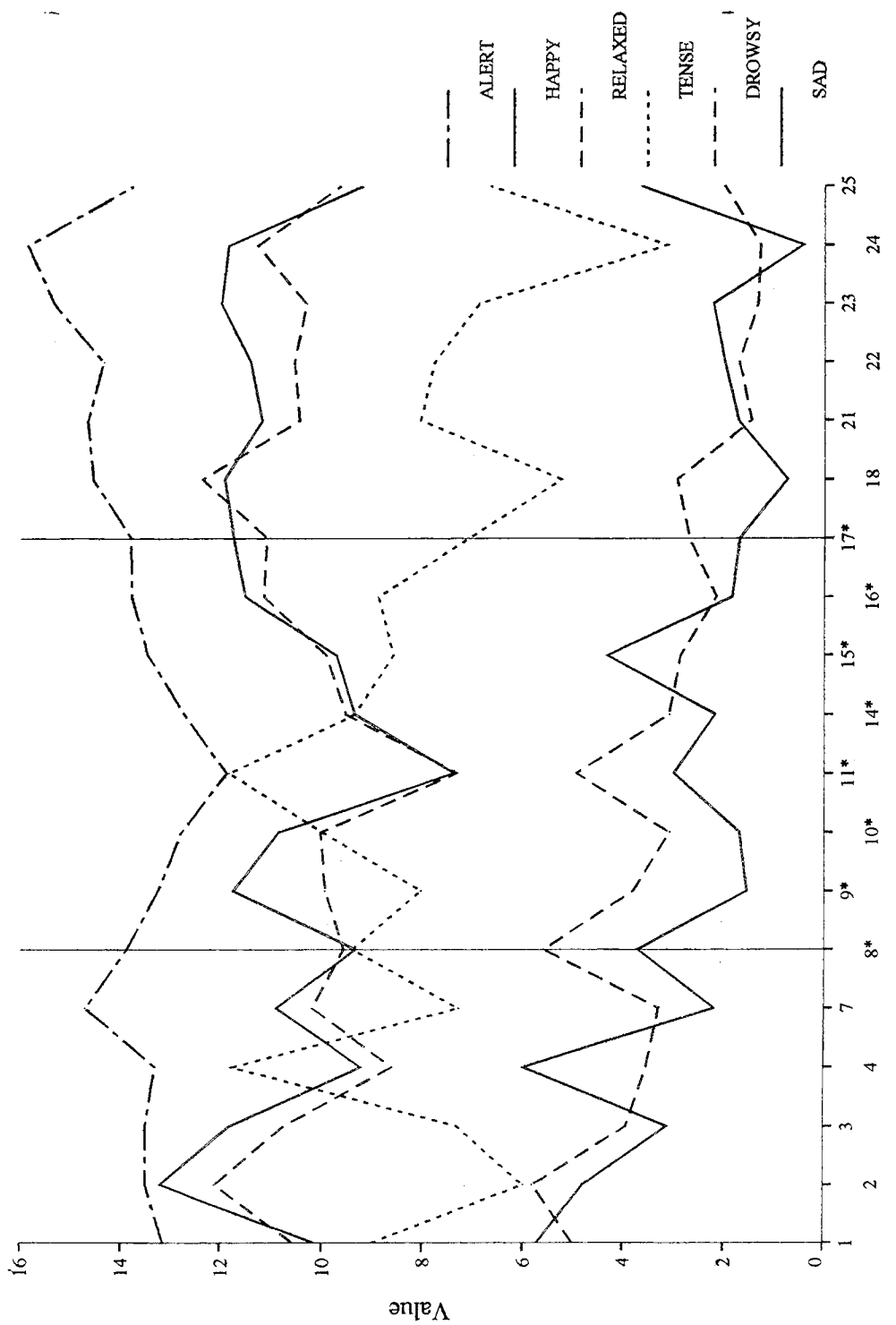

Figure 3. Daily aggregated data of the six mood item scales over the days of the study (excludes three weekends). An asterisk indicates month-end.

Table 2
Within-Participant Correlations Between Variables

Variable	Mean				Minimum				Maximum			
	1	2	3	4	1	2	3	4	1	2	3	4
1. Emotional exhaustion	—				—				—			
2. Negative mood	.54**	—			.22	—			.68	—		
3. Time pressure	.31**	.36**	—		.01	−.06	—		.52	.50	—	
4. Perceived lack of control	.38**	.46**	.26**	—	.06	.22	−.37	—	.74	.67	.59	—

Note. Mean refers to weighted average within-participant correlations (7 participants, $df = 193$), calculated using Fisher's r-to-z transformation. Minimum refers to minimum within-participant correlation. Maximum refers to maximum within-participant correlation.
** $p < .01$.

month-end) decreased perceptions of control and increased feelings of time pressure. Month-end thus had an indirect effect on well-being (mood and emotional exhaustion) through its effect on perceived control and time pressure.

The second question of interest concerned how the relationships between core variables changed at month-end. To investigate this, separate path analyses pertaining to the two workload conditions (month-end and normal) were calculated. For each submodel, a series of three hierarchical regression analyses were conducted with time pressure, mood, and emotional exhaustion as outcome variables. Figures 5 and 6 show the two submodels.

Figures 5 and 6 show that, in both models, time pressure was significantly related to an increase in negative mood and an increase in emotional exhaustion. Similarly, in both models, perceived control had only indirect links with emotional exhaustion through its strong relationship with mood.

However, the error terms for mood and emotional exhaustion indicate that the model was better explained during month-end than in the normal working periods. Only 27% of the variance in emotional exhaustion and 57% of the variance in mood remained unexplained in the model for month-end compared to 45% and 64% in the model for normal working. This suggests that during normal

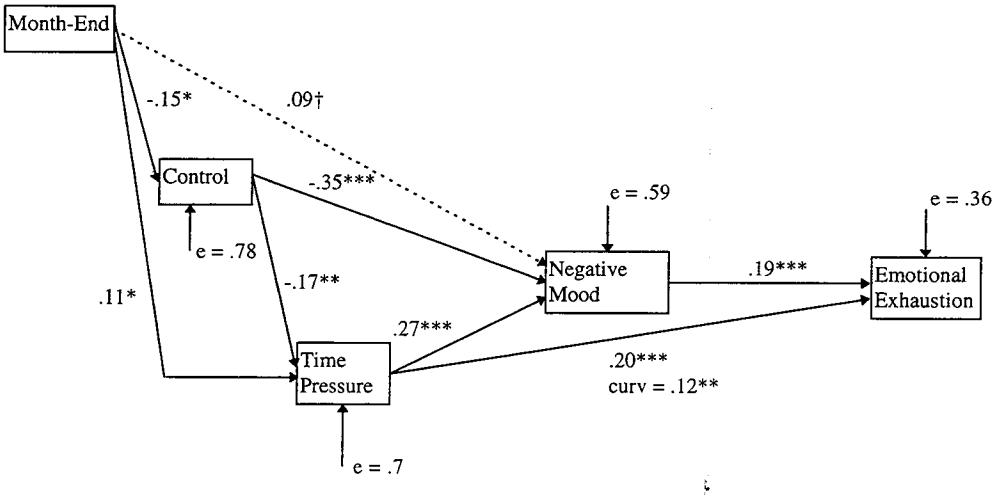

Figure 4. Path analysis of overall model showing the significant relations between month-end, perceived control, time pressure, negative mood, and emotional exhaustion. e = error term; curv = curvilinear relationship. *$p < .05$. **$p < .01$. ***$p < .001$. †$p < .06$. Broken line is nonsignificant.

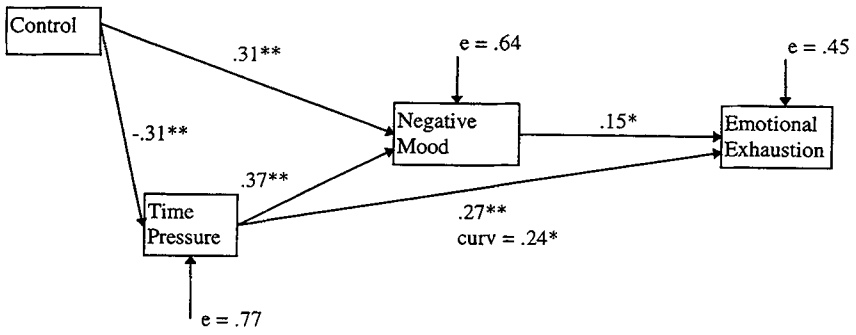

Figure 5. Path analysis of submodel showing the significant relations between perceived control, time pressure, negative mood, and emotional exhaustion during normal working periods (not month-end). e = error term; curv = curvilinear relationship. $*p < .05$. $**p < .01$.

working periods, when workload is not excessive, people's mood and emotional exhaustion will mainly be explained by variables over and above perceived control and time pressure.

In addition, and perhaps most significantly, perceived control was associated with reduced time pressure during normal working periods ($\beta = -.31$, $p < .01$), but there was no relationship between these variables during month-end. In other words, feelings of control and time pressure became disconnected during month-end. Table 1 shows that there was less variability in time pressure and perceived control during month-end, which may partly explain their lack of association during this period.

The nature of relationships between core variables. The final research question concerned the nature of the associations between the core variables in terms of the presence of both mediating and curvilinear relationships.

Figure 4 shows that, although time pressure had a direct (and curvilinear) relationship with emotional exhaustion, the strongest effect was mediated by mood. That is, time pressure was associated with negative mood, which was in turn associated with emotional exhaustion. This was also the case with perceived control, which had no direct association with emotional exhaustion but which was strongly associated with mood. Inspecting mediating relationships for the conditions of month-end versus normal working, it can be seen that this mediating relationship was stronger during month-end than during normal working periods. In other words, time pressure affected emotional exhaustion at month-end primarily via its effect on mood.

Finally, regression analyses showed that there was a significant curvilinear relationship between time pressure and emotional exhaustion ($\beta = .12, p < .01$). This was also true for both submodels (i.e.,

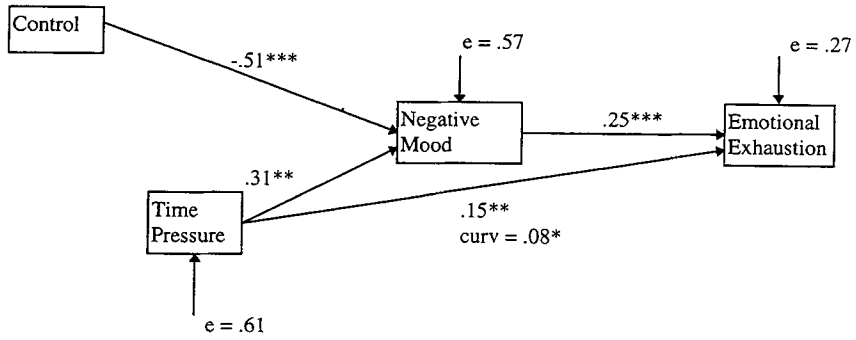

Figure 6. Path analysis of submodel showing the significant relations between perceived control, time pressure, negative mood, and emotional exhaustion during month-end (which is a period of high workload). e = error term; curv = curvilinear relationship. $*p < .05$. $**p < .01$. $***p < .001$.

month-end and normal working period). Figure 7 portrays the nature of the relationship. This suggests that a moderate level of time pressure produced the least emotional exhaustion. Very low and very high levels of time pressure were associated with higher levels of emotional exhaustion. The curvilinear associations between time pressure and negative mood, perceived control and negative mood, perceived control and emotional exhaustion were not significant.

Discussion

This study used an intensive measurement approach to examine the relationship between work demands and well-being. We investigated four core questions: whether time pressure fluctuates together with mood and emotional exhaustion over time, what the role of perceived control is as a potential point of intervention in the relationship between time pressure and these aspects of well-being, what the impact of high sustained workload (i.e., month-end versus normal working) is on levels of and interrelations between core variables, and what the nature is of the relationship between work demands and well-being.

The core research issue concerned the relationship between time pressure and affective outcomes, in the form of mood and emotional exhaustion, and results of this study provide support for the view that these variables are temporally associated. Aggregated analyses showed that time pressure fluctuates over time together with mood and emotional exhaustion, suggesting that these variables are temporally related. Consistent with this, disaggregated analyses showed that time pressure was directly linked with negative mood and that time pressure was directly linked (through a curvilinear association) and indirectly linked (through its effect on mood) to emotional exhaustion. These findings are consistent with other research that showed that mood fluctuates along with changes in subjective work experience (DeLongis, Folkman, & Lazarus, 1988; Repetti, 1993) and are consistent with the findings of Barling and MacIntyre (1993), who showed that work stressors are associated with both mood and emotional exhaustion. More specifically, results of this research are consistent with the view that mood can be described as a transmitter processing the effects of work stressors to emotional exhaustion through its implications for mood (Barling & MacIntyre, 1993).

At a broader level, this research shows the value of conceptualizing a chronic outcome such as emotional exhaustion as a dynamic process. The findings clearly demonstrate that emotional exhaustion varies within persons over time. This highlights the value of an intraperson approach that allows an examination of the dynamics of psychological processes. It also suggests that future research should examine emotional exhaustion processes in greater detail. For example, it raises the question of how acute variations in emotional exhaustion change before and after the onset of chronic emotional exhaustion. Similarly, it raises the question of whether emotional exhaustion mediates or moderates the relationship between work demands and mood, as well as being influenced by these variables.

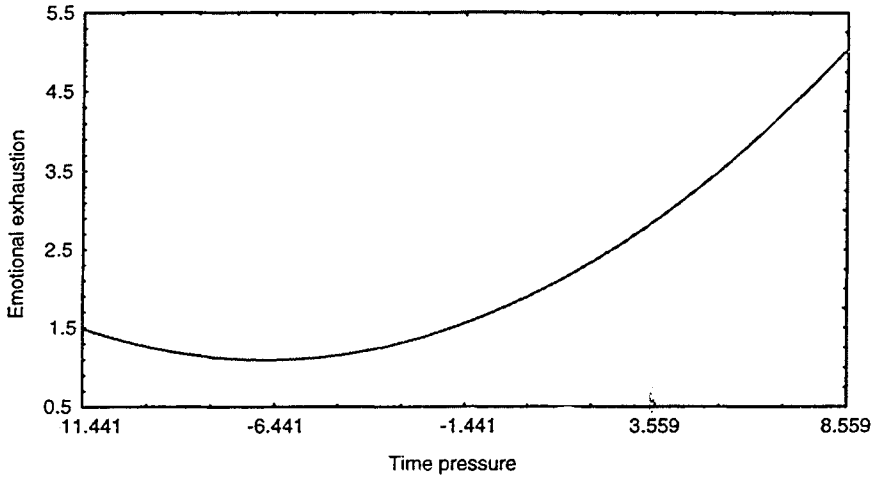

Figure 7. Graph of curvilinear relation between time pressure and emotional exhaustion.

Another natural step now is to investigate the other key dimensions of burnout (i.e., personal accomplishment and depersonalization) and their temporal interrelations with work features. For example, the fact that time pressure, but not perceived control, directly influenced emotional exhaustion may be consistent with the revised conservation of resources explanation of burnout (Lee & Ashforth, 1996; Leiter, 1993). This theory suggests that work demands are related to emotional exhaustion, whereas resources at work are more related to either personal accomplishment or depersonalization, processes that were not considered here.

The curvilinear relationship between time pressure and emotional exhaustion warrants some comment. This result is consistent with other studies of work characteristics (e.g., Champoux, 1980; Warr, 1990) and shows that both low and high levels of time pressure have a negative effect on emotional exhaustion. Generally, the possibility of curvilinear relationships is overlooked by researchers who focus only on linear effects.

Our results also highlight the importance of considering the effect of different periods of workload. A period of sustained workload, known as month-end, was identified as entailing reduced perceived control and greater time pressure and therefore more negative mood and greater emotional exhaustion. These negative effects of high workload are consistent with previous research (e.g., Bolger et al., 1989; Repetti, 1993; Stone, 1987). Interestingly, negative mood and emotional exhaustion appeared to decline toward the end of the high workload period. This could be due to the accountants anticipating the end of the high workload period. Previous research has shown that the anticipation of hassles (or lack of them) can affect current mood (Totterdell, Parkinson, Briner, & Reynolds, 1997).

Although time pressure had strong associations with outcomes (i.e., mood and emotional exhaustion) for both types of workload periods, there were some subtle differences. During month-end, the effect of time pressure on emotional exhaustion was largely determined by mood and less so by direct curvilinear or linear effects. The reverse was true during normal working periods. A possible practical implication of this finding is that efforts should be directed toward positively influencing mood so as to counteract negative effects of time pressure during periods of sustained workload. It is possible, for example, that social support could act as an important determinant of mood during periods of high workload.

Results of this study confirm the role of perceived control as a potential intervention point. Feelings of control were associated with reduced time pressure. This supports previous findings that control beliefs can lead to a decrease in experienced stress of threatening situations (Ganster & Fusilier, 1989). We also found direct and positive effects of control beliefs on mood, in the case of both normal and high levels of workload. This is again consistent with previous research. For example, control as an intervention strategy has been shown to reduce emotional stress (Jackson, 1983; Wall & Clegg, 1981) and to reduce anxiety and somatic complaints (Frese, 1987). The findings in the current study therefore support the notion that enhancing control beliefs through strategies such as participation in decision making (Jackson, 1983) or employee involvement in systems decision making (Frese, 1987) may help in the long run to reduce or even to prevent emotional exhaustion. However, our results also show that the way in which perceived control exerts its positive effect can vary between high workload periods and normal working periods. Perceived control did not have a significant effect on time pressure during month-end, which probably reflected the fact that workload was so high during this time that time pressure was simply beyond individual control. It should therefore be recognized that the ways in which individuals can improve their situation by enhancing their control beliefs are limited by the demands of the situation. In other words, the best and most obvious solution when high workload causes problems is simply to reduce workload rather than to attempt to change individuals' perceptions. However, control beliefs may have a more important role in intervention strategies, aimed at enhancing employees' well-being, when workload is low or moderate.

Limitations

One limitation of the study is that our conception of the direction of causal influence between variables may be wrong or only partially correct. For example, it is quite conceivable that time pressure and mood affect perceptions of control rather than (or as well as) the reverse. Likewise, it is conceivable that mood affects time pressure rather than (or as well as) the reverse. Subsequent studies could therefore profitably examine the issue of temporal precedence amongst variables. It is unclear, however, whether or not there would be a sufficient delay between a change in one variable and a change in another, for example, time pressure and mood, to make this viable from a measurement perspective.

It is also possible that the observed differences

between periods of higher and lower work demands were due to the influence of unmeasured third variables rather than to the influence of work demand. However, we think this unlikely given that any third variable would have to change twice in synchrony (or near synchrony) with the start and end of the month-end period to produce the observed effects.

The other potential limitations of this study relate to methodology. First, a critical issue that has to be considered in the use of ESM is intrusiveness. Participants are interrupted frequently and their attention is therefore diverted from their current activities. This may be especially important in studies that involve people working under high workload, such as the current study. However, results of the evaluation of the intrusiveness of the measures and the research instrument (pocket computer) showed that the method was not perceived as causing major interruptions. Nevertheless, this issue requires careful handling, part of which involves establishing a research alliance (Larson & Csikszentmihalyi, 1983) in which researchers and participants develop a mutual understanding of the study's objectives. In this study, the participants had some influence over the design and content of the study.

A second issue is that repeated measurement could cause changes in people's experiences. It might be the case that completing the measures for 4 weeks affects the phenomena being studied. For this reason, the normal working period was split into two periods, one before and one after month-end, so that comparisons between demand periods were not confounded with time into study. The analyses also controlled for linear trends in the data that might have arisen from repeated response to a measure.

Another issue that has to be considered is method variance. In ESM studies, self-report measures are usually used that reflect people's immediate response to situations. Basically, this approach eliminates or at least reduces the effects of recall and interpretation biases. However, the self-report nature of independent and dependent variables may inflate the observed correlations (Stone, Kessler, & Haythornthwaithe, 1991). In this study, month-end was the only variable that was assessed objectively as an independent measure (although note that time pressure was also considered as an explicit problem area, and this provided a validity check of the perceptual measure).

Even though we coached the participants in the meaning of the measures, our use of a single-item measure for perceived control might also have affected reliability. The use of a small set of measures was necessary because of the need to limit the time required to complete the measures. A possible solution to this common ESM problem would be to obtain additional independent assessments of the measures from co-raters. However, this method can be problematic when the measures are primarily subjective.

Summary and Final Comment

This study demonstrates that ESM is a valuable tool for studying fluctuations in relationships between characteristics of work and subjective experiences. Results show that associations between certain core work aspects and individual well-being reflect intraperson processes. The nature of these relationships sometimes contains nonlinear dynamics, and the relationships are affected by sustained periods of high workload. Our findings additionally suggest that a strategy to enhance feelings of control could function as an effective intervention, although the mechanism underlying the positive effects of perceived control differs during periods of normal work demands compared to periods of high sustained demand. Generally, the results of this study show the value of intensive measurement approaches, and we recommend their wider use in research on occupational health.

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