

From mental strain to burnout

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This study examines the relationships between burnout and short-term consequences of mental strain within and outside human services professions, at the same time contributing to the understanding of the development of burnout as a long-term effect of impairing work and job design. A total of 294 German employees working in human services ($N = 149$) and industrial production ($N = 145$) completed the Oldenburg Burnout Inventory (OLBI) and four scales measuring short-term consequences of mental strain. Results of factor analyses confirmed that the elements of the OLBI's two-factor structure—exhaustion and disengagement—are distinct from a range of impairing short-term consequences of mental strain. In addition, structural equation modelling showed that each burnout dimension is differentially related to specific short-term consequences of strain: Exhaustion is primarily related to mental fatigue, whereas disengagement is primarily related to satiation and the experience of monotony. The findings did not differ substantially for the two occupational groups. Burnout, as a long-term consequence of impairing mental strain, is distinct from and presumably temporally-causally related to specific impairing short-term consequences of mental strain, which, in turn, can be attributed to inadequate job design.

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Maslach and Jackson (1986) have defined burnout as a psychological syndrome that can occur among employees who do “people work” of some kind. According to these authors, burnout consists of feelings of emotional exhaustion (energy depletion or the draining of emotional resources), depersonalization (negative, cynical attitudes towards the recipients of one’s services or care), and reduced personal accomplishment (the tendency to evaluate one’s own work with recipients as insufficient). Karger (1981) criticized the burnout literature for “privatizing” the nature of the problem to the human services sector. He argues that the burnout components of exhaustion and depersonalization in particular have a high similarity with the well-known phenomenon of industrial alienation. In human services, employees objectify their relationship with clients, while in production they objectify their relationships with their inanimate object of production (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001).

Even though these objections were raised more than two decades ago, the relationship between burnout and immediate or temporary effects of work strain within the worker, such as mental fatigue, monotony, and satiation (which are relevant to alienation), is still unknown. The present study examines such relationships between so-called short-term consequences of strain on the one hand, and burnout on the other hand, using a “typical” burnout sample (social services) and a presumable non-burnout sample (production work). The analysis concerns a construct validation of burnout since we examine whether specific dimensions of the short-term consequences of strain are highly related to the burnout dimension with which they should theoretically correlate (a test of convergent validity), but also whether they do not correlate with the burnout dimension from which they should differ (a test of discriminant validity) (Anastasi, 1988; Campbell & Fiske, 1959).

The majority of the studies on burnout utilize the Maslach Burnout Inventory (MBI; Maslach & Jackson, 1981, 1986; Maslach, Jackson, & Leiter, 1996) for human service professions, or the Maslach Burnout Inventory—General Survey (MBI-GS; Schaufeli, Leiter, Maslach, & Jackson, 1996) for all other occupations. Due to substantive psychometric inadequacies of the MBI and MBI-GS, i.e., the one-directional formulation of the items in each subscale (see Demerouti, 1999), we used an instrument that overcomes this problem, the Oldenburg Burnout Inventory (OLBI), which measures feelings of *exhaustion* and *disengagement from work*, applicable to virtually any occupation, and includes both *negatively* and *positively* worded items for each dimension (Demerouti, 1999; Demerouti, Bakker, Vardakou, & Kantas, 2003).

POSSIBLE TEMPORAL CORRELATES OR ANTECEDENTS OF BURNOUT

Individuals’ immediate reactions (e.g., redefinition of the situation, strain, activation, and mental effort; Bartenwerfer, 1960) to stressors can result in positive (warming up, increased performance, learning), neutral, or negative

(over-, under-taxing) short-term, reversible consequences, depending on an individual's personal resources and his/her perception of the situation (cf. Lazarus & Launier, 1981; see also McGrath, 1976, who uses the term "stress" to describe this effect within the individual). Plath and Richter (1984) classify the impairing short-term consequences of strain into four categories (see ISO 10075, 1991, for definitions of these concepts—except for stress sensations, which is still missing—and whose terminology will be adhered to in this article for reasons of terminological precision).

- *Mental fatigue* refers to a temporary impairment of mental and physical functional efficiency, depending on the intensity, duration, and temporal pattern of the preceding mental strain. Recovery from mental fatigue is achieved by time-consuming recuperation (e.g., rest breaks) rather than changes in activity (ISO 10075). This reduced functional efficiency becomes apparent, at the beginning in feelings of tiredness, less favourable relationships between effort and performance, and later on in losses of concentration and exhaustion (Plath & Richter, 1984).
- *Monotony* is a state of reduced activation (within the individual), which may occur during repetitive task performance with a narrow field of attention under monotonous job conditions. This state is mainly associated with—negatively evaluated—drowsiness, tiredness, and reductions in adaptability and responsiveness. In contrast to fatigue, monotony immediately disappears with a change in work activities (see ISO 10075). Note that in the terminology of Plath and Richter (1984) as well as in ISO 10075, monotony is not a characteristic of the task, but rather a short-term strain reaction in individuals.
- *Satiation* is a state of nervously unsettled, strongly emotional rejection of a (structurally) repetitive task or situation in which the experience is of "marking time" or "not getting anywhere" (see ISO 10075). The individual executes the work task only with reluctance and has a strong feeling of aversion to work accompanied by physiological hyperactivation. Comparable to monotony, satiation disappears completely with a change in task activities. On the other hand, satiation may spill over outside the specific task (to structurally similar tasks) and may end up in an early "exhaustion of the occupational will" (Lewin, 1928; p. 186).
- *Stress sensations*¹ (which are not yet included in the definitions of ISO 10075) are complex psycho-physiological reactions to unacceptable, conflicting, or especially threatening demands that may result from a perceived over- or under-load (e.g., time pressure), causing frustration of personal goals and aversive consequences (Plath & Richter, 1984). They are characterized by uneasiness and tension, and by anxious assessments of the work situation. The

¹In contrast to the BMS manual, we will use the term "stress sensations" instead of "stress", as it concerns the subjective estimation of an individual. The term stress will be utilized to describe an independent variable produced by "stressors" (compare the stress-strain model in the ISO 10075).

prolonged experience of stress sensations may lead, among others, to chronic stress sensations, exhaustion, shifts of the aspiration level, and finally to health impairments.

The differentiation between short- and long-term effects of strain is well known in the literature (e.g., Payne, Jick, & Burke, 1982). Whereas short-term effects of strain develop as an immediate reaction to specific working conditions (e.g., during or at the end of a work shift; cf. Plath & Richter, 1984), burnout will develop only after repeated, prolonged, and unsuccessful confrontation with such conditions (e.g., after 2 years of working experience at a specific job according to Cherniss, 1980). Burnout represents a *chronic* ongoing reaction to one's work and a negative affective response to prolonged impairing strain (or stress, in the terminology of Shirom, 1989), which is not immediately reversible after changes in tasks or the working conditions, for example by having a break or a change in task activities. According to Shirom (1989, p. 33), the conceptualization of burnout (as a chronic, ongoing affective response) makes it distinct from a temporary state like fatigue, which is reversible by adequate recuperation, or monotony or satiation, which disappear with a change in task activities. Thus, burnout represents a chronic, long-term (mental) health impairment, characterized by the combination of an enduring physical, cognitive, and emotional deterioration of health, whereas the short-term effects of strain mainly have a temporary, reversible cognitive/affective (and with fatigue as well physical) constitution (Richter & Hacker, 1998).

Therefore, our *first hypothesis* is that burnout can be empirically (e.g., factorially) differentiated from the short-term effects of mental strain (so-called *discriminability*, according to Kerlinger & Lee, 2000). This would imply that, on the one hand, the burnout measure contains non-redundant information with respect to the negative, impairing short-term effects of mental strain and, on the other hand, these short-term effects of mental strain will be differentially related to the dimensions of burnout (cf. Kerlinger & Lee, 2000). Evidence for the former would be less than perfect or, in fact, rather low intercorrelations between these short-term effects of mental strain and distinguishable factors/components of burnout. Evidence for the latter would be that some of the short-term effects of mental strain will be differentially related (e.g., some relations greater than 0 with others near to 0) to specific burnout dimensions.

How should these differential relationships look like? It can be argued that, in theory, mental fatigue, monotony, satiation, and stress sensations are temporal *antecedent stages* of burnout, since these impairing short-term consequences of strain, especially if experienced repeatedly and/or over longer periods of time, may mediate the relationship between stress (or stressors) and long-term consequences of strain (Koslowsky, 1998). There is evidence showing that the

impairing short-term effects of strain are systematically related to long-term consequences of strain (cf. Caplan, Cobb, French, Van Harrison, & Pineau, 1982; Fletcher, 1991). According to Richter and Hacker (1998), when regeneration from short-term consequences of strain is not possible during or after a work shift, critical functional disturbances (e.g., coronary, digestive, and sleeping problems) can appear. This may be due to a temporal interdependence and a history of repetitive unsuccessful coping with these short-term effects, under persisting/unchanged working conditions. It can thus be hypothesized that long-term effects of repeated, intensive forms of these impairing short-term effects of mental strain can be changes in personality (e.g., engagement in passive and uncreative leisure-time activities after the long-term experience of monotony), ways of working, coping with work, health problems, and finally burnout (Richter & Hacker, 1998). More specifically, it can be argued that the experience of repeated, non-compensated, and intensive mental fatigue over longer periods of time may, in the long run, lead to feelings of exhaustion. Moreover, a habituation to conditions leading to monotony, in combination with the negative evaluation associated with monotony, and especially with satiation and stress sensations (and the working conditions leading to these states), should lead to a generalized negative evaluation of one's work and working conditions (e.g., dissatisfaction) and thus to disengagement or even alienation from work, particularly if there is no indication of a change. Therefore, our *second hypothesis* is that exhaustion is primarily developing from and thus related to, mental fatigue whereas disengagement is developing from and thus related to monotony and satiation. Stress sensations, on the other hand, should be related to both burnout dimensions (cf. Büssing & Perrar, 1992; Richter & Hacker, 1998) because of their common negative evaluation and (temporary to sustained) performance impairment.

Since the antecedent conditions of the impairing short-term effects of mental strain are well known (e.g., Richter & Hacker, 1998), and thus offering means to avoid these effects by appropriate work and job design, it would be interesting to see whether there is such a relationship between these short-term effects and burnout. If this is the case, design solutions intended to avoid the impairing short-term effects of mental strain should also be able to reduce or prevent burnout, with interventions preventing short-term fatigue also preventing exhaustion in the long run, and interventions preventing monotony and/or satiation preventing disengagement in the long run. Demonstrating such relationships should thus enable preventive strategies, which are oriented towards changing working conditions (as the primary source of the effects) instead of changing individuals. This would then allow a change in the perspective from a more clinical- to a more ergonomic-oriented approach. However, until now, it is still unknown whether and how these short-term effects of strain are related to burnout.

OCCUPATION-INDEPENDENT OPERATIONALIZATION AND MEASUREMENT OF BURNOUT

The most popular instrument that operationalizes the three components of burnout, the Maslach Burnout Inventory (MBI; Maslach & Jackson, 1981, 1986; Maslach et al., 1996) has intentionally been developed for exclusive use in the human services. Schaufeli and colleagues (1996) developed the MBI-GS, which includes three parallel burnout dimensions that were labelled exhaustion, cynicism, and reduced professional efficacy. However, the MBI-GS still suffers from one of the same methodological deficiencies as the original version of the MBI, namely that the items in each subscale are all phrased in the same direction. That is, all exhaustion and cynicism items are phrased negatively, whereas all professional efficacy items are phrased positively. From a psychometric point of view, such one-sided scales are inferior to scales that include both positively and negatively worded items (cf. Guilford, 1954). One-sided scales increase acquiescence tendencies and thus may lead to artificial factor solutions (Doty & Glick, 1998), in which positively and negatively worded items are likely to cluster in separate factors (Demerouti & Nachreiner, 1996; Lee & Ashforth, 1990).

In the present study, we applied an alternative measure of burnout that can be used among occupations within and outside human service professions with consistent central elements of the burnout construct. This instrument—called the Oldenburg Burnout Inventory (OLBI; Demerouti, 1999; Demerouti et al., 2003)—is primarily based on theoretical work of Cherniss (1980) and Hall (1976).² An important distinctive feature of the OLBI compared to the MBI-GS (and the original MBI) is that the OLBI includes both *negatively* and *positively* worded items, as requested by conventional psychometric standards in order to avoid artefacts due to acquiescence tendencies. The OLBI conceives burnout as a syndrome of work-related negative experiences, including *feelings of exhaustion* and *disengagement from work*. Exhaustion is defined as a consequence of prolonged and intense physical, affective and cognitive strain, as the result of prolonged exposure to specific working conditions (or stressors). This conceptualization corresponds to definitions of exhaustion as proposed by Aronson, Pines, and Kafry (1983), Lee and Ashforth (1993), and Shirom (1989). In contrast to exhaustion as operationalized in the MBI or the MBI-GS, the OLBI covers not only affective (e.g., emotionally drained), but also physical and cognitive aspects of exhaustion (e.g., need of long resting time). This makes it more applicable both to those workers who perform physical work and to those

²The OLBI is available in German and English from the first author on request. It is interesting to note that the OLBI has been developed at *exactly* the same time as the MBI-GS. Unfortunately, the authors of both scales were unaware of each other's work at that time.

whose job is mainly about processing information instead of dealing with people.

The OLBI's disengagement scale refers to emotions regarding the work task (e.g., uninteresting, no longer challenging, and "disgusting"), as well as to a devaluation and mechanical execution of one's work, while the MBI-GS's cynicism scale restricts itself to measuring mainly subjective job meaninglessness and the lack of interest employees have in their job. Disengagement represents an extensive and intensive reaction in terms of an emotional, cognitive, and behavioural rejection of the job and it delineates an occupational disillusionment (cf. Freudenberger, 1974).

The convergent validity of the OLBI and the MBI-GS was confirmed in a study among 232 Greek employees from different occupational groups including banking, insurance, and the chemical industry (Demerouti et al., 2003). Results of multitrait-multimethod analysis including both the OLBI and MBI-GS scales showed that both types of factors, namely the burnout components (traits) and the measurement instruments (methods), could explain the responses to the various items. In fact, the bivariate correlation between OLBI-exhaustion and MBI-GS-exhaustion was .60. Exactly the same correlation was found between OLBI-disengagement and MBI-GS-cynicism. In other words, the two core dimensions of the OLBI and the MBI-GS, although using slightly different conceptualizations, share a substantial amount of common variance. Besides assessing this common component, the differences in the conceptualizations in the MBI-GS and the OLBI are clearly represented in the data.

Before testing our hypotheses, we examined the equivalence of the factorial structure of burnout as measured by the OLBI within and outside human service professions by investigating whether the hypothesized two-factor structure of the OLBI, including the exhaustion and disengagement sub-scales, can be reproduced in a human service sample and an industrial production sample (a test of factorial validity).

METHOD

Sample and procedure

In total, 294 employees from 11 German organizations participated in the study by returning their questionnaire. Five of these organizations were involved in industrial production (food, automobiles, chemical industry, electrical engineering, and glass industry), and six organizations were from the human services sector (three hospitals, two homes for the elderly, and an orthopaedic clinic). The response rate for the production sample was 43% and for human services 42%. The production sample (total $N = 145$) included employees working directly on the production process (e.g., assembly line workers, control room operators), and the human service sample (total $N = 149$) included nurses and medical doctors. Fifty per cent of the participants were female; however, the

production sample included 76% males, whereas the human services sample included 77% females, as might be expected from the actual composition of the samples. The mean age was 36.4 years ($SD = 9$), with the human services employees being slightly younger (35.6 years) than the production employees (37 years). Mean job tenure was 10 years and 2 months ($SD = 8$ years), and mean organizational tenure was 7 years ($SD = 6.5$ years). Production employees worked in their present job on average for 9 years, while the nurses and doctors did so on average for 5.5 years. Most participants had a full-time job (88%), and 63% worked changing shifts.

Participants were recruited at their job sites, after management and the workers' council agreed that the study could be conducted in their organization. Participants were informed that the survey was about work-related stress and that a survey feedback poster would be made available to them. Confidentiality and anonymity of the data was emphasized. Participants were kindly requested to fill out the questionnaire during their break or during their working time—but only if this did not interfere with their task performance—and to drop it in a special box placed in their department. The former was a precondition posed by most organizations in order to participate in the study.

Measures

Burnout. This was measured with the OLBI, including 15 items operationalizing the dimensions of exhaustion and disengagement (Demerouti, 1999; Demerouti et al., 2003). The seven items of the *exhaustion* scale are generic, and refer to general feelings of emptiness, overtaxing from work overload, a strong need for rest, and a state of physical exhaustion. Example items are: “After my work, I regularly feel worn out and weary”, “During my work I very often feel emotionally drained”, and “After my work, I regularly feel totally fit for my leisure activities” (reversed). Three items are positively worded and four negatively. Participants could respond on a 4-point scale, ranging from 1 “totally disagree” to 4 “totally agree”. *Disengagement* refers to distancing oneself from the object and content of one's work and to negative, cynical attitudes and behaviours toward one's work in general. This scale comprises eight items, including: “I frequently talk about my work in a derogatory way”, “With the time, one loses the internal relationship with one's own work”, and “I get more and more engaged in my work” (reversed). Three items are positively worded and five negatively. The same response categories as for exhaustion were used. The correlation between the two burnout scales was .39 ($p < .001$).

Short-term effects of strain. These were assessed with short scales derived from the BMS inventory (original in German: *Ermüdung-Monotonie-Sättigung-Streß*; Plath & Richter, 1984). The BMS is a reliable and valid German questionnaire measuring the subjectively represented short-term, reversible

effects of task performance and job conditions, i.e., mental fatigue, monotony, satiation, and stress sensations. The BMS is available in two versions, i.e., BMS I for (dominantly manual) production work and BMS II for jobs including mental work, that measure the three common dimensions with comparable items, and BMS II measuring stress sensations with an additional, separate scale. Each version includes two parallel forms (A and B) for repeated measurements. In total, the BMS I includes 2×31 items, while the BMS II includes 2×40 items. The short scales used in the present study included those items that reflected the concepts most clearly (highest item total correlations) using positively and negatively worded items, and they were taken from both versions and forms. The reduction of the BMS scales was necessary in order to avoid a lengthy questionnaire. Example items are: "It is difficult for me at the moment to work concentrated" (mental fatigue, five items); "At the moment, I could almost doze off" (subjective monotony, four items); "At the moment I am fed up with this job" (satiation, four items), and "Even small disruptions make me nervous at the moment" (stress sensations, three items). Ten out of the sixteen items included in the short BMS sub-scales came from the BMS II and in particular from form A. For reasons of consistency with the OLBI items and to avoid any obvious discrimination by a different response format, but as a deviation from the original questionnaire, the answer format of all scales was identical to that of the burnout scales. The reliability coefficients and the descriptive statistics for these short BMS sub-scales as well as the OLBI-scales are displayed in Table 1.

Strategy of the analyses

Separate regression analyses of the background variables (gender, age, family status, education, job tenure, duration of working time, and shift work) on each BMS and burnout dimension showed that after controlling for the occupational group (which was included in the first step) only shift work was significantly related to both burnout dimensions and all dimensions of BMS, except for stress

TABLE 1
Means, standard deviations, and reliabilities (Cronbach's α) for all scales, as well as partial correlations (third order) between the OLBI and BMS scales ($N = 294$)

	<i>Items</i>	<i>M</i>	<i>SD</i>	α	$I (r_{1 \times 2})$	$2 (r_{2 \times 1})$
1. Exhaustion	7	2.46	0.68	.85		
2. Disengagement	8	2.14	0.64	.84		
3. Mental fatigue	5	2.02	0.66	.78	.52**	-.09
4. Monotony	4	1.98	0.59	.67	.01	.33**
5. Satiation	4	1.82	0.72	.87	.00	.53**
6. Stress sensations	3	1.76	0.56	.68	-.13*	-.01

* $p < .01$, ** $p < .001$.

sensations. Inspection of the mean scores indicates that employees who worked constant shifts other than day shifts ($N = 20$) had the highest scores on the burnout and BMS dimensions followed by those working in changing shifts ($N = 165$). The lowest scores were reported by those employees ($N = 75$) who worked in day shifts. The demographic and background variables were excluded from all subsequent analyses since they had no substantial impact and a consideration of the factor shift work would result in sub-groups with rather unbalanced number of cases.

The *factorial validity* of the OLBI was examined with multi-group confirmatory factor analyses (CFA) in which several plausible models were compared on the basis of the chi-square difference test. The *first hypothesis* concerning the non-redundancy between the OLBI and BMS dimensions was examined with partial correlations between the sub-scales and first-order factor analyses computed with the OLBI and BMS items. Partial correlations were preferred to bivariate correlations because they take into account the common (shared) variance between negatively evaluated psychological states (see also, Meier, 1984). Each burnout dimension was correlated with each BMS sub-scale by controlling for the effect of the other three BMS sub-scales. The *second hypothesis*, implying specific differential relationships between BMS and OLBI dimensions, was examined through structural equation modeling (SEM) for multiple groups with the BMS sub-scales as exogenous variables and both burnout sub-scales as endogenous variables. Different nested models were tested. CFA and SEM were executed with the AMOS computer program (Arbuckle, 1997), using the maximum likelihood method to examine the covariance matrix of the items. All competing models were the same for both groups (human services and industrial production), allowing the parameter estimations, however, to be different.

RESULTS

Factorial validity of the OLBI

Results of the multi-group CFA showed that the proposed two-factor model with two correlated factors (exhaustion and disengagement) and no cross-loadings fitted well to the data (see Table 2). The four fit indices have values $> .90$ and the RMR is $.05$. In addition, all items loaded significantly ($p < .05$) on the intended dimensions. The estimated correlations between the two factors for the human service and industry sub-samples were substantial, i.e., $.74$ and $.63$, respectively. As can be seen from the comparison between the proposed model and the orthogonal model (in which the burnout factors are uncorrelated), the improvement in fit provided by the addition of the correlation between the factors is significant, $\Delta\chi^2(2) = 112.34$, $p < .001$. In addition, the proposed two-factor model was compared with a “wording” model in which all positively phrased items of both burnout dimensions were specified to load on one factor and all

negatively phrased items on a second factor. This model tests the hypothesis that the factor structure is an artefact of the scale construction. Again, the proposed model fitted better to the data than the wording model: All fit indices of the proposed model have higher values and its χ^2 is 124.01 points lower with equal degrees of freedom. Finally, the one-factor model, collapsing exhaustion and disengagement into a single (burnout) factor, also provided a less satisfactory fit than the proposed model, $\Delta\chi^2(2) = 130.26, p < .001$. In conclusion, the results of a series of multi-group CFAs support the relevance of burnout in the human services and in the industrial production sample by showing that the OLBI has a very similar two-factor structure across occupational domains.

Discriminability between burnout and short-term consequences of strain

As can be seen from Table 1, the maximum shared-variance between the burnout dimensions and the short-term effects of strain is 28% ($r = .53; p < .001$), which is less than the common variance between both burnout dimensions. This is a first indication that the short- and the long-term consequences of strain cannot only theoretically, but also empirically, be differentiated. Moreover, both burnout dimensions show the strongest partial correlations with those short-term consequences of strain that are theoretically most closely related: Exhaustion is most strongly related to mental fatigue and somewhat less and unexpectedly in the opposite direction to stress sensations, whereas disengagement is most strongly related to satiation and subjective monotony.

The overlap between the OLBI and the BMS scales was further examined using exploratory factor analysis (principal axis factoring). Discriminability would be confirmed if the BMS items would load on different factor(s) than the OLBI items. The factor analysis of the joint OLBI and BMS items resulted in three orthogonal factors with eigenvalues > 1 that explained 54% of the total

TABLE 2
Indices of overall fit for alternative factor structures of the OLBI: Results of multi-group confirmatory factor analysis for two independent samples, $N = 294$

<i>Model</i>	χ^2	<i>p</i>	<i>df</i>	<i>GFI</i>	<i>RMR</i>	<i>NFI</i>	<i>CFI</i>	<i>IFI</i>
Proposed model								
(correlated factors)	166.87	.022	132	.93	.05	.91	.99	.98
Uncorrelated model	279.21	.001	134	.90	.16	.84	.91	.91
Wording model	290.91	.001	132	.87	.07	.84	.90	.90
One-factor model	297.13	.001	134	.87	.07	.83	.90	.90
Null-model	1785.06	—	210	.38	.28	—	—	—

χ^2 = chi square; *df* = degrees of freedom; *GFI* = goodness-of-fit index; *RMR* = root mean square residual; *NFI* = non-normed fit index; *CFI* = comparative fit index; *IFI* = incremental fit index.

variance. The eigenvalues for the first, second, and third factor were 11.61, 3.14, and 1.90, respectively. The first factor contains all exhaustion items and one item of the BMS mental fatigue dimension. The second factor consisted of all disengagement items, two of the monotony items, and four satiation items (see Table 3). However, almost all BMS-items with factor loadings on the first (exhaustion) and the second (disengagement) factor have double loadings on the third factor that only includes BMS items. Thus, the results of the exploratory factor analysis confirm the factor structure of the OLBI and support that burnout is not identical to the short-term effects of mental strain (Hypothesis 1). Although the structure of the BMS could not be reproduced factorially (which might be due to the small number of items per scale), nine of the sixteen BMS-items formed one factor that is distinct from the burnout dimensions. Satiation and monotony items loaded on the disengagement factor, which is in agreement with the high partial correlations between these constructs at the scale level (and the proposed relationships).

Hypothesis 2 (assuming differential relations between the BMS and the OLBI sub-scales) was tested with SEM for simultaneous groups (Jöreskog & Sörbom, 1993). In the proposed model, mental fatigue and stress sensations were related to exhaustion, whereas satiation, monotony, and stress sensations were related to disengagement. As can be seen in Table 4, this model fits very well to the data. Moreover, the results confirm (1) a positive relationship between mental fatigue and exhaustion, and (2) positive relationships between satiation/monotony and disengagement, and this is true for both sub-samples. However, stress sensations were significantly and *negatively* related to disengagement only for the production sub-sample.

The alternative hypothesis that all short-term consequences of strain influence both burnout dimensions in an undifferentiated way was tested in two separate models, as the inclusion of all paths in one model would result in zero degrees of freedom. In a second model, the exhaustion model, all BMS scales were related to exhaustion, and satiation, monotony and stress sensations to disengagement. In a third model, the disengagement model, all BMS scales were related to disengagement and only mental fatigue and stress sensations were related to exhaustion. None of the relationships between satiation/monotony and exhaustion, and between mental fatigue and disengagement, were significant in the second and third models. In addition, none of the competing, nested models is significantly better than the proposed model, $\Delta\chi^2(4) = 5.54$, n.s., for the exhaustion model; $\Delta\chi^2(2) = 3.31$, n.s., for the disengagement model. They all fit very well to the data and have fit indices close to one. In the revised model, only the significant paths were included: the path from mental fatigue to exhaustion, and the paths from satiation, monotony, and stress sensations to disengagement. This model is the most parsimonious, and gives the best description of the data. The beta-weights are displayed in Figure 1. Mental fatigue explains 46% and

TABLE 3
 Factor pattern of the OLBI and BMS items:
 Exhaustion, disengagement and BMS items

<i>Item</i>	<i>Exhaustion</i>	<i>Disengagement</i>	<i>BMS</i>
OLBI-Exhaustion_1	.64		
OLBI-Exhaustion_2	.73		
OLBI-Exhaustion_3	.67	.31	
OLBI-Exhaustion_4	.59	.32	.37
OLBI-Exhaustion_5	.74		
OLBI-Exhaustion_6	.67		
OLBI-Exhaustion_7	.65		.34
BMS-Fatigue_4	.62		.47
OLBI-Disengagement_1		.68	
OLBI-Disengagement_2		.59	
OLBI-Disengagement_3		.66	
OLBI-Disengagement_4		.75	
OLBI-Disengagement_5		.72	
OLBI-Disengagement_6		.59	.46
OLBI-Disengagement_7		.58	
OLBI-Disengagement_8		.57	
BMS-Monotony_2		.77	
BMS-Monotony_4		.51	.46
BMS-Satiation_1		.58	.55
BMS-Satiation_3		.65	.47
BMS-Satiation_4		.70	.41
BMS-Satiation_5		.68	.31
BMS-Fatigue_2			.61
BMS-Fatigue_3	.48		.50
BMS-Fatigue_4			.71
BMS-Monotony_1	.32		.55
BMS-Monotony_3			.47
BMS-Satiation_2			.71
BMS-Stress sensations_1			.74
BMS-Stress sensations_3			.73
BMS-Stress sensations_2			.56

52% of the variance in exhaustion for the human services and the production sample respectively. Satiation, monotony, and stress sensations explain 52% and 67% of the variance in disengagement for the two samples. In sum, these results largely support Hypothesis 2. Only the relationship between stress sensations and disengagement is contrary to expectations and somewhat inconsistent for the human services and the production sample, although in both samples its contribution is rather low.

TABLE 4
Indices of overall fit for alternative structural models: Results of multi-group analyses for two independent samples, $N = 294$

Model	χ^2	p	df	GFI	RMR	NFI	CFI	IFI
Proposed model	9.13	.166	6	0.99	0.01	0.99	1.00	1.00
Exhaustion model ¹	3.59	.167	2	1.00	0.00	1.00	1.00	1.00
Disengagement model ²	5.82	.213	4	0.99	0.01	1.00	1.00	1.00
Revised model	10.66	.221	8	0.99	0.01	0.99	1.00	1.00
Null-model	1132.85	—	30	0.36	0.20	—	—	—

¹In this model, all short-term consequences of strain are related to exhaustion.

²In this model, all short-term consequences of strain are related to disengagement.

χ^2 = chi-square; df = degrees of freedom; GFI = goodness-of-fit index; RMR = root mean square residual; NFI = non-normed fit index; CFI = comparative fit index; IFI = incremental fit index.

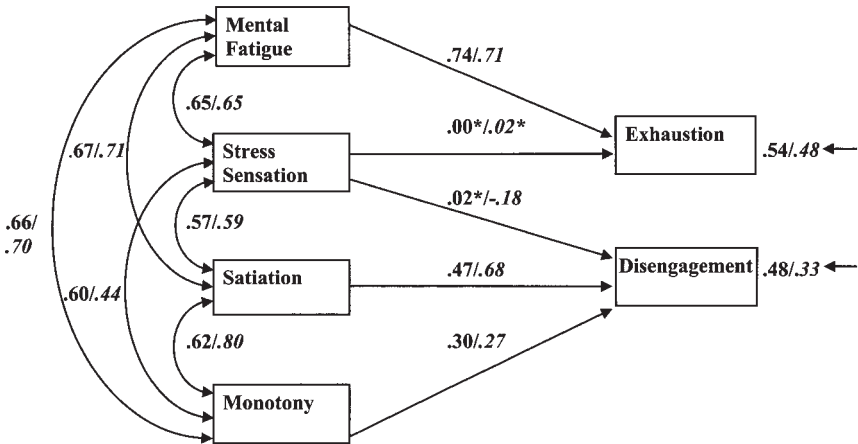


Figure 1. Standardized solution of the model of short-term effects of strain and burnout for human service professionals ($N = 149$) and production workers ($N = 145$; in italics). All parameters, except those marked with an asterisk (*), are significant at the $p < .05$ level.

DISCUSSION

The central aim of this study was to examine the relationships of burnout as measured by the OLBI (Demerouti, 1999; Demerouti et al., 2003) with well-documented short-term consequences of strain, namely mental fatigue, monotony, satiation, and stress sensations. Because burnout represents a long-term, habitual experience we predicted that it sufficiently differs from these mental strain measures (Hypothesis 1). However, we also predicted that each

burnout component would be systematically associated with specific types of short-term effects of mental strain (Hypothesis 2), since the latter—due to their nature as direct and momentary reactions to stressors—would act as intermediate outcomes or mediators (cf. Koslowsky, Kluger, & Reich, 1995). Specifically, we hypothesized that mental fatigue would be primarily related to exhaustion, whereas monotony and satiation would be primarily related to disengagement. Stress sensations were expected to correlate with both burnout dimensions.

Before these two hypotheses were tested, the factorial validity of burnout as measured by the OLBI was examined. Results confirmed that burnout has a two-factor structure, with exhaustion and disengagement as separate but correlated dimensions and this structure was also invariant across human service professions and industrial production work. This consistency of the factorial structure of the OLBI across different occupational groups confirms the generalizability of the burnout construct to other than people work, and suggests that human service burnout represents only one specific manifestation of burnout (Demerouti & Nachreiner, 1998). Burned-out human service professionals may feel exhausted by the emotionally demanding contacts with their patients or clients, and may feel to treat them in a depersonalized way. In manufacturing work, burnout includes the same basic elements, yet its manifestation differs—since there are no recipients of any services—and more generic symptoms occur (exhaustion and disengagement). Thus, the present study provides empirical support for the contention of several authors arguing that burnout may be found in any occupational context (e.g., Cordes & Dougherty, 1993; Golembiewski, Boudreau, Munzenrider, & Lou, 1996; Lee & Ashforth, 1996; Maslach & Leiter, 1997; Shirom, 1989) by including employees from occupational fields within and outside the human services and by measuring burnout independently of the occupational context.

The results presented here also support the notion that burnout, as conceptualized by the OLBI, can be discriminated from temporary and reversible consequences of mental strain. Burnout has common relations with the acute impairment of the physical and mental state; it is however a distinguishable phenomenon with different symptoms (but possibly common causes). Moreover, a series of SEM-analyses provided evidence for a differentiated and conceptually plausible pattern of relationships among short-term, reversible changes of performance (short-term consequences of strain) and stable and habitual changes in the long run (burnout). Specifically, the association between mental fatigue and exhaustion, as well as between satiation and monotony and disengagement, could be supported—*independently of the work sector*. Stress sensations were, however, irrelevant for exhaustion and for the production sub-sample negatively related to disengagement. The latter finding regarding the role of stress sensations contradicts the general assumption that short-term stress-reactions are antecedents of burnout (Schaufeli & Enzmann, 1998). One possible explanation for the negative relationship between stress sensations and disengagement is that

employees who distance themselves from their work may also disengage from stress-inducing work situations and in that way may report less experienced stress. Another possible explanation may be that stress sensations as measured by the BMS describe an affective negative state with high activation (anxious, nervous, uncertain, etc.). In contrast, exhaustion as measured by the OLBI may be associated with a state of decreased activation.³

The present findings provide insights regarding which immediate impairing reactions to task performance are related to each burnout component (as a long-term and long-lasting work-related stress reactions to impairing stress). Job tasks or working conditions that lead to (reversible) mental fatigue in employees will most probably cause exhaustion in the long run, whereas tasks and working conditions evoking satiation and/or monotony must be expected to lead to disengagement. There is sufficient evidence on the fundamental question regarding which tasks or working conditions are related to which short-term effects of strain. Answers, besides the guidelines included in ISO 10075-2 (1996), and that means an already consensually standardized set of rules, which represent the state of the art, can be found in the available research (see Richter & Hacker, 1998, for a review). The documented relationships between short-term effects of strain and burnout may be useful for an early evaluation of the burnout potential of a particular job—comparable to the assessment of the risk for fatigue, monotony, satiation, and sensations of stress (Richter & Hacker, 1998). This can facilitate the prevention of burnout by means of job (re)design approaches—instead of individual-oriented approaches, which blame the individual and her/his deficiencies for burnout instead of inappropriate, impairing working conditions, an approach implied when looking for individual differences in the causation of burnout.

Because of the cross-sectional design of the current study, the postulated relationships between short-term and long-term consequences of strain cannot be interpreted causally. Strictly speaking, the relationships found may be the result of cognitive consistency in the perceptions of the employees (Festinger, 1957) and common method variance due to negative connotations/evaluations (cf. Doty & Glick, 1998). Nevertheless, the results provide preliminary evidence that burnout can be predicted by short-term consequences of strain (which in turn are predictable by specific working conditions), since they do not contradict such an explanation and a reverse causal ordering would not make sense. Longitudinal studies and quasi-experimental research designs are thus urgently needed for a further validation of the hypothesized relationships, combined with an independent assessment of working conditions by independent observers in order to avoid correlations among subjective perceptions only. A second limitation of the study is the low response rate (less than 50%) that limits the generalizability

³We thank an anonymous reviewer for this explanation.

of the results only to those individuals that had time to voluntarily complete the questionnaires during their break or during their working time. However, these are criticisms that the present study shares with a lot of research on burnout. A final limitation concerns the fact that while the BMS should ideally be filled out at the end of the working shift, participants were instructed to fill out the questionnaire during their break or during their working time if this did not interfere with their task performance. This instruction was required by the management of most participating companies and increases the possibility that only employees with low job intensity filled out the questionnaire. Nevertheless, this bias does not seem to have violated our results, since the average scores on burnout in the present study were comparable to those of the study of Demerouti (1999).

Summing up the results, our study supports the construct validity of burnout as measured by the OLBI, an instrument that measures burnout independent of the occupational context, and which can thus be used in all types of jobs and organizations. A major advantage of this feature is that burnout levels can be compared across occupational areas, which may substantially increase our insight into the antecedents of burnout, without falling into the (theoretical and methodological) trap of circular reasoning. That is, if future studies show that the scores on the exhaustion and disengagement scales are relatively high in certain occupational contexts with specific constellations of working conditions, we may then have a key to the most distal and changeable predictors of burnout. Since our study supports the conception that mental fatigue is related to exhaustion, and satiation as well as monotony are related to disengagement, we may well be able to prevent burnout by (re)designing tasks and working conditions (cf. ISO 10075-2). In this way, the impairing short-term effects of strain can be avoided and—as a consequence—the risk of burnout (as a long-term consequence) can be substantially reduced in the long run.

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