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The loss spiral of work pressure, work–home interference and exhaustion: Reciprocal relations in a three-wave study

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Abstract

This study tested the 'loss spiral' hypothesis of work–home interference (WHI). Accordingly, work pressure was expected to lead to WHI and exhaustion, and, vice versa, exhaustion was expected to result in more WHI and work pressure over time. Results of SEM-analyses using three waves of data obtained from 335 employees of an employment agency offered strong support for this hypothesis. It was found that T1 work pressure and exhaustion were determinants of T2 and T3 WHI, whereas T1 WHI was a causal determinant of T2 and T3 exhaustion and work pressure. In addition, work pressure and exhaustion had causal and reversed causal relationships over time. These empirical findings suggest that common theoretical models postulating the causal chain of work pressure → WHI → exhaustion are inadequate. Rather, more elaborated models including *reciprocal* relationships between work characteristics, WHI and employee well-being seem more appropriate.

Keywords: Work pressure; Work–home interference; Exhaustion; Reciprocal effects; Longitudinal

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1. Introduction

Researchers have investigated the relations between work and family since the 1930s and 1940s (Barling, 1990). Although our understanding of the phenomenon has grown, there is still a gap in our in-depth knowledge about the processes through which interference between work and non-work arises and affects employees' well-being. More specifically, a fundamental limitation of the literature on work–home interference (WHI) is that it remains unclear where we should theoretically position WHI in the stressor–strain relation. WHI is often considered as a *stressor* that together with other stressors has adverse effects on health and well-being (e.g., Cohen, 1997; Grant-Vallone & Donaldson, 2001). In addition, several scholars view WHI as a *stress-reaction* (i.e., an indicator of *strain*), particularly caused by work-related stressors (e.g., Stoeva, Chiu, & Greenhaus, 2002; Wallace, 1997). Alternatively, researchers have used more elaborated models in which interference is considered a *mediator* in the stressor–strain relation, particularly between job stressors (e.g., work overload, time pressure) and indicators of impaired psychological health, including psychosomatic complaints, depressive symptoms, and occupational burnout (e.g., Frone, Yardley, & Markel, 1997b; Geurts, Rutte, & Peeters, 1999; Grandey & Cropanzano, 1999).

Partly responsible for this ambiguity in the work–family literature is the fact that most previous studies are cross-sectional. Such a research design makes it impossible to draw strong inferences about the causes and consequences of WHI. Suppose that we know from a cross-sectional study that work pressure, WHI, and exhaustion are strongly and positively correlated; we would not be able to know whether WHI should be seen as a stressor, a mediator, or a stress-reaction in the stress process. Although some well-formulated theories claim that work pressure is the cause, WHI the mediator, and exhaustion the outcome, there may be equally valuable theories asserting that feelings of fatigue are the starting-point leading to WHI. It is also conceivable that WHI is a *precursor* of work pressure, for instance when interference between work and family roles leads to an expansion and accumulation of job demands.

The aim of the present three-wave panel study is to increase our knowledge about the role of WHI in the stressor–strain relation. In particular, we examine the causal and reversed causal relations of WHI with work pressure and feelings of chronic fatigue (i.e., exhaustion). A secondary aim of our study is to examine the extent to which WHI remains stable or fluctuates over time.

1.1. Work–home interference

From the perspective of role stress theory (Kahn, Wolfe, Quinn, Snoek, & Rosenthal, 1964), Greenhaus and Beutell (1985) provided the most widely used definition of conflict or interference between work and family roles. Accordingly, work–family conflict is "a form of interrole conflict in which the role pressures from the work and family domains are mutually incompatible in some respect. That is, participation in the work (family) role is made more difficult by virtue of participation in the family (work) role'' (p. 77). Moreover, Greenhaus and Beutell suggested that the type of work–family conflict could be based on roles that affect time involvement, strain or behavior in one domain (e.g., work) that are incompatible with fulfilling roles in the other domain (e.g., family).

Take, for example, the employee who is confronted with a high workload, and with job insecurity as a consequence of a recent merger. Frequent or intense exposure to such stressors may result in strain and chronic stress that cannot easily be 'turned off' once she/he comes home. The consequence may be that the employee has sleepless nights and does not recover adequately at home from the demands faced during the workday; this may lead eventually to a state of breakdown or exhaustion. In the present study, we specifically focused on the negative impact of the work domain on the home domain (from now on referred to as work–home interference or WHI), when participation at home and recovery are inhibited by virtue of the experiences, behaviors and demands built up or faced at work (cf. Greenhaus & Beutell, 1985).

1.2. Classical view of the role of WHI

The idea that stressors cause WHI, and consequently strain, represents a classical hypothesis in the Occupational Health Psychology literature. This model can be explained with the Effort–Recovery (E–R) model (Meijman & Mulder, 1998). According to this model, the quantity and quality of *recovery* plays a crucial role in the stressor–strain process. When during a certain amount of time no or little appeal is made to the psychobiological systems that are used for task performance, these systems will stabilize and employees will recover from the load effects that have built up during task performance. Although daily work usually involves loads that are not necessarily harmful, they recur day-after-day and may consequently function as a permanent source of tension. If opportunities for recovery after being exposed to a high workload are *in*sufficient—which is the case when employees experience WHI—the psychobiological systems are activated again before they have had a chance to stabilize. The person, still in a sub-optimal state, will have to make additional (compensatory) effort (Hockey, 1993, 1997). This may result in an increased intensity of the load reactions, which, in turn, will make higher demands on the recovery process. Thus, an accumulative process may yield a draining of one's energy and a state of breakdown or exhaustion (e.g., Sluiter, 1999; Ursin, 1980).

Although several authors favor and traditionally investigate the sequence 'stressor → WHI → strain,' most of the supportive evidence for this model comes from *cross-sectional* studies. These studies have shown consistently that work overload is a robust predictor of WHI (see Geurts & Demerouti, 2003; Wallace, 1997). Other job characteristics related to WHI are the number and distribution of working hours (Geurts et al., 1999; Moen & Yu, 2000), impaired decision latitude (Grzywacz & Marks, 2000), and lack of social support from colleagues (Carlson & Perrewé, 1999). In a similar vein, cross-sectional studies form the basis for the contention that psychosomatic health complaints, depressive symptoms, and exhaustion are important consequences of WHI (Kinnunen & Mauno, 1998). Allen, Herst, Bruck, and

Sutton (2000) reported in their meta-analysis a weighted mean correlation of .29 between WHI and general psychological strain measures. Higher weighted mean correlations were found between WHI and *work-related* strain measures ($r_w = .41$).

We located three *longitudinal* studies that tested the causal relation between WHI and strain; unfortunately, only one of these studies investigated the relation between a stressor and WHI. Grant-Vallone and Donaldson (2001) used a six-month follow-up study to examine the relation between WHI and general well-being among a heterogeneous sample of employees. Their results showed that T1 WHI was a predictor of T2 general well-being, after controlling for social desirability. Leiter and Durup (1986) used a cross-lagged panel design with three months in-between the two waves, and found that WHI had a longitudinal influence on emotional exhaustion and marital satisfaction. Finally, Frone, Russell, and Cooper (1997a) used a four-year panel study to investigate the relation of WHI with health-related outcomes among a random community sample of employed parents. WHI was longitudinally related only to elevated levels of alcohol consumption, and not to elevated levels of depression, poor physical health, and the incidence of hypertension.[1]

Interestingly, the only longitudinal study on WHI (Leiter and Durup, 1986) that included a stressor (work overload), did *not* find empirical evidence for the presumed relation between work overload and WHI, and therefore the hypothesized full sequence stressor → WHI → strain awaits further empirical tests. On the basis of the E–R model (Meijman & Mulder, 1998) and the partial evidence from previous research, we formulated the following hypothesis:

Hypothesis 1: Work pressure has lagged, positive effects on WHI and exhaustion. Additionally, WHI has a lagged positive effect on exhaustion.

1.3. Opposite view on the role of WHI

Although many scholars seem to think in terms of the stressor → WHI → strain model, there are several reasons to expect that a model with opposite pathways may be valid as well. First, according to the '*drift*' *hypothesis* (Kohn & Schooler, 1983; Zapf, Dormann, & Frese, 1996), individuals with bad health drift to worse jobs, which also go along with higher job stressors. People with high exhaustion or with problems managing the work–home boundaries might be absent more often and therefore eventually get jobs with higher job demands and lower job resources. Second, those employees who experience exhaustion or WHI more likely will stay behind their workflow, creating consequently more job demands (including work pressure). Third, job stressors also may be affected by employees' perceptions of these stressors (Zapf et al., 1996). Just like the tendency of depressed people to assess their environment more negatively and thus contributing to a more negative climate (Beck, 1972), exhausted employees or employees with elevated levels of WHI may perceive a relatively high work pressure and complain more often about their workload creating a negative work climate.

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[1] Interestingly, *home–work* interference was related to each of these health outcomes.

In their review of longitudinal studies on organizational stress, Zapf et al. (1996) located six out of 16 studies that tested and provided evidence for reversed causation. These kinds of relationships have, for example, been found between social support and mental health (Schwarzer, Hahn, & Jerusalem, 1993), job characteristics (like job complexity, job pressure, and boundary spanning) and (dis)satisfaction (James & Tetrick, 1986), and, more recently, between job demands (a composite measure including time pressure, working hard, and job complexity) and emotional exhaustion (De Jonge et al., 2001). In addition, two longitudinal studies on WHI provide evidence for part of the reversed causation model. The first study is a six-month follow-up study by Kelloway, Gottlieb, and Barham (1999) among employees of a health care and a retail grocery organization. The results showed that WHI was an *outcome* of strain (they call this 'stress'; i.e., feelings of being overwhelmed by things and unable to cope, having troubles with concentrating). The second study is the cross-lagged panel study of Leiter and Durup (1986), which revealed that WHI had *reciprocal* longitudinal relations with emotional exhaustion and marital satisfaction. Moreover, among other findings, WHI predicted work overload over time. On the basis of the theoretical considerations regarding reversed causation and the partial evidence from previous research, we formulated the second hypothesis:

Hypothesis 2: Exhaustion has a lagged positive effect on WHI. Additionally, exhaustion and WHI have lagged, positive effects on work pressure.

1.4. The loss spiral of work pressure, work–home interference, and exhaustion

The two hypotheses tested in this study come close to what Hobfoll (1989, 2001) calls 'loss spirals.' According to his conservation of resources theory, individuals strive to obtain things they value. These are called 'resources' and include objects, conditions, personal characteristics and energies. People strive to protect themselves from resource loss, which makes loss more salient than gain. However, resources are related to each other in a 'web like' nature, which further suggests that resource loss and gain will occur in spirals. Loss spirals will follow initial losses, with each loss resulting in depletion of resources for confronting the next threat or loss (Hobfoll, 2001). Besides, resource loss also prevents the switching of the situation into gain cycles. Applied to our study, this loss spiral looks as follows: work pressure will evoke WHI and consequently feelings of exhaustion. These feelings of chronic fatigue will, consequently, give rise to more work pressure and WHI.

1.5. The present study

The participants in our study are Dutch employees working in different districts of an employment agency. Even though employment agencies are known to be confronted with considerable job stress and to have high rates of absenteeism and personnel turnover, we could not locate any study that has investigated this occupational group before in a systematic way. Since burnout, and particularly its core dimension 'exhaustion,' is one of the most frequently studied work-related outcomes of WHI (e.g., Burke, 1988; Kinnunen & Mauno, 1998; Netemeyer, Boles, & McMurrian, 1996), we included exhaustion as the focal strain variable. Allen et al. (2000) report a weighted mean correlation of .42 between WHI and burnout.

We employed a longitudinal design in which all variables were measured three times with six weeks in-between the waves. A first, major advantage of this design is that it enables an investigation of causality in an applied setting, where it is not possible to manipulate parameters of the environment (as in experimental studies). A second advantage of this design is that it allows an investigation of the stability of WHI. We could locate only two longitudinal studies that reported autocorrelations of measures of WHI. In Leiter and Durup's (1986) study this autocorrelation was .46, whereas Kelloway et al. (1999) found an autocorrelation of .62 for strain-based WHI and .65 for time-based WHI. Thus, the experience of WHI seems to be quite stable (at least for a time lag of three to six months). Geurts and Demerouti (2003) assumed that WHI is affected not only by stable (work and home) characteristics but probably also by 'critical incidents' that do not occur every day but have a more sudden and unexpected character. The longest time interval in our study is three months; this has the advantage that the occurrence of radical changes in the work (e.g., a reorganization) or the private situation (e.g., change in the family constitution) is relatively unlikely. This enables the evaluation of the effects of more structural and changeable characteristics of work, like the amount of work pressure, which, of course, can also fluctuate over time (providing sufficient variance). We could not locate, however, any study that examined time as a theoretical variable for the investigated constructs. We simply do not know how long it takes until exhaustion or WHI can arise. As Frese and Zapf (1988) noted, time factors have been researched explicitly only in unemployment and learned helplessness research. Accordingly, the former leads to psychological dysfunctioning within three months and one year and the latter within 24 h, both surprisingly short time lags. Therefore, common practice in longitudinal research is to choose the particular time lag on the basis of organizational reasons rather than theoretical considerations (Zapf et al., 1996).

2. Method

2.1. Procedure and participants

The study was part of a larger research project on employee well-being executed among all 831 employees of an employment agency in The Netherlands. The management of this company had been confronted with high absenteeism and personnel turnover, and wished to examine how workload could be better distributed among the employees. Participants were approached three times, six weeks apart. We assumed this time interval would be long enough to expect variance in the model variables, given the fact that rapid changes took place in the organization (e.g., fluctuating work pressure due to absent employees or due to job vacancies).

Before the employees received the first questionnaire, they received an informative letter in which the purpose of the study was explained, and anonymity and confidentiality were assured. One week later, the first questionnaire was sent. Employees could fill it out during their work and return it to the university with a stamped and addressed envelope. The office managers of all employment agencies reminded the employees about the purpose and the importance of the study one week after they had received the first questionnaire. In total, 576 employees (69.3%) returned the first questionnaire. Six weeks after the first measurement, 733 employees received the second questionnaire. Company records showed that almost 100 employees (98 of the original 831) had undergone job change, promotion, or job transfer. At time 2, managers were again asked to remind their employees to fill out the questionnaires. This time, 425 (58%) questionnaires were returned. The third questionnaire was filled out and returned by 357 employees (49% of the original sample). Some questionnaires had missing values, leaving 335 usable questionnaires that had been filled out during all three times of measurement.

In order to rule out selection problems due to panel loss (i.e., *attrition*) we first examined whether there were differences between employees in the panel group and the dropouts with regard to demographic characteristics as well as the mean scores on the study variables. *T* tests indicated that the panel group had comparable age and organizational tenure with the dropouts, but the panel group included slightly more male employees than did the dropouts, χ^2 $(1) = 8.38$, $p < .01$. There were no significant differences between the panel group and the dropouts with regard to the mean values of work pressure, WHI and exhaustion, with one exception: the dropouts (at Time 3) scored higher on Time 2 exhaustion than did the panel group, t $(403) = -3.23$, $p < .01$. The mean difference, however, was rather small, namely one third of the standard deviation. Therefore, we concluded that the dropouts were comparable to the panel group and that no serious selection problems due to panel loss had occurred.

The sample included 235 women (70%) and 100 men (30%). Their mean age was 30 years ($SD = 6.0$) and mean organizational tenure was four years ($SD = 3.8$). The majority of the sample had a steady contract (81%). Most employees worked full-time (83%), and 27% of the participants had a supervisory position. The main activities of the employees in this organization were to offer staffing resources, quality assessment, testing and training for different types of jobs, on-site management of the contingent workforce, flexible staffing, employee training, outplacement, and reintegration programs.

2.2. Measures

Work pressure was based on a short Dutch version (Furda, 1995; see also De Jonge J, Dollard, Dormann, Le Blanc, & Houtman, 2000) of Karasek's (1985) job content scale. This questionnaire has been validated in several Dutch samples of social services employees (Bakker, Demerouti, Taris, Schaufeli, & Schreurs, in press; De Jonge, Janssen, & Van Breukelen, 1996). The scale includes three items that refer to quantitative, demanding aspects of the job (e.g., time pressure, working hard).

A sample item is: "My work requires working very hard." Items are scored on a five-point Likert scale, ranging from (1) "never" to (5) "always".

Exhaustion was measured with a subscale of the Dutch version (Schaufeli & Van Dierendonck, 2000) of the MBI-General Survey (Schaufeli, Leiter, Maslach, & Jackson, 1996). This instrument has been validated in several studies (e.g., Bakker, Demerouti, & Schaufeli, 2002; Leiter & Schaufeli, 1996) and the Dutch norm scores can be found in Schaufeli and Van Dierendonck (2000). The exhaustion scale includes five items that refer to severe fatigue. Exemplary items are: "I feel used up at the end of the workday" and "I feel burned out from work". The items were scored on a 7-point rating scale (0 = never, 6 = always).

Work–home interference. The extent to which work is negatively influencing the home situation is central in the scale measuring work–home interference. This scale consists of three items that are a selection of the Dutch questionnaire 'Survey Work–home Interference NijmeGen' (SWING; Wagena & Geurts, 2000). The authors of the scale generated an item-pool derived from 21 published scales (e.g., Kopelman, Greenhaus, & Connolly, 1983; Netemeyer et al., 1996), and consequently, using multiple raters, they selected the nine items best fitting to the working definition of WHI (together with other criteria of minimal confounding with health outcomes, or work and home characteristics, as well as meaningful content in the Dutch language). An example item is 'How often does it happen that your work schedule makes it difficult for you to fulfil your domestic obligations?' Responses could be made on a five-point scale (1 = never, 5 = always). We could use the data of a previous Dutch study among 751 postal employees (Wagena & Geurts, 2000) to examine the relationship between the three-item index utilized in the present study and the original nine-item scale. The correlation was high, $r = .90$, $p < .01$.

2.3. Data analysis

Our panel data were analyzed with covariance structure modeling (Jöreskog & Sörbom, 1993) using the AMOS computer program (Arbuckle, 1997). Each of the model components was included as a latent factor that was operationalized by the items as observed, indicator variables. Specifically, exhaustion was indicated by five items, whereas WHI and work pressure were each indicated by three items.

By means of a cross-lagged structural equation model, a number of competing models were fitted to the data in several steps. First of all, a model without cross-lagged structural paths but with temporal stabilities and synchronous correlations (Model 1) was specified. The temporal stabilities were specified as correlations between the constructs for each possible pair of measurement waves. This model estimates therefore the total stability coefficient between measurement waves 1 and 2, waves 2 and 3, and between waves 1 and 3, without decomposing the variance into constituent paths (direct and indirect effects) (see Pitts, West, & Tein, 1996). Second, this stability model was compared with three more complex models that were nearest in likelihood to the hypothesized structural model:

Model 2: a model that is identical to Model 1 but also includes cross-lagged structural paths from Time 1 (T1) work pressure to T2 and T3 WHI and exhaustion, as well as from T2 work pressure to T3 WHI and exhaustion. Additionally, this model included cross-lagged structural paths from T1 WHI to T2 and T3 exhaustion and from T2 WHI to T3 exhaustion. This represents the *causality model*.

Model 3: a model that is identical to Model 1 but also includes cross-lagged structural paths from T1 exhaustion to T2 and T3 WHI and from T2 exhaustion to T3 WHI. Additionally, this model included cross-lagged structural paths from T1 exhaustion and WHI to T2 and T3 work pressure, as well as from T2 exhaustion and WHI to T3 work pressure. This is the *reversed causation model*.

Model 4: a model that includes reciprocal relationships between work pressure, WHI, and exhaustion (including all paths of Models 2 and 3). This is the *reciprocal model*.

All models had the restriction that the disturbances of each construct were equal across the three measurement waves. This was done because the reliabilities of the constructs did not change substantially over time. Moreover, the measurement errors of the same indicators (i.e., items) collected at different time points were allowed to covary over time (e.g., a covariance is specified between the measurement error of exhaustion item 1 as measured at T1 and the measurement error of this item as measured at T2 and T3). While in cross-sectional data measurement errors should generally not covary, in longitudinal measurement models the errors of measurement corresponding to the same indicator *should* covary over time. According to Pitts et al. (1996), this specification of covariance between errors of measurement accounts for the systematic (method) variance associated with each specific indicator. Failing to specify the covariances between the measurement errors leads to high stability coefficients and a poor fit of the model.

The various nested models were compared by means of the χ^2 difference test (Jöreskog & Sörbom, 1993). Besides the χ^2 statistic, the analysis assessed the goodness-of-fit index (GFI) and the root mean square error of approximation (RMSEA). Furthermore, AMOS provides several fit indices that reflect the discrepancy between the hypothesized model and the baseline, Null model. In the present analyses, the comparative fit index (CFI) and the Tucker–Lewis index (TLI) are utilized. Marsh, Balla, and Hau (1996) recommended the latter two indices, because they are less dependent on sample-size than the χ^2 statistic and the GFI. In general, models with fit indices $> .90$ and RMSEA $< .08$ indicate a good fit (Hoyle, 1995).

Finally, preliminary analyses showed that sociodemographics (included as covariates) were not systematically related to the model variables, and did not modify the results of the model testing. Therefore, to facilitate model estimation, the demographics were excluded from all further analyses. Although gender did not act as a confounding variable, it may still moderate the examined relationships. To test whether the results based on the full sample were invariant across genders, we conducted multi-group analyses.

3. Results

Prior to the model testing, the means, standard deviations, Cronbach's α coefficients and bi-variate correlations (including test–retest correlations) were computed (see Table 1). As can be seen from the table, all variables had test–retest reliabilities of at least .54. The highest test–retest reliabilities resulted for exhaustion followed by work pressure and WHI. This means that WHI and its concomitants are relatively stable experiences. The internal consistencies for all constructs per measurement wave were satisfactory ($\alpha \geqslant .79$).

Table 2 displays the overall fit indices of the competing models. In general, all models indicate a good fit since all fit indices are equal to or higher than .90 (save one exception), and the ratio between the χ^2 statistic and the number of degrees of freedom is relatively low. We will first concentrate on the model comparisons.

The causality model (M2) proved to be superior to the stability model (M1), Delta χ^2 (9) = 87.84, $p < .001$. This suggests that the inclusion of cross-lagged paths from

Table 1
Means, standard deviations (*SD*), Cronbach's α (on the diagonal), and correlations for the study variables, $N = 335$

	Mean	SD	1	2	3	4	5	6	7	8	9
1. Work pressure 1	3.58	.79	.85								
2. Work pressure 2	3.55	.67	.54	.83							
3. Work pressure 3	3.49	.75	.60	.66	.84						
4. WHI 1	1.85	.66	.41	.29	.27	.79					
5. WHI 2	1.90	.57	.29	.43	.29	.57	.81				
6. WHI 3	1.89	.72	.27	.28	.29	.56	.58	.83			
7. Exhaustion 1	1.88	1.01	.38	.34	.28	.53	.41	.40	.85		
8. Exhaustion 2	1.85	.98	.34	.47	.38	.41	.54	.42	.68	.89	
9. Exhaustion 3	1.90	1.12	.28	.39	.38	.39	.41	.56	.68	.72	.89

Note. WHI, work–home interference. All correlations are significant at the $p < .01$ level.

Table 2
Goodness-of-fit indices for the alternative work–home interference models, $N = 335$

Model	χ^2	*df*	*p*	GFI	RMSEA	TLI	CFI
M1, Stability model	773.28	447	.001	.89	.05	.95	.95
M2, Causality model (WP → WHI/EX, WHI → EX)	685.44	438	.001	.90	.04	.96	.97
M3, Reversed causality model (EX → WHI/WP,WHI → WP)	653.62	438	.001	.90	.04	.96	.97
M4, Reciprocal model	558.82	429	.001	.91	.03	.98	.98
Null model	7599.31	528	—	.19	.20	—	—

Note. χ^2, chi square; *df*, degrees of freedom; GFI, goodness-of-fit index; RMSEA, root mean square error of approximation; TLI, Tucker–Lewis index; CFI, comparative fit index; WP, work pressure; WHI, work–home interference; and EX, Exhaustion.

work pressure to WHI and exhaustion, as well as from WHI to exhaustion is substantial. Additionally, the reversed causality model (M3) fitted significantly better to the data than the stability model, Delta χ^2 (9) = 119.66, $p < .001$. This indicates that the model with the cross-lagged paths from exhaustion to WHI and work pressure, as well as from WHI to work pressure also showed a better fit to the data than the model including only temporal stabilities and synchronous correlations (M1).

The χ^2 difference test regarding the stability model vis-à-vis the *reciprocal* model revealed that the addition of reciprocal effects significantly improved the stability model, Delta χ^2 (18) = 214.46, $p < .001$. Moreover, the model with the cross-lagged reciprocal relationships among the variables resulted in a significantly better fit to the data than the causality model (M2, including only cross-lagged paths from work pressure to WHI and exhaustion as well as from WHI to exhaustion) or the reversed causality model (M3, with only cross-lagged paths from exhaustion to WHI and work pressure as well as from WHI to work pressure). The results of the χ^2 difference tests for both comparisons (M2 vs. M4 and M3 vs. M4) are Delta χ^2 (9) = 126.62, $p < .001$, and Delta χ^2 (9) = 94.80, $p < .001$, respectively. This means that the theoretical model including cross-lagged *reciprocal* relationships between work pressure, WHI and exhaustion fits best to the empirical data.

In examining the specific structural relationships that resulted from these models, it is important to note that all manifest variables loaded significantly on the intended latent factors. Inspection of the output revealed that all items of work pressure had loadings on the intended latent factor higher than .66. Furthermore, the loadings of the WHI-items on the WHI-factor were higher than .53, whereas the loadings of the exhaustion-items on the exhaustion-factor were higher than .62. Additionally, the autocorrelations between the three measurements of work pressure ranged from .50 to .67; the range was .51 to .54 for WHI, and .66 to .70 for exhaustion.

Hypothesis 1 asserted that work pressure has lagged positive effects on WHI and exhaustion, and that WHI has a lagged positive effect on exhaustion. The model that includes these causal relations, the causality model (M2), resulted in significant lagged, and positive effects of T1 work pressure on T2 and T3 WHI, as well as on T2 exhaustion. Additionally, T2 work pressure has a positive impact on T3 exhaustion, and T1 WHI influences T2 and T3 exhaustion. These findings clearly support our first hypothesis since we found significant lagged effects of work pressure on WHI and exhaustion and of WHI on exhaustion.

Hypothesis 2 stated that exhaustion has lagged effects on WHI, and that exhaustion and WHI have lagged effects on work pressure. The model including these reversed causal paths (M3), also resulted in several significant cross-lagged structural relations. Specifically, T1 exhaustion had a positive impact on T2 and T3 WHI, as well as on T2 work pressure. Moreover, both T1 WHI and T2 exhaustion influenced T3 work pressure. Finally, the results from Model 4 (including the reciprocal relationships) showed one additional cross-lagged effect from T1 WHI to T2 work pressure. The significant paths of the reciprocal model, which overlap with the significant paths of the causality and reversed causality models, are displayed in Table 3 (see also Fig. 1 for a graphical display). These findings mean that our second hypothesis was substantiated since we found that employees with higher

Table 3
Maximum likelihood estimates of stability coefficients between the study variables (in italics) and significant lagged effects ($p < .05$), $N = 335$

Predictor variables: T1 and T2 variables	Criterion variables: T2 and T3 variables					
	WP 2	WP 3	WHI 2	WHI 3	EX 2	EX 3
Work pressure 1	*.50*	*.61*	.17	.21	.19	
Work pressure 2		*.67*				.19
Work–home interference 1	.16	.23	*.54*	*.53*	.34	.41
Work–home interference 2				*.51*		
Exhaustion 1	.28		.39	.40	*.66*	*.68*
Exhaustion 2		.28				*.70*

Note. WP, work pressure; WHI, work–home interference; and EX, exhaustion. All coefficients referring to lagged effects are based on the Reciprocal Model (Model 4). The stability coefficients are based on the Stability Model (Model 1).

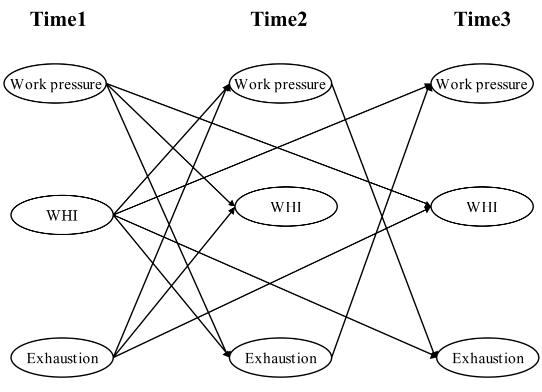

Fig. 1. Significant lagged paths ($p < .05$) in the Reciprocal Model, showing the loss spiral of work pressure, work–home interference (WHI), and exhaustion.

feelings of exhaustion experienced more WHI and work pressure over time, and those with more interference between the work and home domain reported also more pressure at work.

Several other paths did not reach significance. For instance, T1 work pressure (exhaustion) was not related to T3 exhaustion (work pressure), and T2 WHI was not related to T3 work pressure and exhaustion. The latter finding implies that WHI was not a *mediator* of the relation between work pressure and exhaustion. On the contrary, work pressure partially mediated the relation between WHI and exhaustion, whereas exhaustion partially mediated the WHI–work pressure relation.

Finally, the best fitting model (reciprocal model) was tested separately for men and women by means of a multi-group analysis. This model resulted in a satisfactory fit to the data, χ^2 (861) = 1063.56, GFI = .86, RMSEA = .03, TLI = .96, CFI = .97. Moreover, this unconstrained model was not significantly better than the model in which the cross-lagged paths were constrained to be equal for both genders, Delta

χ^2 (18) = 16.88, *n.s.* Thus, the reciprocal model fitted best our empirical data, irrespective of the gender of the participants.

4. Discussion

This longitudinal study was designed to examine the role of work–home interference (WHI) in the stressor–strain relation. Work pressure, WHI and feelings of exhaustion were assessed in three different waves with a six-week time lag between each measurement point. This research design allowed us to investigate not only the short-term fluctuations of the investigated constructs but also the way they relate to each other over time, thus addressing an important limitation of the work–home interference literature.

Several interesting findings emerged from our study. Most important is perhaps the finding that work pressure, WHI and exhaustion predict each other over time so that none of these constructs can be considered as *only* a cause or *only* a consequence. According to the results of the cross-lagged SEM-analysis, work pressure had a short- (6 weeks) and long-term (3 months) lagged effect on WHI, but the reversed pattern was true as well: WHI had a short- and long-term lagged effect on work pressure. Moreover, the same type of reciprocal relation was found between WHI and exhaustion. WHI had lagged, short- and long-term effects on exhaustion, and exhaustion had short- and long-term effects on WHI. No evidence was found for a pure mediational role of WHI. For work pressure and exhaustion we only found short-term reciprocal effects (over a six-week time interval). Accordingly, work pressure predicted later exhaustion and exhaustion predicted later work pressure.

What do these findings mean? According to our findings, WHI was both a predictor and an outcome of work pressure and exhaustion, since employees who experienced WHI at T1 reported more exhaustion and more work pressure at T2 and at T3, whereas T1 exhaustion and work pressure predicted WHI at both later measurement moments. This finding is consistent with and expands the findings of Leiter and Durup (1996), who had information from two measurement points (their time-lag of three months was comparable to the one used in the present study). They also found that exhaustion had reciprocal relations with WHI over time, and that exhaustion and WHI were predictors of workload.

These long-term reciprocal relations seem to function according to the principle of *loss spirals* proposed by Hobfoll (1989, 2001). Accordingly, people who lack resources are most vulnerable to additional losses. Put differently, those who lack resources attempt to employ their remaining resources, often producing self-defeating consequences by depleting their resource reserves (Hobfoll, 1989). Equally applicable here is Hockey's (1993, 1997) theory about how people maintain their performance under demanding conditions. Under normal working conditions, performance remains stable and the associated effort remains within reserve limits, though the overall level of energy is increased. When confronted with high job demands, employees either adopt performance protection strategies (e.g., mobilization of extra mental effort, which is associated with extra costs), or they accept a reduction in overt performance (with no increase in costs). The former is called the *active coping mode* and the latter the *passive coping mode*. Although an active coping response is basically adaptive in the short run, it is likely to be maladaptive as an habitual pattern of response to work, or if sustained over a prolonged period (see also Meijman & Mulder, 1998). The point is that it happens at the expense of an increase in compensatory costs that are manifested psychologically (e.g., anxiety and fatigue) as well as physiologically (e.g., increased excretion of catecholamines and cortisol).

These findings have important implications for the theoretical models utilized to explain WHI and chronic fatigue or exhaustion. Several models (see Introduction section) position WHI as a cause, mediator, or consequence in the stressor–strain chain, whereas exhaustion is virtually always considered as an outcome. Our three-wave longitudinal study integrates these research findings by showing that both WHI and exhaustion are causes *and* consequences in a process in which experiences that are negative for individual employees trigger other negative experiences over time (at least over a time period of three months), following the form of a negative (or loss) spiral. This implies that theoretical models aiming at the explanation of WHI should come further than utilizing simple one-way causal pathways. Instead, dynamic models that incorporate reciprocal relations between the respective constructs seem more plausible.

Besides the presence of the significant cross-lagged relations, the results of the SEM-analysis provided evidence for moderate to high inherent stability of the constructs. The highest stability was found for exhaustion, which is comparable with the results of other longitudinal studies that used the same, short measurement interval (e.g., Dignam, 1986; Leiter & Durup, 1996). This finding is also consistent with the general notion that burnout, and its core dimension of exhaustion, has a chronic, ongoing character (see also Bakker, Schaufeli, Sixma, Bosveld, & Van Dierendonck, 2000; Maslach, Schaufeli, & Leiter, 2001; Schaufeli & Enzmann, 1998). Comparable high stability coefficients resulted for work pressure. This finding is in line with the study of Alleyne et al. (1996), who found a high stability coefficient of work pressure using a measurement interval of one year. Thus, our results illustrate that work pressure and feelings of chronic fatigue are not easily changed. For WHI, the stability coefficients were moderate but still above .50; this is comparable to the findings of Leiter and Durup (1996). It indicates that WHI does not fluctuate greatly over time, but is not as stable an experience as feelings of exhaustion. Taken together, our findings show that a person who feels distressed at one point in time is likely to be distressed at a later time point unless a significant event changes the given emotional state (see also Leiter & Durup, 1996). Similar to the findings of research on work breaks showing that recovery time is shorter if breaks are taken before fatigue arises (e.g., Rutenfranz, Knauth, & Nachreiner, 1993), our findings propose that organizations should undertake countermeasures instead of trying to remedy employees' experiences of exhaustion and problems with managing the work and home domain.

One vital question that arises after the discussion of our results is whether there is a way out of these negative, loss spirals or even how a loss spiral can be turned into a gain spiral. According to Marks's (1977) (role) expansion approach, the fulfillment of multiple roles may also create human energy and is not necessarily related to role overload (scarcity perspective, Marks, 1977; or inter-role conflict, Kahn et al., 1964). Research suggests that the conditions under which such a positive spillover between the work and home domain occurs, are different than those that create conflict between the focal domains (Geurts & Demerouti, 2003; Grzywacz & Marks, 2000). Recent empirical evidence suggests that demanding aspects in the work or family domain (or both) are mainly related to conflict, but resources such as control and support are related to positive spillover (Geurts & Demerouti, 2003; Grzywacz & Marks, 2000). Therefore, we suggest that, under specific conditions (i.e., properly designed role demands and availability of sufficient role resources), the participation in multiple roles is the way out of the negative spirals. Future longitudinal studies are necessary to test this hypothesis.

One additional remark regarding the present study can be made. Our data were collected in discrete time samples, but the observed processes are continuous (see also De Jonge et al., 2001). This leaves two issues open. First, according to Frese and Zapf (1988), unless the measurement period matches the actual causal lag we cannot obtain the valid parameter estimates. Such information is lacking particularly regarding the process of experiencing problems with managing work and family boundaries, therefore we had to evaluate the chosen time lag a posteriori (cf. Engel & Meyer, 1996). The confirmation of several significant relations between the constructs under study makes our assumption plausible that the utilized time lags of six weeks and three months were at least adequate.

Second, the question is how this continuous process arises. One logical hypothesis is that the original initiator of the present process is the job stressor, i.e., work pressure, since it represents the stimulus in the situation to which the individual should react. However, alternative scenarios are equally plausible. For instance, the process can for some individuals also initiate from the experience of conflict between work and home. This might be the case when employees are confronted with a demanding situation in private life, as is the case with the birth of a child or moving to another house. In such circumstances, individuals may face problems with managing work and nonwork (or so-called home–work interference) when simultaneously confronted with increased job demands. Another possibility is that the person arrives at the present job with elevated levels of exhaustion built up in a previous job. This alternative process may be applicable to the reintegration of partly disabled employees in organizations. Our design inhibits us from testing the suitability of these alternatives in our sample. Future studies with base-line assessment of these parameters at job entry would be useful to unravel these alternative starting points.

One limitation of our study is that it is based on self-reports; this increases the possibility of contamination of the reported relationships through common-method variance. Yet, the differentiated pattern of relations among the constructs found in our study and the consistency of our findings with theory and previous research suggest that mono-method bias is not a major drawback of this study. Moreover, the job incumbent seems to be the most important source that can offer information regarding his/her unique job position (e.g., Frese & Zapf, 1999). Other, so-called 'objective' methods like observers' ratings appear to be good alternatives, but suffer from problems too, including observers' bias, halo and stereotyping effects

(Kerlinger & Lee, 2000). In addition, several researchers have provided evidence for a relation between objective job demands and self-reports of these demands (e.g., Semmer, Zapf, & Greif, 1996).

A second limitation is that although the use of a three-wave panel study allowed a more rigorous interpretation of causality and reciprocity than previous cross-sectional studies on WHI, it does not exclude the possibility that the resulting associations are due to confounders such as negative affectivity, and negative or depressive mood. By using linear structural modeling we partialled out the prior from the subsequent measure of a variable; this means that we automatically controlled for the effects of stable third variables such as negative affectivity but also for so-called occasion factors (i.e., mood specific to a particular occasion) (Spector, Zapf, Chen, & Frese, 2000).

A third limitation of the study is that it is based on a single occupation, that of employment agents. Strictly speaking, our findings cannot be generalized to the universe of employees and jobs. Yet, the consistency of our findings with theory and the results of previous studies is again an indication that we did not find relationships that are specific for one unique occupation. Nevertheless, generalization of the current results to other occupations awaits further empirical examination.

Notwithstanding these limitations, this study advances our understanding of the spillover between two important life domains ('work' and 'home'). The present study builds on previous cross-sectional and longitudinal studies, but also expands our knowledge on WHI by addressing several methodological and design deficiencies. Besides the stability of the experience of WHI, the study provides evidence that work pressure, WHI and exhaustion have reciprocal relations over time when time concerns periods up to three months. From a theoretical point of view, the implication of this finding is that researchers who attempt to uncover the nexus of the phenomenon of conflict between work and home should look for more elaborated models than simple causal chains. From a practical point of view, our results emphasize the importance of an appropriate management of the work and home life from the side of the individual. Employers should interpret our study as additional evidence for the vital role of assisting employees to manage the boundaries between work and private life. This should be done not only by reducing the job demands but also by providing resources that enhance the employee's well-being and help him or her to manage both work and home demands (cf. Demerouti, Bakker, Nachreiner, & Schaufeli, 2000, 2001). Examples of such resources are networks of social support at work, autonomy and flexibility regarding for instance work tasks, methods, and time, but also on-site child care and leave facilities. On the one hand, these resources may eliminate the impact of demanding working conditions, and help employees to avoid excessive strain. On the other hand, they may enhance employees' motivation and performance.

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