Toward a Dual-Process Model of Work-Home Interference

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This article introduces the dual-process model of work-home interference (WHI), which claims that job characteristics can be categorized in two broad categories, job demands and job resources, that are differentially related to job-related outcomes and WHI measures. The model proposes that job demands are primarily related to feelings of exhaustion, whereas job resources are primarily related to work-related flow. The central hypothesis of the current study among 1,090 employees was that exhaustion and flow, in turn, are related to negative and positive WHI, respectively. A series of structured equation modeling (SEM) analyses provided strong evidence for the dual-process model of WHI. The implications for WHI research and practice are discussed.

Keywords: *work-home interference; exhaustion; flow; recovery*

A growing number of individuals is challenged to combine substantial domestic responsibilities and work obligations (Allen, Herst, Bruck, & Sutton, 2000; Bond, Galinsky, & Swanberg, 1998). This challenge may become a stressor when "role pressures from the work and family domains are mutually incompatible in some respect" (Greenhaus & Beutell, 1985; p. 77). For example, research by Galinsky, Bond, and Friedman (1993) indicates that a considerable proportion of employed parents (i.e., 40%) experiences problems in combining work and family demands, often referred to as work-to-family conflict or negative work-to-home interference. In contrast

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with the general belief among practitioners, empirical research has consistently shown that work demands are far more likely to interfere negatively with domestic obligations than vice versa (e.g., Burke & Greenglass, 1999; Leiter & Durup, 1996). Frone, Russell, and Cooper (1992) found that "work interfering with home" (WHI) was reported 3 times more often than "home interfering with work" (HWI) by male and female employees (see also Bond et al., 1998). In addition, a recent meta-analysis including 67 studies (Allen et al., 2000) shows that negative WHI is associated with serious consequences, including depression, psychosomatic complaints, and reduced marital satisfaction. This article focuses on WHI in light of this relatively high prevalence of negative WHI, and its potential relevance for understanding employee well-being.

Work-family studies have related WHI to several antecedents and psychological well-being and have increased our understanding of the phenomenon. Nevertheless, research within this field is characterized by two main limitations. First, research has focused almost exclusively on the negative impact of work on the home situation. However, several scholars have argued that workers may also benefit from combining "work" and "family" and that these benefits may outweigh the costs (e.g., Hochschild, 1997; Kirchmeyer, 1993). There is indeed ample empirical evidence for this contention. For example, Crosby (1982) found that married employed women with children were more satisfied with their jobs than single employed women or married employed women without children (see also Bersoff & Crosby, 1984). In addition, Barnett's (1998) review shows that full-time workers experience better health than their reduced-hours counterparts. For example, in a classic longitudinal study, Moen, Dempster-McClain, and Williams (1992) showed that occupying multiple roles in 1956, participating in volunteer work on an intermittent basis, and belonging to a club or organization were positively related to various measures of health in 1986. In addition, a longitudinal study in the United States showed that White married women who decreased their labor force participation from full-time to low part-time or homemaker reported a significant increase in distress symptoms over a 3-year period (Wethington & Kessler, 1989). Conversely, those women who increased their labor force participation from homemaker or part-time worker to full-time worker reported a significant decrease in emotional distress (see also Barnett & Gareis, 2000; Herold & Waldron, 1985; Verbrugge, 1989).

Second, work-family researchers have not based their hypotheses about negative WHI on strong conceptual frameworks (cf. Grandey & Cropanzano, 1999). Where conceptual frameworks are used, researchers relied mainly on role stress theory (Kahn, Wolfe, Quinn, Snoek, & Rosenthal, 1964), postulat-

ing that participation in one role makes it more difficult to participate in another role (Greenhaus & Beutell, 1985). From this perspective, however, it remains unclear how negative WHI should be embedded in the stressor-strain relationship. Negative WHI is often considered a potential source of stress that, in addition to other potential stressors, will have adverse effects on health and psychological well-being, resulting in, for example, poor physical health, depression, or anxiety (e.g., Burke, 1988, 1993; Frone et al., 1991, 1992, 1997; Kinnunen & Mauno, 1998).

Rather than as a "stressor," negative WHI is also often considered a *stress reaction* (i.e., strain), particularly caused by work-related stressors (e.g., high quantitative workload; Burke, 1988; Frone et al., 1992; Grzywacz & Marks, 2000). Furthermore, various studies have provided evidence for a mediating role of negative WHI in the stressor-strain relationship. For instance, a Dutch study among four independent samples provided evidence for a mediating role of negative WHI in the relationship between workload and general health indicators (Geurts, Kompier, Roxburgh, & Houtman, 2003). Another study among medical residents revealed that various stressors (e.g., an unfavorable working time schedule) were important antecedents of negative WHI, which, in turn, was associated with psychosomatic health complaints and sleep deprivation (Geurts, Rutte, & Peeters, 1999). In a similar vein, Parasuraman, Purohit, Godshalk, and Beutell (1996) found that male and female entrepreneurs who experienced work-role overload reported higher levels of negative WHI, which, in turn, was related to their general life stress (for similar evidence, see Stephens, Franks, & Atienza, 1997). Taken together, previous studies have produced mixed findings, suggesting that WHI may be conceived as a stressor, a strain, or an outcome of strain. These findings emphasize the importance of using a clear theoretical framework (Grandey & Cropanzano, 1999).

The current study was designed to overcome these two limitations. First, the current research does not focus exclusively on negative work-to-home interference but on the possible positive impact of work on the home situation. Second, our hypotheses are based on a strong conceptual framework, integrating theoretical notions from the job demands-resources model and the effort-recovery model.

THEORETICAL BACKGROUND

A central proposition of the job demands-resources (JD-R) model (Bakker, Demerouti, De Boer, & Schaufeli, 2003; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001) is that work characteristics can be organized

in two broad categories, namely, job demands and job resources. Job demands refer to those physical, psychosocial, or organizational aspects of the job that require sustained physical and/or mental effort and are, therefore, associated with certain physiological and/or psychological costs. Examples are a high work pressure (i.e., high work pace and tight deadlines), high physical or emotional demands, and role conflicts. Job resources refer to those physical, psychosocial, or organizational aspects of the job that may be functional in meeting task requirements (i.e., job demands) and may thus reduce the associated physiological and/or psychological costs—and at the same time stimulate personal growth and development. Resources may be located in the task itself (e.g., performance feedback, skill variety, autonomy; cf. Hackman & Oldham, 1976), as well as in the context of the task, for instance, organizational resources (e.g., career opportunities, job security) and social resources (e.g., supervisor and coworker support).

In addition, the JD-R model proposes that employee health and psychological well-being is the result of two relatively independent processes (Bakker, Demerouti, De Boer, et al., 2003; Bakker, Demerouti, Taris, Schaufeli, & Schreurs, 2003; Demerouti, Bakker, Nachreiner, & Schaufeli, 2000; Demerouti et al., 2001). In the first process, particularly the demanding aspects of work (e.g., work overload) lead to constant overtaxing and in the long term to health problems (e.g., chronic fatigue, burnout). In the second process, the availability of job resources may help employees to cope with the demanding aspects of their work and simultaneously stimulate them to learn from and grow in their job, which may lead to motivation, feelings of accomplishment, and organizational commitment. Theoretically, the JD-R model can be considered an elaboration of the more classic demand-control (D-C) model (Karasek, 1979), in which autonomy can be considered a resource that enables workers to cope with a high workload.

The effort-recovery (E-R) model (Meijman & Mulder, 1998) can be used to illustrate the mechanisms that may underlie the two processes just described. According to this model, the quantity and quality of recovery plays a crucial role in the first process. When during a certain amount of time no or little appeal is made to the psychobiological systems that were used for task performance, these systems will stabilize at a specific baseline level, and individuals 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 consequently function as a permanent source of tension. If opportunities for recovery after being exposed to a high workload are insufficient, the psychobiological systems are activated again before they had a chance to stabilize at a baseline level. The person, still in a suboptimal state, will have to make additional (compensatory) effort.

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). Under unchanged conditions these symptoms may develop into manifest health problems (cf. Kompier, 1988; Sluiter, 1999).

According to the E-R model, the willingness to put effort into the tasks may be crucial to the second process. Following the E-R model, work environments that offer many resources (e.g., performance feedback, autonomy, and possibilities for professional development) may foster the willingness to dedicate one's abilities to the task and yield positive outcomes; that is, under the latter conditions, the probability that energy will be produced rather than consumed and that tasks will be completed successfully increases. This means that employees have the opportunity to develop their skills and may find satisfaction through their work activities. Because of the mobilization of energy (and the related reduced need for recovery), people will start the next working day in an optimal condition. Over time, this process will result in increased motivation and organizational commitment (cf. Hackman & Oldham, 1976).

The central idea of job demands that require too much effort, the lack of job resources to fulfill the job requirements, and the "spillover" of negative load effects that have built up during working hours to the nonwork situation makes the theoretical perspective offered by the JD-R model and the E-R model relevant for studying negative WHI. Moreover, this theoretical framework might also be fruitful for studying positive WHI. The existence of resources that enable individuals to deal with the demanding aspects of their job and simultaneously increase their willingness to do so may be associated with positive load effects that have built up during working hours and may spill over to the nonwork domain. From this theoretical perspective, WHI can be defined as an experience that is implicated in the process whereby workers' functioning and need for recovery in one domain is influenced by load effects that have built up in the other domain. In this article, we focus on the impact of negative and positive load effects that have built up at work on one's (energetic) state at work and eventually on one's functioning and need for recovery in the nonwork domain.

TOWARD A DUAL-PROCESS MODEL OF WHI

The current research proposes and tests a dual-process model of WHI in three different occupational groups in the Netherlands. The central assump-

tion is that work can interfere with family life in a negative and positive way and that WHI is an important consequence of demands and resources in the job setting and psychological well-being. As a prerequisite of the current research, we examine the factor structure of two scales measuring positive and negative WHI. *Hypothesis 1* is that confirmatory factor analyses will confirm the two-factor structure of WHI (i.e., negative and positive WHI).

Two different aspects of psychological well-being are examined, namely, exhaustion and flow. Exhaustion refers to feelings of being overextended and exhausted by the demands of one's work (Maslach, Jackson, & Leiter, 1996) and is generally considered the core dimension of burnout (Aronson, Pines, & Kafry, 1983; Shirom, 1989). In previous research, feelings of exhaustion have been related to a variety of individual and organizational consequences, including psychosomatic health complaints and absenteeism (see Schaufeli & Enzmann, 1998, for an overview).

Flow is defined in the current research as a state of being fully concentrated and engrossed in one's work, whereby time passes quickly. This definition comes close to the one offered by Csikszentmihalyi (1990), who has described flow as an optimal experience that is characterized by focused attention, mind and body unison, effortless concentration, complete control, a loss of self-consciousness, a distortion of time, and intrinsic enjoyment. Typically, flow refers to rather particular, short-term "peak" experiences instead of a more pervasive and persistent state of mind, as is the case with the operationalization in the current research. As part of the "work engagement" construct, rather than a momentary and specific state, flow at work refers to a more persistent and pervasive affective-motivational state that is not focused on any particular object, event, individual, or behavior (Schaufeli, Salanova, González-Romá, & Bakker, 2002).

The dual-process model of WHI assumes that high or negative job demands are most strongly related to exhaustion (*Hypothesis 2a*), and consequently to negative WHI (*Hypothesis 2b*), whereas job resources are most strongly related to flow (*Hypothesis 3a*) and consequently to positive WHI (*Hypothesis 3b*) (see Figure 1). One could argue that job demands do not only have adverse effects on WHI. Job demands that are not taxing may also be a challenge and facilitate flow experiences and positive WHI. In a similar vein, a lack of resources may also be a negative experience that contributes to feelings of exhaustion and negative WHI. However, on the basis of the JD-R model and the E-R model, we expect particularly strong positive relationships between job demands, feelings of exhaustion, and negative WHI, as well as between job resources, experiences of flow, and positive WHI. The cross-paths will be tested in an alternative model. Furthermore, we predict that job demands will have a direct relationship with negative WHI (*Hypoth-*

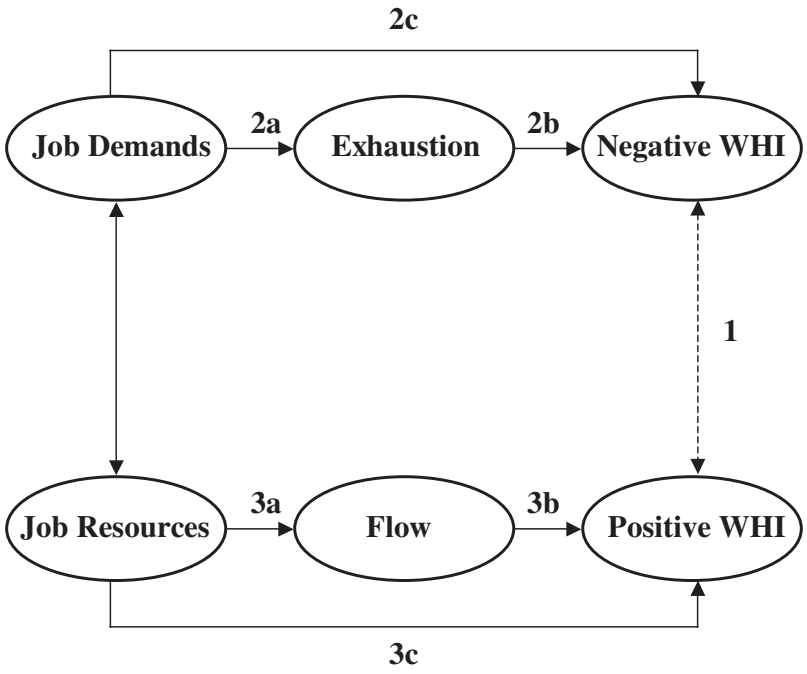

Figure 1: The Dual-Process Model of Work-Home Interference
NOTE: Numbers correspond with the hypotheses.

esis 2c), in addition to the indirect effect through exhaustion (see *Hypothesis 2a* and *2b*). In contrast, job resources will have a direct relationship with positive WHI (*Hypothesis 3c*), in addition to their indirect effect through flow (see *Hypothesis 3a* and *3b*).

METHOD

PROCEDURE AND PARTICIPANTS

The current study was conducted in three different organizations in the Netherlands. After informative meetings with representatives of the management, personnel department, and employee/employers committees, all employees from the three organizations received paper-and-pencil question-

naires and return envelopes at their work. The questionnaires were accompanied by a letter, in which the goal of the study was briefly introduced. The confidentiality and anonymity of the answers was emphasized. The employees were kindly requested to fill out the questionnaire in private and to post it afterward in a special box at their departments.

Participants of Sample 1 were employees of a pension fund company. A total of 507 employees filled out and returned the questionnaire (response = 83%). The sample included 334 men (66%) and 173 women (34%). The mean age was 35 years (*SD* = 9.5) and mean organizational tenure was 6.5 years (*SD* = 7.5). The majority of the sample had a steady contract (73%). Most employees worked full-time (91%). Of the participants, 16% had a supervisory position. The main activities of the employees in this organization were to collect premiums, to administrate, and to pay out monthly allowances and pensions. Employees in this company worked in a range of different job positions, including financial administration (24%), information and communication technology (ICT) (5%), management (7%), sales (18%), consultancy (9%), financial markets (12%), customer services (8%), accountancy (7%), portfolio management (5%), and other (5%).

Participants of Sample 2 worked at an occupational health services company. A total of 202 employees filled out and returned the questionnaire (response = 63%). The sample included 76 men (38%) and 126 women (62%). The mean age was 40 years (*SD* = 9.0) and mean organizational tenure was 7 years (*SD* = 6.5). The majority of the sample had a steady contract (90%). Most employees worked full-time (75%). Of the participants, 25% had a supervisory position. Occupational health services included (a) the primary, secondary, and tertiary prevention of work-related health problems and disability; (b) protection and promotion of employees' safety, health, and well-being; and (c) monitoring of the relationship between quality of work and health. The sample included company doctors (23%), team assistants (14%), occupational health nurses (11%), work and organizational consultants (9%), doctor assistants (9%), work hygienists (5%), administrative staff members (5%), ICT workers (3%), safety experts (3%), secretaries (6%), social workers (1%), and other (11%).

Participants of Sample 3 were employees of an insurance company. A total of 381 employees filled out and returned the questionnaire (response = 61%). The sample included 261 men (69%) and 120 women (31%). The mean age was 40 years (*SD* = 10.4). Mean organizational tenure was 12.5 years (*SD* = 10.5 years). Of the sample, 12% had a managerial position. Most participants had a full-time job (64%). The services of this company include life and funeral insurance, disability insurance, pension funds, and home loans. The sample included employees working in several professions:

22% sales, 22% insurances, 16% banking, 8% ICT, 7% marketing, 6% finances, 4% facilities, 3% human resources management, 2% staff, and 10% other.

MEASURES

Job demands. Two specific job demands were included in each of the three studies. Workload was based on a Dutch version (Furda, 1995) of Karasek's (1985) Job Content Scale. The scale includes five 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 4-point Likert-type scale, ranging from 1 (*never*) to 4 (*always*). Emotional demands were measured with a scale developed by Van Veldhoven and Meijman (1994) and included five items. An example item is "Is your work emotionally demanding? (1 = *never*, 5 = *always*). All responses were coded such that higher scores referred to higher job demands.

Job resources. Three job resources were included in the questionnaires. Autonomy was assessed with a Dutch version (Furda, 1995) of Karasek's (1985) job content instrument. It includes five items concerning skill discretion (i.e., the breadth of skills used by workers in performing their job) and four items concerning decision authority (i.e., freedom of action in accomplishing the formal work task). In earlier studies, factor analyses have repeatedly demonstrated that all nine items load on one factor and can therefore be combined into one scale (De Jonge, Landeweerd, & Nijhuis, 1993). A sample item is "I can decide myself how I execute my work" (1 = *never*, 4 = *always*). Possibilities for professional development were measured with a self-constructed 6-item scale. An example item is "My work offers me the opportunity to learn new things" (1 = *totally disagree*, 5 = *totally agree*). Performance feedback was assessed with three items, based on Karasek's (1985) job content instrument. For example "I get sufficient information about the goal of my work" (1 = *never*, 5 = *always*). All responses were coded such that higher scores referred to more job resources.

Work-home interference. Geurts (2000; Wagena & Geurts, 2000) developed the two WHI scales included in the current study. For both scales, responses could be made on a 5-point scale (1 = *never*, 5 = *always*). Negative WHI was assessed with three items, including "How often does it happen that your work schedule makes it difficult for you to fulfill your domestic obligations?" Positive WHI was assessed with two items. One example item is

"How often does it happen that you come home cheerfully after a successful day at work, positively affecting the atmosphere at home?" ($r = .66$, $p < .001$).

Exhaustion was assessed with five items using the Maslach Burnout Inventory–General Survey (MBI-GS; Schaufeli, Leiter, Maslach, & Jackson, 1996). Exemplary items are "I feel burned out from my work," and "I feel tired when I get up in the morning and have to face another day on the job" (0 = *never*, 6 = *every day*).

Flow was measured with a six-item subscale of the Utrecht Work Engagement Scale (Schaufeli et al., 2002). Two exemplary items are "Time flies when I am working," and "I am totally engrossed in my work" (0 = *never*, 6 = *every day*). Bakker and Schaufeli (1999) showed that the internal consistency of the flow scale is satisfactory. Using the data of almost 4,500 employees in different occupations, they found a Cronbach's alpha coefficient of .76.

RESULTS

DESCRIPTIVE STATISTICS

Table 1 shows the means, standard deviations, correlations between the variables, and internal consistencies of the scales included in the analyses for the combined data of the three samples. As can be seen from this table, all scales show good reliabilities (all Cronbach's alpha coefficients are higher than .77). In addition, the two job demands (workload and emotional demands) show the highest correlations with negative WHI, whereas the three job resources (autonomy, possibilities for professional development, and feedback) show the highest correlations with positive WHI. Furthermore, exhaustion is most strongly correlated with negative WHI, whereas flow is most strongly correlated with positive WHI. Preliminary analyses revealed that demographic variables (e.g., gender, age, organizational tenure) were not substantially related to the outcome variables; all correlation coefficients had values lower than .15, except the coefficient of the relationship between leadership (dichotomized variable: 0 = no leader, 1 = leader) and flow: $r = .28$, $p < .001$. Therefore, we decided to omit the demographics from further analyses.

CONFIRMATORY FACTOR ANALYSES

According to Hypothesis 1, confirmatory factor analysis (CFA) will confirm a two-factor structure of WHI (i.e., negative and positive WHI). To test this hypothesis, we performed CFA using the AMOS software package

TABLE 1: Means, Standard Deviations, Intercorrelations, and Internal Consistencies (Cronbach's alpha; on the diagonal) of the Scales Used in This Study, *N* = 1,090

Variable	M	SD	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
1. Workload (1 to 4)	2.74	.57	(.84)								
2. Emotional demands (1 to 5)	1.98	.48	.33***	(.76)							
3. Autonomy (1 to 4)	2.88	.43	.06	.11***	(.78)						
4. Possibilities development (1 to 5)	3.47	.72	–.07*	–.08**	.55***	(.86)					
5. Performance feedback (1 to 5)	3.11	.81	–.06	–.03	.40***	.40***	(.80)				
6. Negative WHI (1 to 5)	1.88	.71	.33***	.35***	.12***	–.12***	–.05	(.78)			
7. Positive WHI (1 to 5)	2.58	.87	–.09**	.03	.19***	.18***	.21***	.00	(.79)		
8. Exhaustion (0 to 6)	1.76	1.08	.30***	.28***	–.12***	–.27***	–.19***	.48***	–.11***	(.88)	
9. Flow (0 to 6)	3.60	.99	.06*	.11***	.39***	.33***	.26***	.12***	.27***	–.16***	(.80)

NOTE: WHI = work-home interference.
*$p < .05$. **$p < .01$. ***$p < .001$.

(Arbuckle, 1997). The fit of the model to the data was examined with the Goodness-of-Fit Index (GFI) and the root mean square error of approximation (RMSEA). Furthermore, the Nonnormed Fit Index (NNFI), the Comparative Fit Index (CFI), and the Incremental Fit Index (IFI) were utilized. In general, models with fit indices greater than .90 and an RMSEA less than .08 indicate a close fit between the model and the data (Browne & Cudeck, 1989; Hoyle, 1995).

The proposed two-factor structure of WHI was supported by the results of the CFA. The model including the two latent factors positive WHI and negative WHI showed a very good fit to the data, χ^2 (4) = .42, GFI = 1.00, RMSEA = .00, NNFI = 1.01, CFI = 1.00, IFI = 1.00. In addition, the five WHI indicators loaded significantly on the intended latent factors of negative and positive WHI. The factor loadings ranged from 0.48 to 0.97. More interesting, the correlation between the two latent factors was nonsignificant (covariation = –.02, $t < 1$), thus supporting the independence of negative and positive WHI. In contrast, the alternative one-factor model did not fit adequately to the data, χ^2 (5) = 456.48, GFI = .84, RMSEA = .35, NNFI = .29, CFI = .65, IFI = .65. The difference in fit between the two-factor model and the one-factor model is highly significant, χ^2 (1) = 456.06, $p < .001$. Thus, CFA supported *Hypothesis 1:* Negative and positive WHI cannot only conceptually but also empirically be distinguished.

TEST OF THE DUAL-PROCESS MODEL OF WHI

According to the dual-process model of WHI, job demands are most predictive of exhaustion (*Hypothesis 2a*), and consequently of negative WHI (*Hypothesis 2b*), whereas job resources are most predictive of flow (*Hypothesis 3a*) and consequently of positive WHI (*Hypothesis 3b*). In addition, job demands will also have a direct relationship with negative WHI (*Hypothesis 2c*), whereas job resources will also have a direct relationship with positive WHI (*Hypothesis 3c*) (see Figure 1). To test these hypotheses, we performed a series of structural equation modeling (SEM) analyses. The five working conditions were classified in two latent factors, one representing job demands and the other job resources, and they were treated as exogenous variables in the model. The latent factors job demands and job resources were allowed to correlate. Exhaustion and flow were included as mediators in the model (both treated as endogenous latent variables), whereas negative WHI and positive WHI were included as criterion variables (endogenous latent variables) (see Figure 1).

Results of the SEM analyses show that the hypothesized or proposed model M1 fits adequately to the data (see first row in Table 2). All fit indices

have values higher than 0.90 and the RMSEA is .06. In addition, all relationships in the model were significant and in the expected direction (see Figure 2). Workload and emotional demands loaded significantly on the latent factor job demands; autonomy, possibilities for development, and performance feedback loaded significantly on the latent factor job resources. Note also that the two WHI constructs can be distinguished empirically from exhaustion and flow: All indicators load only on the intended factors. More important, the coefficients of the paths from job demands to exhaustion and from job resources to flow were positive and highly significant (cf. *Hypotheses 2a* and *3a*). Exhaustion, in turn, was significantly related to negative WHI (cf. *Hypotheses 2b*), whereas flow was significantly related to positive WHI (cf. *Hypotheses 3b*). These findings strongly support our hypotheses that those employees who are exposed to high or badly designed job demands experience most feelings of emotional exhaustion and report most negative interference between work and family life. In contrast, when exposed to many resources, employees report peak experiences, which positively affects their family life.

As predicted, job demands also had a direct relationship with negative WHI, whereas job resources had a direct relationship with positive WHI (cf. *Hypotheses 2c* and *3c*; see Figure 2). The dual-process model of WHI explained 34% of the variance in exhaustion, and 32% of the variance in flow. In addition, the model explained 45% and 14% of the variance in negative and positive WHI, respectively.

To test the alternative hypothesis that the latent factor job demands is related to positive WHI, and that job resources is related to negative WHI, these two paths were included in the model. As can been seen in the second row of Table 2, this alternative model (M2) fits somewhat better to the data than the proposed model, $\chi^2\,(2) = 23.06$, $p < .001$. Note, however, that most fit indices were not affected by the inclusion of the two alternative paths. Moreover, the relationship between job demands and positive WHI was nonsignificant (parameter = –.08; $t = -1.86$). The relationship between job resources and negative WHI was significant (parameter = .15, $p < .01$) but significantly weaker than the proposed relationship between job resources and flow (parameter = .56; Critical Ratio (CR) for the difference between parameters = –5.95, $p < .01$). Nevertheless, the results indicate that job resources may to a certain extent coincide with negative WHI. This deviation from our model will be addressed in the Discussion section.

The second alternative model to be tested included the paths from exhaustion to positive WHI and from flow to negative WHI (M3). Table 2 shows that this alternative model also fits somewhat better to the data than the proposed model, $\Delta\chi^2\,(2) = 34.62$, $p < .001$. A closer inspection of the output indicated

TABLE 2: Results of Structural Equation Modeling: Fit Indices of the Dual-Process Model of WHI and the Alternative Models, Standardized Maximum Likelihood Estimates, *N* = 1,090

Model	χ^2	df	*GFI*	*RMSEA*	*NNFI*	*CFI*	*IFI*	*Model Comparison*	$\Delta\chi^2$	df	p
M1. Dual-process WHI model	805.19	182	.93	.06	.92	.93	.93	—			
M2. Alternative model	782.13	180	.93	.06	.92	.93	.93	M2 – M1	23.06	2	.001
M3. Alternative model	770.57	180	.93	.06	.92	.93	.93	M3 – M1	34.62	2	.001
M4. Alternative model	709.54	180	.94	.05	.93	.94	.94	M4 – M1	95.65	2	.001
M0. Null model	8,704.89	210	.43	.19	—	—	—	—	—	—	—

NOTE: WHI = work-home interference; GFI = Goodness-of-Fit Index; RMSEA = root mean square error of approximation; NNFI = Nonnormed Fit Index; CFI = Comparative Fit Index; IFI = Incremental Fit Index; $\Delta\chi^2$ = chi-square difference; M2 = Alternative model, including the paths from job demands to positive WHI and from job resources to negative WHI; M3 = Alternative model, including the paths from flow to negative WHI and from exhaustion to positive WHI; M4 = Alternative model, including the paths from job demands to flow and from job resources to exhaustion.

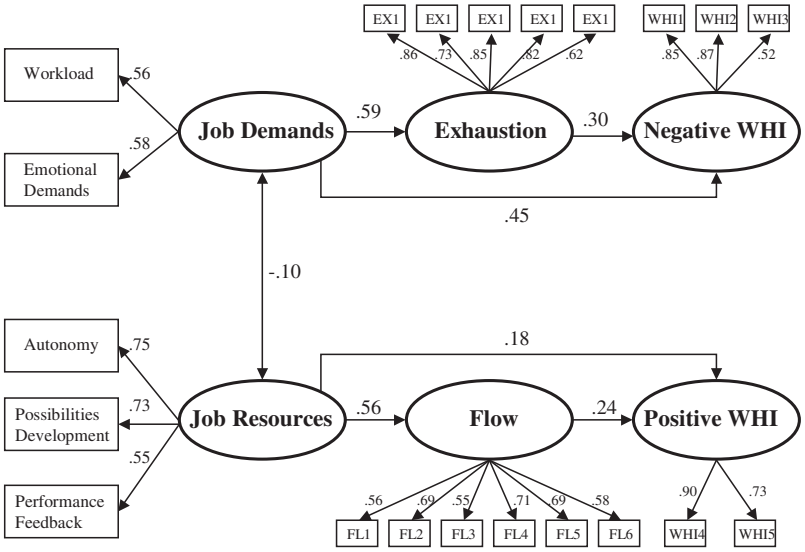

Figure 2: Standardized Maximum Likelihood (ML) Estimates for the Dual-Process Model of WHI, *N* = 1,090

NOTE: All parameters are significant at the $p < .05$ level.

that the coefficient of the path from exhaustion to positive WHI was marginally significant and negative ($\beta = -.07$, $t = -2.04$, $p < .05$), whereas the coefficient of the path from flow to negative WHI was significant and positive ($\beta = .18$, $t = 5.61$, $p < .01$). These latter findings suggest that exhaustion may also coincide with somewhat reduced positive WHI and that flow may coincide with negative WHI.

The final alternative model included the paths from job demands to flow and from job resources to exhaustion (M4). This model also fitted well to the data (see Table 2) and performed better than the proposed model, $\Delta\chi^2 (2) = 95.65$, $p < .001$. The output showed that the coefficient of the path from job demands to flow was significant and positive ($\beta = .13$, $t = 3.29$, $p < .01$) and that the coefficient of the path from job resources to exhaustion was significant and negative ($\beta = -.33$, $t = -8.34$, $p < .01$). Note, however, that the proposed relationship between job demands and exhaustion was stronger than the relationship between job demands and flow (CR for difference = –8.14, $p < .01$) and that the proposed relationship between job resources and flow was stronger than the relationship between job resources and exhaustion (CR

for difference = –11.84, $p < .01$). Nevertheless, the findings suggest that job demands may also facilitate flow (be it marginally) and that job resources may alleviate exhaustion.

DISCUSSION

The starting point for the current study was the observation that WHI is associated with serious costs but that employees may also benefit from combining "work" and "family" in terms of self-esteem, personal accomplishment, happiness, and health (Barnett, 1998; Kirchmeyer, 1993). The dual-process model of WHI integrates these two perspectives and argues in line with the JD-R model (Bakker, Demerouti, De Boer, et al., 2003; Bakker, Demerouti, Taris, et al., 2003; Demerouti et al., 2000, 2001) that employees are not only exposed to job demands but also to job resources. These two categories of working conditions trigger two fairly independent processes: a health impairment process leading to negative WHI and a motivational process leading to positive WHI.

In general, the results provided evidence for the validity of the dual-process model of WHI. First, CFAs supported *Hypothesis 1*: Negative and positive WHI cannot only conceptually but also empirically be distinguished. Second, consistent with our hypotheses, exhaustion and flow played a partial mediating role in the relationship between job demands and job resources on one hand and negative and positive WHI on the other hand. The results showed that the model fitted adequately to the data of employees working in three different companies. Specifically, we found that job demands are the most important predictors of exhaustion and that job resources are the most important predictors of flow. Exhaustion, in turn, is most strongly related to negative WHI, whereas flow, in turn, is most strongly related to positive WHI. The partial mediating roles of exhaustion and flow imply that job demands also have a direct relationship with negative WHI, whereas job resources also have a direct relationship with positive WHI.

CONCLUSION

The current findings expand the literature on WHI by indicating that there exist two pathways leading to negative and positive WHI. Employees particularly experience negative interference between work and family life when they are exposed to a high workload and demanding interactions with clients. The reason for this is that these job demands evoke feelings of exhaustion that

spill over to the private domain. The end result is that employees worry about their work when at home and are unable to fulfill their domestic obligations. In contrast, job resources such as opportunities for development, autonomy, and performance feedback evoke more positive experiences, where employees are happily engrossed in their work. This experience of flow has a positive influence on private life, as employees come home cheerfully after a successful day at work. In general, these findings are consistent with previous JD-R model studies and suggest that two separate categories of working conditions initiate two fairly independent processes—a health impairment process and a motivational process model (Bakker, Demerouti, De Boer, et al., 2003; Bakker, Demerouti, Taris, et al., 2003; Demerouti et al., 2000, 2001).

Although the current study treated negative and positive WHI as criterion variables, it should be noted that other researchers have argued that (negative) WHI can be seen as a stressor, a strain, or an outcome of strain (Burke, 1988, 1993; Frone et al., 1992; Grzywacz & Marks, 2000; Kinnunen & Mauno, 1998; Parasuraman et al., 1996; Stephens et al., 1997). We believe that (negative and positive) WHI may play each of these roles. Multiwave studies are needed to critically examine how, for example, negative WHI may increase over time, as a result of increasing job demands and feelings of exhaustion. In a longitudinal study, Demerouti, Bakker, and Bulters (2004) indeed provided evidence for this process. More important, they also showed that negative WHI can simultaneously be a predictor of job demands and exhaustion. These findings suggest that those employees who encounter high job demands, feelings of fatigue, and negative WHI may end up in a "loss spiral," where negative experiences reinforce each other. It would be interesting to examine conceptually comparable "gain spirals" in future research, where job resources and flow are reciprocally related to positive WHI.

Results highlighted some deviations from our model. First, exhaustion correlated significantly and negatively with positive WHI. Although this relationship was marginally significant and weak, it suggests that feelings of exhaustion may also reduce positive spillover from work to home. Second, job resources and flow correlated positively with negative WHI. We can only speculate about the reasons for this finding. It is conceivable that employees who get engrossed in their work lose perspective of time and/or keep preoccupied with their work even during the nonworking hours, which therefore may result in negative interference between work and family life. For example, if one partner agreed to pick up the child from the child care institute and then forgets to do so in time, the child may feel lost, and the spouse may become worried and upset.

Nevertheless, the findings of the current research generally provide support for our dual-process model of WHI. Job demands appear to be most

strongly related to exhaustion, which, in turn, is related to negative WHI, whereas job resources appear to be most strongly related to flow, which coincides with positive WHI. Particularly the latter finding expands previous research that has primarily focused on negative WHI. In the context of the effort-recovery model (Meijman & Mulder, 1998), our findings suggest that job demands that require too much effort are associated with the building up of negative load effects that spill over to the nonwork domain (negative WHI). In that domain they obstruct opportunities to recover sufficiently from the effort one has put forth into the job and increase the probability that job demands erode psychological health. On the other hand, our findings suggest that job resources—that enable workers to deal with high job demands and simultaneously increase their willingness to put effort into the job—are associated with the mobilization of energy and the development of positive load effects that spill over to the nonwork domain (positive WHI). In that domain, they yield a reduced need for recovery and related positive outcomes and increase the probability that job resources positively affect psychological health.

The current research is not without limitations. One limitation derives from the fact that the research design was cross-sectional. This implies that the postulated relationships between working conditions, exhaustion and flow, and the two types of WHI cannot be interpreted causally. A second drawback of our study is that our samples included employees who are, generally, higher educated. We do not know to what extent the findings can be generalized to employees with a lower education. A final limitation is that we included only a few job demands and resources. The JD-R model is capable of integrating several demands and resources, and therefore, it would be interesting to replicate the current findings in future studies using a broader range of working conditions (e.g., mental and physical demands, supervisory support, support from colleagues, skill variety).

Despite these limitations, the current findings may have important implications for future research and practice. First of all, the application of the dual-process model of WHI in research among different organizations and occupational groups may further increase our understanding of the phenomenon and process of WHI. It is important to note that the proposed model is a parsimonious model that is capable of integrating a wide range of potential job demands and resources (see Bakker, Demerouti, Taris, et al., 2003; Demerouti et al., 2001). Accordingly, it can be used to study different profiles of demands and resources that may be typical for important job-related outcomes in specific occupations. The model encompasses earlier models of job stress and burnout, such as the demands-control model (Karasek, 1979), and the demand-control-support model (Johnson & Hall, 1988), in that it pro-

vides a systemic schema to incorporate various dimensions of the work situation that might be relevant for the development of WHI and specific long-term consequences of work for individual employees.

The dual-process model of WHI may also be applied for workplace interventions aimed at optimizing employees' health and psychological well-being. Our results suggest that to avoid employees' exhaustion, specific job demands have to be reduced or redesigned. In addition, increasing their job resources may enhance employees' experiences of work-related flow. Note that the specific job demands and resources to be addressed may differ across organizations. This implies that interventions aimed at improving the working environment will be most successful if they are tailored to the most important job characteristics. Such tailor-made interventions may contribute to a reduction of job demands and an increase of job resources that may, in turn, lead to less exhaustion and more flow. The current study suggests that these interventions would eventually lead to a reduction in negative WHI and an increase in positive WHI.

REFERENCES

Allen, T. D., Herst, D. E., Bruck, C. S., & Sutton, M. (2000). Consequences associated with work-to-family conflict: A review and agenda for future research. *Journal of Occupational Health Psychology*, *5*, 278-308.

Arbuckle, J. L. (1997). *AMOS users' guide. Version 3.6*. Chicago: Smallwaters Corporation.

Aronson, E., Pines, A. M., & Kafry, D. (1983). *Ausgebrannt. Vom Überdruß zur Selbstentfaltung* [Burnout: From tedium to personal growth]. Stuttgart, Germany: Klett-Cotta.

Bakker, A. B., Demerouti, E., De Boer, E., & Schaufeli, W. B. (2003). Job demands and job resources as predictors of absence duration and frequency. *Journal of Vocational Behavior*, *62*, 341-356.

Bakker, A. B., Demerouti, E., Taris, T., Schaufeli, W. B., & Schreurs, P. (2003). A multi-group analysis of the job demands-resources model in four home care organizations. *International Journal of Stress Management*, *10*, 16-38.

Bakker, A. B., & Schaufeli, W. B. (1999). *De Utrechtse bevlogenheidsschaal: UBES* [The Utrecht work engagement scale: UWES]. Utrecht, the Netherlands: Utrecht University, Department of Social Organizational Psychology.

Barnett, R. C. (1998). Toward a review and reconceptualization of the work/family literature. *Genetic, Social and General Psychology Monographs*, *124*, 125-182.

Barnett, R. C., & Gareis, K. C. (2000). Reduced-hours employment: The relationship between difficulty of trade-offs and quality of life. *Work and Occupations*, *27*, 168-187.

Bersoff, D., & Crosby, F. (1984). Job satisfaction and family status. *Personality and Social Psychology Bulletin*, *10*, 79-83.

Bond, T., Galinsky, E., & Swanberg, J. E. (1998). *The 1997 National Study of the Changing Workforce*. New York: Families and Work Institute.

Browne, M. W., & Cudeck, R. (1989). Single sample cross-validation indices for covariance structures. *Multivariate Behavioral Research*, *24*, 445-455.

Burke, R. J. (1988). Some antecedents and consequences of work-family conflict. *Journal of Social Behavior and Personality*, *3*, 287-302.

Burke, R. J. (1993). Work-family stress, conflict, coping and burnout in police officers. *Stress Medicine*, *9*, 171-180.

Burke, R. J., & Greenglass, E. R. (1999). Work-family conflict, spouse support, and nursing staff well-being during organizational restructuring. *Journal of Occupational Health Psychology*, *4*, 327-336.

Crosby, F. (1982). *Relative deprivation and working women*. New York: Oxford University Press.

Csikszentmihalyi, M. (1990). *Flow. The psychology of optimal experience*. New York: Harper.

De Jonge, J., Landeweerd, J. A., & Nijhuis, F. J. N. (1993). Constructie en validatie van de vragenlijst voor het "autonomie project" [Construction and validation of the questionnaire for the "job autonomy project"]. Maastricht, the Netherlands: Maastricht University, Bedrijfsgezondheidszorg Studies.

Demerouti, E., Bakker, A. B., & Bulters, A. J. (2004). The loss spiral of work pressure, work-home interference and exhaustion: Reciprocal relations in a three-wave study. *Journal of Vocational Behavior*, *64*, 131-149.

Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2000). A model of burnout and life satisfaction among nurses. *Journal of Advanced Nursing*, *32*, 454-464.

Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology*, *86*, 499-512.

Frone, M. R., Russell, M., & Cooper, M. L. (1991). Relationship of work and family stressors to psychological distress: The independent moderating influence of social support, mastery, active coping and self-focused attention. *Journal of Social Behavior and Personality*, *6*, 227-250.

Frone, M. R., Russell, M., & Cooper, M. L. (1992). Antecedents and outcomes of work-family conflict: Testing a model of the work-family interface. *Journal of Applied Psychology*, *77*, 65-78.

Frone, M. R., Russell, M., & Cooper, M. L. (1997). Relation of work-family conflict to health outcomes: A four-year longitudinal study of employed parents. *Journal of Occupational and Organizational Psychology*, *70*, 325-335.

Furda, J. (1995). *Werk, persoon en welzijn: Een toets van het JD-C model* [Work, personality, and well-being: A test of the JD-C model]. Unpublished doctoral dissertation, Utrecht University, the Netherlands.

Galinsky, E., Bond, J. T., & Friedman, D. E. (1993). *The changing workforce: Highlights of the national study.* New York: Families and Work Institute.

Geurts, S. A. E. (2000). *SWING: Survey work-home interaction Nijmegen* (Internal research report). Nijmegen, the Netherlands: University of Nijmegen.

Geurts, S. A. E., Kompier, M. A. J., Roxburgh, S., & Houtman, I. L. D. (2003). Does work-home interference mediate the relationship between workload and well-being? *Journal of Vocational Behavior*, *63*, 532-559.

Geurts, S. A. E., Rutte, C., & Peeters, M. (1999). Antecedents and consequences of work-home interference among medical residents. *Social Science and Medicine*, *48*, 1135-1148.

Grandey, A., & Cropanzano, R. (1999). The conservation of resources model applied to work-family conflict and strain. *Journal of Vocational Behavior*, *54*, 350-370.

Greenhaus, J. H., & Beutell, N. J. (1985). Sources of conflict between work and family roles. *Academy of Management Review*, *10*, 76-88.

Grzywacz, J. G., & Marks, N. F. (2000). Re-conceptualizing the work-family interface: An ecological perspective on the correlates of positive and negative spillover between work and family. *Journal of Occupational Health Psychology*, *5*, 111-126.

Hackman, J. R., & Oldham, G. R. (1976). Motivation through the design of work: Test of a theory. *Organizational Behavior and Human Performance*, *16*, 250-279.

Herold, J., & Waldron, I. (1985). Part time employment and women's health. *Journal of Occupational Medicine*, *27*, 405-412.

Hochschild, A. (1997). *The time bind*. New York: Metropolitan.

Hoyle, R. H. (1995). The structural equation modeling approach: Basic concepts and fundamental issues. In R. H. Hoyle (Ed.), *Structural equation modeling, concepts, issues, and applications* (pp. 1-15). Thousand Oaks, CA: Sage.

Johnson, J. V., & Hall, E. M. (1988). Job strain, work place social support and cardiovascular disease: A cross sectional study of a random sample of the Swedish working population. *American Journal of Public Health*, *78*, 1336-1342.

Kahn, R. L., Wolfe, D. M., Quinn, R. P., Snoek, J. D., & Rosenthal, R. A. (1964). *Organizational stress: Studies in role conflict and ambiguity.* New York: John Wiley.

Karasek, R. (1985). *Job content instrument: Questionnaire and user's guide, revision 1.1*. Los Angeles: University of Southern California.

Karasek, R. A. (1979). Job demands, job decision latitude and mental strain: Implications for job redesign. *Administrative Science Quarterly*, *24*, 285-308.

Kinnunen, U., & Mauno, S. (1998). Antecedents and outcomes of work-family conflict among employed women and men in Finland. *Human Relations*, *51*, 157-177.

Kirchmeyer, C. (1993). Nonwork-to-work spillover: A more balanced view of the experiences and coping of professional women and men. *Sex Roles*, *28*, 531-552.

Kompier, M. A. J. (1988). *Arbeid en gezondheid van stadsbuschauffeurs* [Work and health of city bus drivers]. Doctoral thesis, University of Groningen, the Netherlands. Delft, the Netherlands: Eburon.

Leiter, M. P., & Durup, M. J. (1996). Work, home and in-between: A longitudinal study of spillover. *Journal of Applied Behavioral Science*, *32*, 1, 29-47.

Maslach, C., Jackson, S. E., & Leiter, M. P. (1996). *Maslach Burnout Inventory manual* (3rd ed.). Palo Alto, CA: Consulting Psychologists Press.

Meijman, T. F., & Mulder, G. (1998). Psychological aspects of workload. In P. J. Drenth, H. Thierry, & C. J. de Wolff (Eds.), *Handbook of work and organizational psychology* (2nd ed., pp. 5-33). Hove, UK: Psychology Press.

Moen, P., Dempster-McClain, D., & Williams, R. M. (1992). Successful aging: A life-course perspective on women's multiple roles and health. *American Journal of Sociology*, *97*, 1612-1638.

Parasuraman, S., Purohit, Y. S., Godshalk, V. M., & Beutell, N. J. (1996). Work and family variables, entrepreneurial career success, and psychological well-being. *Journal of Vocational Behavior*, *48*, 275-300.

Schaufeli, W. B., & Enzmann, D. (1998). *The burnout companion to study and practice: A critical analysis*. London: Taylor & Francis.

Schaufeli, W. B., Leiter, M. P., Maslach, C., & Jackson, S. E. (1996). *The Maslach Burnout Inventory-General survey.* In C. Maslach, S. E. Jackson, & M. P. Leiter (Eds.), *Maslach Burnout Inventory. Manual* (3rd ed., pp.19-26). Palo Alto, CA: Consulting Psychologists Press.

Schaufeli, W. B., Salanova, M., González-Romá, V., & Bakker, A. B. (2002). The measurement of burnout and engagement: A confirmatory factor analytic approach. *Journal of Happiness Studies*, *3*, 71-92.

Shirom, A. (1989). Burnout in work organizations. In C. L. Cooper & I. T. Robertson (Eds.), *International review of industrial and organizational psychology* (pp. 25-48). Chichester, UK: Wiley.

Sluiter, J. K. (1999). *How about work demands, recovery, and health*. Unpublished doctoral thesis, University of Amsterdam, the Netherlands.

Stephens, M. A. P., Franks, M. M., & Atienza, A. A. (1997). Where two roles intersect: Spillover between parent care and employment. *Psychology and Aging*, *12*, 30-37.

Ursin, H. (1980). Personality, activation and somatic health: A new psychosomatic theory. In S. Levine & H. Ursin (Eds.), *Coping and health* (pp. 259-279). New York: Plenum.

Van Veldhoven, M., & Meijman, T. F. (1994). *Het meten van psychosociale arbeidsbelasting met een vragenlijst: De vragenlijst beleving en beoordeling van de arbeid* [The measurement of psychosocial strain at work: The questionnaire experience and evaluation of work]. Amsterdam: TNO Arbeid.

Verbrugge, L. M. (1989). The twain meet: Empirical explanations of sex differences in health and mortality. *Journal of Health and Social Behavior, 30*, 282-304.

Wagena, E., & Geurts, S. A. E. (2000). SWING. Ontwikkeling en validering van de "Survey Werk-thuis Interferentie-Nijmegen" [SWING. Development and validation of the "Survey Work-home Interference-Nijmegen"]. *Gedrag & Gezondheid*, *28*, 138-158.

Wethington, E., & Kessler, R. C. (1989). Employment, parental responsibility, and psychological distress. *Journal of Family Issues*, *10*, 527-546.

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