Work & Stress, October-December 2005; 19(4): 319–339

Taylor & Francis
Taylor & Francis Group

Work-home interaction from a work psychological perspective: Development and validation of a new questionnaire, the SWING

SABINE A. E. GEURTS[1], TOON W. TARIS[1], MICHIEL A. J. KOMPIER[1], JOSJE S. E. DIKKERS[1], MADELON L. M. VAN HOOFF[1], & ULLA M. KINNUNEN[2]

[1]*Radboud University Nijmegen, Nijmegen, The Netherlands; and* [2]*University of Jyväskylä, Jyväskylä, Finland*

Abstract
This paper reports on the stepwise development of a new questionnaire for measuring work-home interaction, i.e. the **S**urvey **W**ork-home **I**nteraction—**N**ijme**G**en, the SWING). Inspired by insights from work psychology, more specifically from Effort-Recovery Theory (Meijman & Mulder, 1998), we defined work-home interaction by differentiating between the direction and quality of influence. Four types of work-home interaction were distinguished and measured by using 22 (including 13 self-developed) items. By using data from five independent samples (total $N = 2472$), validity evidence was provided based on the internal structure of the questionnaire. The results showed that the questionnaire reliably measured four empirically distinct types of work-home interaction, and that this four-dimensional structure was largely invariant across the five samples as well as across relevant subgroups. Validity evidence was also provided based on the relations with external (theoretically relevant) variables (i.e. job characteristics, home characteristics, and indicators of health and well-being). The results generally supported the hypothesized relationships of these external variables with negative work-home interaction. Less support was found, however, for the hypothesized relationships with positive work-home interaction. This contributes to current literature as it employs a relatively broad conceptualization of work-home interaction and offers a promising tool that measures its multiple components across a wide variety of workers.

Keywords: *Work-home interaction, questionnaire development, SWING, validation, job characteristics, home characteristics, health*

Introduction

Many scholars have theorized about the way in which people manage the possibly conflicting demands from work and family life. In the literature two main hypotheses are distinguished (Geurts & Demerouti, 2003, for an overview). The *role scarcity hypothesis* (related concepts are resource drain, conflict and negative spillover, see Edwards & Rothbard, 2000, for an overview) assumes that people possess limited and fixed amounts of resources (e.g. time and energy). Managing multiple roles (e.g. of employee, spouse and

Correspondence: S. A. E. Geurts, Department of Work & Organizational Psychology, Radboud University Nijmegen, PO Box 9104, NL-6500 Nijmegen, The Netherlands. E-mail: S.Geurts@psych.ru.nl

ISSN 0267-8373 print/ISSN 1464-5335 online
DOI: 10.1080/02678370500410208

parent) is problematic as they draw on the same scarce resources. Consequently, work-family conflict (or work-family interference) has been defined as 'a form of interrole conflict in which role pressures from the work and family domains are mutually incompatible in some respect' (Greenhaus & Beutell, 1985, p. 77). Previous research has demonstrated that especially time- and strain-based conflict (i.e. fulfilment of demands in one domain is difficult owing to the time devoted to and strain produced in the other domain, respectively) are associated with various negative work-, family- and stress-related outcome variables (Allen, Herst, Bruck, & Sutton, 2000, for a meta-analysis).

The second main hypothesis, the *role enhancement hypothesis* (related concepts are enrichment, facilitation and positive spillover, Greenhaus & Powell, in press), challenges the assumptions that people possess fixed amounts of energy and that fulfilling multiple roles is inevitably associated with strain. For example, the expansion theory of Marks (1977) proposes that fulfilling multiple roles may produce resources (e.g. energy mobilization, skill acquisition, greater self-esteem) that facilitate functioning in both life spheres.

Interestingly, empirical studies have abundantly examined work-home conflict and the role scarcity hypothesis, whereas positive work-home interaction and the idea of role enhancement have been under-researched (Geurts & Demerouti, 2003). This is also reflected in the many instruments available to measure negative work-home interaction, as opposed to only a few instruments exclusively developed for measuring positive interaction (Carlson, Kacmar, Wayne, & Grzywacz, in press; Kirchmeyer, 1992). Instruments developed for measuring both negative and positive interaction are even more exclusive. Although Grzywacz and Marks's (2000) instrument tapping negative and positive spillover is a notable exception, a concern is that some of its items (e.g. 'Your job makes you feel too tired to do the things that need attention at home'; 'Activities and chores at home prevent you from getting the amount of sleep you need to do your job well'; and 'The love and respect you get at home makes you feel confident about yourself at work') confound work-family spillover with its possible consequences (e.g. fatigue and sleep quality) and antecedents (e.g. spouse support).

The present study was designed to develop and validate a new questionnaire on work-home interaction. This instrument improves upon existing measures regarding the breadth of the concept measured, and the insights used from work psychology. In general, work psychological theories are based on the premise that workers interact with their work environment (i.e. job characteristics), and that workers' behaviour has consequences in terms of health and well-being. Drawing on Effort-Recovery (E-R) theory (Meijman & Mulder, 1998), this questionnaire (**S**urvey **W**ork-home **I**nteraction—**N**ijme**G**en or SWING; Nijmegen is the university town where the questionnaire was developed) differentiates between the *direction* of influence (i.e. influence from work on private life, and vice versa) and the *quality* of influence (i.e. negative versus positive influence).

The SWING was validated on the basis of its *internal structure* (i.e. 'the degree to which the relationships among test items and test components conform to the construct on which the proposed test score interpretations are based', American Psychiatric Association [APA] 1999, p. 13) and its *relations with external variables* (i.e. 'the degree to which these relationships are consistent with the construct underlying the proposed test interpretations', APA, 1999, p. 13), using data from 2472 workers drawn from five independent and different Dutch samples. The internal structure of the SWING was tested by (1) comparing the fit of a proposed 4-component model with other competing models, and (2) testing its invariance across five samples and relevant subgroups (i.e. gender, parental status, and full-/part-time status). We investigated the relations with external variables by examining the

patterns of correlations between the SWING components and three categories of theoretically relevant variables (i.e. job characteristics, home characteristics, and indicators of health and well-being).

Theoretical background

According to E-R theory, exposure to workload requires effort, which is associated with short-term psychophysiological reactions (e.g. accelerated heart rate, increased hormone secretion, and mood changes). In principle, these reactions are adaptive (e.g. providing information on the effort that is needed to perform the task) and reversible (i.e. when the exposure to workload ceases, the functional systems that were activated will stabilize (recover) again within a certain period of time). A central assumption of E-R theory is that the originally adaptive responses develop into *negative* reactions to workload (i.e. negative load reactions, such as sustained activation, strain, and/or short-term psychosomatic health complaints) when recovery opportunities during the exposure period are insufficient. This is ensued in job settings that provide workers with insufficient possibilities to regulate demands (e.g. job demands are too high) and/or to adjust their work strategy (work behaviour) when they consider this necessary (e.g. one cannot switch to less demanding tasks when one needs to recuperate). Owing to workers' inability to regulate effort investment, it will exceed acceptable limits resulting in negative load reactions (e.g. strain) that may spill over to the home domain.

In line with E-R theory, negative spillover has detrimental health effects when recovery opportunities between successive exposure periods are insufficient in terms of quantity (recovery time is too short, e.g. due to persisting demands) and/or quality (e.g. individuals unwind slowly and remain activated (sustained activation) after the exposure period, Ursin, 1980). Under these circumstances, functional systems are activated again before having had a chance to stabilize at a baseline level. The individual, still in a suboptimal state, must invest additional effort to perform adequately when confronted with (new) task demands, resulting in an increased intensity of the negative load reactions making even higher demands on the recovery process. Consequently, a cumulative process is started that in the long run may seriously affect health and well-being (e.g. prolonged fatigue and/or other manifest health problems, Sluiter, Frings-Dresen, Van der Beek, & Meijman, 2001; Van Hooff et al., 2005).

Consistent with our theoretical framework, not only negative but also *positive* reactions may develop as a function of job characteristics (further referred to as positive load reactions). In job settings that are characterized by high regulation possibilities in conjunction with high (but not overwhelming) job demands, workers can align their work behaviour with their current need for recovery. Consequently, effort expenditure remains within acceptable limits and is accompanied by positive load reactions (e.g. skills acquisition, motivation for learning, positive affect, self-efficacy). Insofar as studies have addressed this hypothesis, they provide evidence that the availability of regulation possibilities is associated with the absence of strain and the presence of learning experiences and personal growth (Taris & Kompier, 2005, for an overview). However, empirical tests of the positive spillover between both life domains are rare. One recent exception is Rothbard's (2001) study showing that engagement in the work domain was related to family positive affect. Two other notable studies revealed that workers reported more positive influence from work on home, the more job resources (i.e. learning opportunities, and meaningful work, Voydanoff, 2004; i.e. autonomy, performance feedback, and possibilities for

professional development, Bakker & Geurts, 2004) they experienced, and the higher their level of work engagement (Bakker & Geurts, 2004).

Although E-R theory was developed to understand the impact of *work* characteristics on work behaviour, and health and well-being, we expect the proposed mechanisms to operate similarly for the impact of *home* characteristics. When effort investment in the home domain becomes excessive (e.g. household or care-giving activities unremittingly require effort) and recovery is insufficient, negative load reactions will develop and spill over to the work domain. Then again, when effort investment remains acceptable because individuals can adjust their behaviour at home to their current need for recovery (e.g. by rescheduling effortful home tasks), positive load reactions will develop and spill over to the work domain.

Drawing on this theoretical perspective, we defined work-home interaction as

> a process in which a worker's functioning (behaviour) in one domain (e.g. home) is influenced by (negative or positive) load reactions that have built up in the other domain (e.g. work) (Geurts & Demerouti, 2003; Geurts, Kompier, Roxburgh, & Houtman, 2003; Van Hooff et al., 2005).

In the remainder of this research we will refer to work-home interaction (WHI) or home-work interaction (HWI), depending on the direction of the interaction.

Questionnaire development

In order to develop an instrument that measures both negative and positive work-home interaction, we followed a 4-step procedure (DeVellis, 1991). In the first step we defined the components to be measured. Building on the general definition of WHI/HWI, we distinguished four types of interaction: (1) *negative WHI*, that is, negative load reactions developed at work hamper functioning at home; (2) *negative HWI*, that is, negative load reactions developed at home hamper functioning at work; (3) *positive WHI*, that is, positive load reactions developed at work facilitate functioning at home; and (4) *positive HWI*, that is, positive load reactions developed at home facilitate functioning at work.

In the second step (item generation) we generated an item pool consisting of 187 items obtained from 17 existing instruments for measuring (particularly negative) WHI/HWI (Bacharach, Bamberger, & Conley, 1991; Bohen & Viveros-Long, 1981; Burley, 1989; Drory & Shamir, 1988; Field & Bramwell, 1988; Frone, Russell, & Cooper, 1992a; Gutek, Searle, & Klepa, 1991; Higgins, Duxbury, & Irving, 1992; Kirchmeyer, 1992; Kopelman, Greenhaus, & Connolly, 1983; Nelson, Quick, Hitt, & Moesel, 1990; Netemeyer, Boles, & McMurrian, 1996; O'Driscoll, Ilgen, & Hildreth, 1992; Small & Riley, 1990; Stephens, G. K. & Sommer, 1996; Stephens, M.A.P., Franks, & Atziena, 1997; Wortman, Biernat, & Lang, 1991). Items from three recently developed instruments for measuring negative interaction (Carlson, Kacmar, & Williams, 2000), positive interaction (Carlson et al., in press), or both (Grzywacz & Marks, 2000) could not be incorporated as they had not been published at the time of SWING construction.

In the third step (item evaluation), we discarded 30 items as they duplicated other items in the pool. We evaluated the remaining 157 items based on four criteria: (1) they should fit one of the four definitions of WHI/HWI (i.e. specifying a clear direction with an origin in one domain and an impact in the other, and with the quality of impact being clearly negative or positive); (2) they should, as far as possible, not confound with external variables (e.g. with presumed outcomes, such as fatigue, or presumed antecedents, such as social support); (3) they should not contain expressions that were difficult to translate into

other languages (especially Dutch; The Netherlands was the first country for which the SWING was developed); and (4) they should apply to all workers irrespective of their marital and/or parental status (e.g. they should not apply to only those with a spouse and/or children as all workers have a private life that may interact with their work life). Four researchers in the field of occupational health psychology (including the first and third author of the current paper) determined independently whether each item was a good representation of one of the four types of interaction.

In the fourth step (item selection and development), the classifications of these four judges were brought together in order to decide which items passed these four criteria. An item was selected if, after discussion, the four judges agreed on this issue. We discarded 69 items (e.g. 'I cannot balance my home and work responsibilities') based on criterion 1; 23 items (e.g. 'After work, I come home too tired to do some of the things I'd like to do') based on criterion 2; 14 items based on criterion 3 (e.g. 'My personal demands are so great that it takes away from my work'); and 41 items based on criterion 4 (e.g. 'I am a better parent because of my job'). Ten items survived this selection process and were adapted such that they would fit our definitions in the best possible way, and that respondents could answer how often (0 = '(practically) never', 1 = 'sometimes', 2 = 'often', and 3 = '(practically) always') they experienced negative or positive WHI/HWI: 6 items were included in our negative WHI scale, 2 items were incorporated in our negative HWI scale, 1 item was included in our positive WHI scale, and 1 item was included in our positive HWI scale (see table I for specific sources). For negative WHI, we developed three additional items so as to better capture the impact of mental preoccupation with the job while functioning at home (items 2 and 3, table I) and time-based interference (item 5, table I). For the other three scales, we developed new items to obtain at least six items per scale.

Table I presents the results of this four-step procedure. At this stage, the SWING consisted of 27 items (17 newly developed items are printed in bold in table I). Nine items were designed to measure *negative WHI* (five items (1–3, 6, 8) covering strain-based interference, and four items (4, 5, 7, 9) covering time-based interference). *Negative HWI* is measured by six (including four self-developed) items. Five of these items (10–12, 14, 15) parallel items from the negative WHI scale (items 1–3, 5, and 6, respectively). *Positive WHI* is measured by six items, of which five items were self-developed (items 16 and 17 tap the spillover of positive mood, and items 18–21 cover the transfer of skills learned at work). *Positive HWI* is measured by six items, of which five items (i.e. 22 to 26) were self-developed to parallel five positive WHI-items (items 22 and 23 capture the spillover of positive mood, and items 24–26 measure the transfer of skills learned at home).

Hypotheses

Factor structure. As we consider work-home interaction a 4-dimensional construct that distinguishes between the direction and quality of influence, we expect a 4-component model of the SWING (negative WHI, negative HWI, positive WHI, and positive HWI) to fit the data well and better than models distinguishing between either the direction (work affects home versus home affects work) or the quality (negative versus positive) of influence (*Hypothesis 1*).

Relations with job characteristics. Job characteristics included job pressure (i.e. quantitative workload at work), job control (i.e. control over work methods, work pace, and work planning) and job support (i.e. support and help from supervisor and colleagues), all considered crucial for workers' regulation of effort investment in job settings (De Lange,

Table I. Items and standardized item loadings for the four-factor model for the exploratory ($N = 615$) and confirmatory ($N = 1{,}857$) samples. All factor loadings significant at $p < .001$

	Exploratory sample		
	Loadings before item selection (27 items)	Loadings after item selection (22 items)	Confirmatory sample
How often does it happen that			
Negative WHI			
1. You are irritable at home because your work is demanding?	.41	.39	.34
2. **You do not fully enjoy the company of your spouse/family/friends because you worry about your work?**	.38	[a]	
3. **You find it difficult to fulfil your domestic obligations because you are constantly thinking about your work?**	.48	.45	.39
4. You have to cancel appointments with your spouse/family/friends due to work-related commitments?	.33	.35	.30
5. **Your work schedule makes it difficult for you to fulfil your domestic obligations?**	.45	.48	.40
6. You do not have the energy to engage in leisure activities with your spouse/family/friends because of your job?	.51	.52	.46
7. You have to work so hard that you do not have time for any of your hobbies?	.53	.56	.50
8. Your work obligations make it difficult for you to feel relaxed at home?	.55	.53	.50
9. Your work takes up time that you would have liked to spend with your spouse/family/friends	.47	.49	.45
Negative HWI			
10. The situation at home makes you so irritable that you take your frustrations out on your colleagues?	.34	.36	.35
11. **You do not fully enjoy your work because you worry about your home situation?**	.35	[a]	
12. **You have difficulty concentrating on your work because you are preoccupied with domestic matters?**	.46	.38	.39
13. Problems with your spouse/family/friends affect your job performance?	.35	.41	.41
14. **You arrive late at work because of domestic obligations?**	.15	[b]	
15. **You do not feel like working because of problems with your spouse/family/friends?**	.30	.31	.35
Positive WHI			
16. You come home cheerfully after a successful day at work, positively affecting the atmosphere at home?	.31	[a]	
17. **After a pleasant working day/working week, you feel more in the mood to engage in activities with your spouse/family/friends?**	.42	.38	.33

(Table continues)

Table I (*Continued*)

	Exploratory sample		
	Loadings before item selection (27 items)	Loadings after item selection (22 items)	Confirmatory sample
18. **You fulfil your domestic obligations better because of the things you have learned on your job?**	.70	.71	.61
19. **You are better able to keep appointments at home because your job requires this as well?**	.77	.80	.65
20. **You manage your time at home more efficiently as a result of the way you do your job?**	.50	.48	.49
21. **You are better able to interact with your spouse/family/friends as a result of the things you have learned at work?**	.32	.37	.35
Positive HWI			
22. **After spending time with your spouse/family/friends, you go to work in a good mood, positively affecting the atmosphere at work?**	.33	[a]	
23. **After spending a pleasant weekend with your spouse/family/friends, you have more fun in jour job?**	.40	.36	.29
24. **You take your responsibilities at work more seriously because you are required to do the same at home?**	.87	.88	.84
25. **You are better able to keep appointments at work because your are required to do the same at home?**	.89	.91	.91
26. **You manage your time at work more efficiently because at home you have to do that as well?**	.70	.69	.67
27. You have greater self-confidence at work because you have your home life well organized?	.62	.61	.60

Note. Response categories are 0 = "never", 1 = "sometimes", 2 = "often", and 3 = "always". Items 1, 7, 8 and 9 were adapted from Kopelman et al. (1983); item 4 was adapted from Netemeyer et al. (1996); item 6 was adapted from Small and Riley (1990); items 10 and 13 were adapted from Kirchmeyer (1992); items 16 and 27 were adapted from Stephens et al. (1997). Self-developed items are printed in bold.
[a] items omitted due to high overlap with other items; [b] item omitted due to low factor loading.

Taris, Kompier, Houtman, & Bongers, 2003; Karasek, 1998). Previous research consistently demonstrated that negative WHI was reported more often by workers who were confronted with relatively high job pressure and relatively low levels of job control and job support (Geurts & Demerouti, 2003), supporting our assumption that negative load reactions develop particularly in jobs that are characterized by high pressure and low levels of control and support. Grzywacz and Marks (2000) showed that more job control and job support were associated with more positive work-family spillover. Therefore, we expect that higher job pressure is associated with more negative WHI (*Hypothesis 2*), and that higher levels of job control and job support are associated with less negative WHI (*Hypothesis 3a*) and more positive WHI (*Hypothesis 3b*).

Relations with home characteristics. Home characteristics mirrored job characteristics and included home pressure (i.e. quantitative workload at home), home control (i.e. possibilities to deal with unexpected problems at home), and home support (i.e. support received from people in one's private life). In line with Hypotheses 2 and 3, we expect that higher home pressure is associated with more negative HWI (*Hypothesis 4*), and that higher levels of home control and home support are associated with less negative HWI (*Hypothesis 5a*) and more positive HWI (*Hypothesis 5b*). Supportive of this latter hypothesis, Grzywacz and Marks (2000) showed that higher home support was associated with less negative and more positive family-work spillover. To our knowledge, home pressure and home control have not been studied before as possible antecedents of positive HWI.

Relations with indicators of health and well-being. Fatigue and organizational commitment were included as a negative and a positive indicator of health and well-being, respectively. Consistent with E-R theory, high levels of negative WHI/HWI indicate spillover of negative load reactions, hampering recovery between successive exposure periods. Previous research provided evidence for strong cross-sectional associations between negative WHI/HWI and fatigue (Allen et al., 2000; Geurts et al., 2003), as well as for temporal relationships with decreased levels of psychological health across time (Demerouti, Bakker, & Bulters, 2004; Van Hooff et al., 2005). Hence, we hypothesize that higher levels of negative WHI/HWI are associated with more fatigue (*Hypothesis 6*). As regards organizational commitment, Cohen (1997) has shown that employees of a school district who reported positive WHI also reported more organizational commitment, suggesting that positive experiences at work are associated with more loyalty and willingness to invest effort into the organization. Therefore, we hypothesize that more positive WHI is associated with more organizational commitment (*Hypothesis 7*).

Method

Participants and procedure

Data were obtained from five cross-sectional studies conducted among five Dutch samples, that is, Sample 1 (*Mancom*) drawn from a manufacturing company in the electronic industry, Sample 2 (*Postcom*) drawn from the Postal Office, Sample 3 (*Fincom*) drawn from a financial consultancy firm, Sample 4 (*School*) drawn from 17 primary schools, and Sample 5 (*Public*) drawn from a governmental institute in the service sector. Data collection took place during the period 1999–2003. The same procedure was followed for all samples. After informative meetings with representatives of the management, personnel department and works council, all employees received a questionnaire, an accompanying letter (in which the goal of the study was explained and strict confidentiality was guaranteed) and a postage-paid reply envelop that could be returned to the university. A reminder was sent two weeks later. Table II presents the descriptive statistics on the five samples. Non-parametric Chi-square (χ^2) tests (comparing observed frequencies with expected frequencies based on the company population) revealed that, despite the relatively low response rates, each sample was similar to its company population with regard to age and gender distributions, except for Sample 2 (*Postcom*) where younger workers (<35 yrs) were under-represented, $\chi^2_{(2)} = 109.55$, $p < .01$.

Table II. Descriptive statistics on the five samples incorporated in this study (total sample, $N = 2472$).

	Mancom	Postcom	Fincom	School	Public
N	521	732	617	201	401
Response rate (%)	39	64	40	47	40
Mean age (standard deviations in brackets)	41.2 (8.81)	42.2 (8.03)	34.4 (9.69)	43.3 (9.95)	43.8 (8.44)
Duration of employment ≥10 years (%)	67	74	30	58	78
Males (%)	82	78	56	24	69
College or university degree	30	5	68	86	26
(%) Full-time job (%)	52	77	64	62	24
Managerial position (%)	29	11	40	16	8
Children living in the household (%)	60	63	34	48	77

Mancom = Manufacturing company (sample 1); Postcom = Postal office (sample 2); Fincom = Financial consultancy firm (sample 3); School = Primary schools (sample 4); Public = Governmental institute (sample 5).

External variables

Not all external variables were identically measured in all five samples. Underneath, for each variable it is indicated in which samples an identical measure was used. In Sample 2, Postcom, all external variables were measured in a different way.

Job characteristics were measured identically in four samples (not in Sample 2). *Job pressure* was measured by 7 items that were adapted from the Job Content Questionnaire (JCQ; Karasek, 1985). The original statements were rephrased as questions (e.g. 'Do you have enough time to get the job done?', 1 = '(almost) never', 4 = 'always'), with higher scores indicating higher pressure (total sample $_{\text{(samples 1,3,4, and 5) } (N=1740)}$: $M = 2.30$, $SD = .65$, $\alpha = .87$; range among the separate samples: $M = 1.43$ (Sample 5) to 2.53 (Sample 3), $SD = .41$ to .45, $\alpha = .65$ to .76). *Job control* was measured by 6 items from the extensively validated (Dutch) questionnaire on experience and evaluation of work (Van Veldhoven, De Jonge, Broersen, Kompier, & Meijman, 2002, for validity evidence). An exemplary item is: 'Can you take a short break if you feel this is necessary?', 1 = '(almost) never', 4 = 'always' (total sample $_{\text{(samples 1,3,4, and 5) } (N=1740)}$: $M = 2.54$, $SD = .63$, $\alpha = .84$; range among the separate samples: $M = 2.03$ (Sample 5) to 2.77 (Sample 3), $SD = .50$ to .59, $\alpha = .74$ to .84), with higher scores denoting higher levels of control. *Job support* was measured by 7 items from the JCQ (Karasek, 1985). Four items addressing supervisor support primarily covered instrumental support (e.g. 'My supervisor is helpful in getting the job done') and emotional support (e.g. 'My supervisor pays attention to what I am saying', 1 = 'totally disagree', 5 = 'totally agree'). Similar questions were asked for colleagues (total sample $_{\text{(samples 1,3,4, and 5) } (N=1740)}$: $M = 3.69$, $SD = .64$, $\alpha = .80$; range among the separate samples: $M = 3.53$ (Sample 5) to 3.81 (Sample 3), $SD = .59$ to .68, $\alpha = .77$ to .82). Higher scores signify higher levels of support.

Home characteristics. Home pressure was measured in Samples 1 and 4 by four items that we developed to parallel the job pressure items (e.g. 'Do you have to work very hard to get things done at home?', 1 = '(almost) never', 4 = 'always'), (total sample $_{\text{(samples 1 and 4) } (N=722)}$: $M = 2.18$, $SD = .66$, $\alpha = .81$; Sample 1: $M = 2.16$, $SD = .66$, $\alpha = .79$; Sample 4: $M = 2.23$, $SD = .65$, $\alpha = .82$), with higher scores denoting higher pressure. *Home control* was measured in three samples (not in Samples 2 and 3) by the self-developed question: 'When something unexpected happens in your home situation (e.g. a child gets ill), to what extent is it possible for you to arrange things (e.g. 'take a day off from work, or work from home', 1 = 'impossible to arrange', 5 = 'very easy to arrange'), (total sample $_{\text{(samples 1,4, and 5)}}$

(samples 1 and 4) ($N = 1123$): $M = 3.72$, $SD = 1.10$; range among the separate samples: $M = 2.72$ (Sample 4) to 4.35 (Sample 5), $SD = .97$ to 1.12). *Home support* was measured in Samples 1 and 4 by three items that were adapted from Geurts, Rutte, and Peeters (1999; Peeters & Le Blanc, 2001, for validty evidence). These items covered emotional support (e.g. 'Do people in your private life (partner, children, friends or family) pay attention to your feelings and problems?') and appraisal support (e.g. 'Do people in your private life show that they appreciate the household and caring tasks you carry out?', 1 = '(almost) never', 4 = 'always'), (total sample (samples 1 and 4) ($N = 722$): $M = 2.90$, $SD = .70$, $\alpha = .79$; Sample 1: $M = 2.84$, $SD = .71$, $\alpha = .80$; Sample 4: $M = 3.08$, $SD = .62$, $\alpha = .79$). Higher scores signify higher levels of support.

Indicators of health and well-being. Fatigue was measured in three samples (not in Samples 2 and 3) using 10 items of the Fatigue Assessment Scale (FAS; see Michielsen, De Vries, & Van Hecke, 2003, for validity evidence). An exemplary item is: 'I am bothered by fatigue', 1 = 'never', 5 = 'always' (total sample (samples 1,4, and 5) (n = 1123): $M = 1.97$, $SD = .57$, $\alpha = .85$; range among the separate samples: $M = 1.91$ (Samples 4 and 5) to 2.04 (Sample 1), $SD = .57$ (all samples), $\alpha = .84$ to .86), with higher scores indicating higher levels of fatigue. *Organizational commitment* was measured identically in four samples (not in Sample 2) by five items from the well-known Affective Commitment Scale (Allen & Meyer, 1990, for validity evidence), e.g. 'This organization has a great deal of personal meaning to me', 1 = 'totally disagree', 5 = 'totally agree', total sample (samples 1,3,4, and 5) ($N = 1740$): $M = 3.49$, $SD = .80$, $\alpha = .82$; range among the separate samples: $M = 3.13$ (sample 4) to 3.63 (Sample 1), $SD = .66$ to .85, $\alpha = .80$ to .86). Higher scores denote higher levels of commitment.

Statistical analysis

To test *Hypothesis 1*, we compared the proposed 4-component model of the SWING with three competing models for the relationships among the 27 items. *Model 1* proposed that all 27 items load on the same underlying latent dimension, assuming that the items cannot be distinguished because of the direction or quality of influence. *Model 2* ('direction model') was a 2-factor model, distinguishing between items that refer to either influence from work or influence from home (irrespective of its quality). *Model 3* ('quality model') also distinguished between two factors, differentiating between items that refer to either positive or negative interaction (irrespective of the originating domain). Finally, *Model 4* ('hypothesized model') represented the four proposed components: negative WHI, negative HWI, positive WHI, and positive HWI. Hypothesis 1 is supported when Model 4 fits the data well and better than Models 1 to 3.

All factor analyses were conducted using confirmatory factor analysis (CFA, LISREL 8, Jöreskog & Sörbom, 1993), with the covariance matrix as input. Preliminary analysis revealed that no less than 98.8% of the participants provided complete data for all variables of interest. We then replaced missing values with maximum likelihood estimates of these (Little & Rubin, 2002). The fit of the respective models was compared in terms of their Chi-square (χ^2) value, as well as the Non-Normed Fit Index (NNFI), the Comparative Fit Index (CFI), and the Root Mean Square Error of Approximation (RMSEA). Values of .90 and over (for NNFI and CFI) or .08 and under (RMSEA) signify acceptable fit (Byrne, 2001). In order to minimize the risk of capitalization on chance, we used the cross-validation approach advocated by MacCallum, Roznowski, and Necowitz (1992). Following this approach, the total sample ($N = 2472$) was split into two subsamples. The first *exploratory* sample ($N = 615$) was a 25% random sample of the total sample, and was used

to compare the four models described above, as well as for model fitting purposes. The results obtained were then cross-validated on a second *confirmatory* sample ($N = 1857$), including the remaining 75% of the cases. The latter sample included more cases, allowing us to use multi-group CFA in order to test the invariance of the factor structure and the equivalence of parameter estimates (i.e. factor loadings, factor covariances and item error variances) across the five separate samples, gender (males versus females), parental status (parents versus non-parents), and working hours (full timers (≥ 36 h) versus part timers (< 36 h)).

In order to test *Hypotheses 2 to 7* concerning the relations with external variables, partial correlations were calculated (controlling for the effects of sample, gender, parental status, and working hours; missing data were excluded pairwise). Each correlation was calculated within a combined sample incorporating those samples in which the specific external variable was measured identically. Sample 2, Postcom, was not included in this combined sample because, as we stated before, the external correlates were measured in a different way. Before pooling the samples, within each sample the four SWING scales and the external variables were standardized (z-scores) in order to adjust for mean level differences among the samples (Hox, 2002). Considering the large sample size, for all analyses a probability level of $p < .01$ was utilized. Irrespective of their statistical significance, correlations of .10 and under were not considered meaningful and will therefore not be discussed (Cohen, 1988).

Results

Internal structure

Factor structure (exploratory sample). Table III presents the fit indices for the four models that were compared. Clearly, the one-factor model (M1) did not account well for the data. Although both 2-factor models (M2 and M3) explained the associations among the items better than Model 1 (M2 versus M1: $\Delta \chi^2 = 725.2_{(N=615)}$, $df = 1$, $p < .001$; M3 versus M1: $\Delta \chi^2 = 2084_{(N=615)}$, $df = 0$, $p < .001$), their fit still did not meet our criteria. Model 4 ('hypothesized model', distinguishing among the four proposed components of WHI/HWI) explained the associations among the items better than the three competing models (M4 versus M1: $\Delta \chi^2 = 3111_{(N=615)}$, $df = 6$, $p < .001$; M4 versus M2: $\Delta \chi^2 = 2386.7_{(N=615)}$, $df = 5$, $p < .001$; M4 versus M3: $\Delta \chi^2 = 1027.9_{(N=615)}$, $df = 5$, $p < .001$). Although Model 4 accounted reasonably well for the data (RMSEA was below the .08 threshold), its fit still fell short of what should be considered acceptable (NNFI and CFI were below the .90 threshold).

Inspection of the fit indices, factor loadings and modification indices suggested that Model 4 could be improved in several respects. Four pairs of items (i.e. items 2 and 3; 10 and 11; 16 and 17; and 22 and 23, see table I) showed highly correlated error terms, suggesting that these pairs of items empirically constituted separate factors. It would seem plausible that omitting one item for each pair (i.e. item 2, 11, 16, and 22) would improve the fit of the 4-factor model. Further, one item (item 14, see table I) loaded only weakly (standardized loading = .15, $p < .001$) on the intended factor. Model 4 was modified accordingly (i.e. these five items were omitted stepwise), resulting in Model 5 ('final model') that fitted the data better than M4 (M5 versus M4: $\Delta \chi^2 = 727.7_{(N=615)}$, $df = 115$, $p < .001$) and acceptably well (NNFI and CFI exceeding .90, RMSEA $< .08$, cf. table 2).

Table III. Comparison of factorial models (exploratory sample, $N = 615$).

Model		χ^2	*df*	NNFI	RMSEA	CFI
M1	1-factor	4440.3	324	.30	.19	.35
M2	2-factor ('direction model')	3715.1	323	.42	.17	.46
M3	2-factor ('quality model')	2356.3	323	.65	.11	.68
M4	4-factor ('hypothesized model')	1328.4	318	.82	.07	.84
M5	4-factor ('final model')	600.7	203	.91	.06	.92

NNFI = Non-Normed Fit Index; RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index.

Table I presents the standardized item loadings for the 4-factor model before and after item selection.

A rule of thumb is that items should have a loading of at least .35 on the presumed factor in order to be retained in a fitted model. Inspection of table I reveals that item 15 did not meet this criterion in the exploratory sample. Nevertheless, we decided to maintain this item since reliability analysis revealed that its inclusion improved Cronbach's α for negative HWI from .67 to .72. The reliabilities of the other scales were .85 (negative WHI), .72 (positive WHI), and .78 (positive HWI), all exceeding the .70 criterion (Nunnally, 1978).

Invariance of factor structure (confirmatory sample). The results obtained for the exploratory sample were cross-validated using the data of the 1857 remaining participants. In four separate multi-group CFAs, we examined whether the final model (M5) fitted the data acceptably well for (1) each of the five samples, (2) males and females, (3) parents and non-parents, and (4) part-timers and full-timers. Further, we examined whether the factor loadings, factor covariances (relationships among latent variables), and item error variances (relationships among manifest variables) were equivalent across these samples and subgroups. These analyses thus reveal (a) whether the model obtained for the exploratory sample holds for the confirmatory sample; and (b) whether the factor structure and parameter estimates are invariant across samples and subgroups.

To test whether the factor structure and loadings were equivalent across the five *samples*, we compared the fit of a model allowing the factor loadings, factor covariances and item error variances to vary across the samples ($\chi^2 = 2305.5$, $df = 1015$, NNFI = .89, RMSEA = .06, CFI = .90) to the fit of a model constraining all these parameter estimates to be equal across the five samples ($\chi^2 = 3031.3$, $df = 1215$, NNFI = .87, RMSEA = .07, CFI = .87). The χ^2-difference relative to the change in the number of degrees of freedom was statistically significant ($\Delta\ \chi^2 = 725.8$ $_{(N=1,857)}$, $df = 200$, $p < .01$), thus indicating that the constrained model provided a worse fit. However, because of our large sample size even small differences between the specified and the underlying 'true' model will be significant (Bentler & Bonett, 1980). This reasoning was confirmed by the fact that the values for the NNFI, RMSEA and CFI were not much lower for the model constraining all parameter estimates to be equal across the five samples (.87, .07, .87, respectively) as compared to the unconstrained model (i.e. .89, .06 and .90, respectively), indicating that the parameter estimates did not differ strongly across the five samples.

Next, we examined whether the factor structure and parameter estimates varied as a function of *gender*, *parental status*, and *working hours*. The χ^2-difference relative to the change in the number of *df* was statistically significant when factor loadings, factor covariances and item error variances were constrained to be equal for males and females ($\Delta\ \chi^2 = 151.5$ $_{(N=1,857)}$, $df = 50$, $p < .01$) and for parents and non-parents ($\Delta\ \chi^2 = 93.1$

$_{(N=1,857)}$, $df=50$, $p<.01$). However, values for the other fit indices (NNFIs and CFIs for both the unconstrained and constrained model were all .91; RMSEAs were all .06) showed that these parameter estimates were highly similar for males and females as well as for parents and non-parents. Constraining these parameter estimates to be equal for full-timers and part-timers did not result in a deterioration in fit ($\Delta\ \chi^2=32.3$ $_{(N=1,1815)}$, $df=50$, $p=ns$), indicating that they were equivalent across these two subgroups.

Table I presents the standardized item loadings for the confirmatory sample ($N=1857$). Although the loadings differed somewhat from those obtained for the exploratory sample, the differences were usually negligibly small. Thus, our results demonstrated that the 4-factor model of the SWING fits the data well and better than any competing model tested, and that this held true across sample, gender, parental status, and working hours. Although five items had to be eliminated from our original set of items, these findings support Hypothesis 1.

Table IV presents the intercorrelations, means, standard deviations, and reliabilities of the four SWING scales, for the confirmatory sample ($N=1857$). The αs were similar to or even higher than those obtained for the exploratory sample, again suggesting that the 4-factor structure of the SWING was robust. The intercorrelations were the highest between the two negative scales ($r=.30$, $p<.001$) and between the two positive scales ($r=.56$, $p<.001$). To exclude the possibility that the items belonging to these two positive components actually tapped the same underlying dimension, a *post-hoc* CFA was conducted in which a 2-factor model (corresponding with the two positive scales proposed in Table I) was compared to a 1-factor model (in which the items of these two scales loaded on one factor). This analysis revealed that the 2-factor solution ($\chi 2=471.4$ $_{(N=1,857)}$, $df=34$, RMSEA = .08, NNFI = .90, CFI = .92) had to be preferred to the one-factor solution ($\chi 2=1388.2$ $_{(N=1,857)}$, $df=35$, RMSEA = .16, NNFI = .70, CFI = .77), indicating that positive WHI and positive HWI represented two empirically different constructs.

Additional paired-samples *t*-tests revealed that workers reported more negative WHI ($M=.86$) than negative HWI ($M=.47$, $t_{(1857)}=32.6$, $p<.001$). This difference was not only observed in the total sample, but also in each of the five samples (all ts >16.3, ps $<.001$, except Public, $t=3.7$, $p<.01$), among men and women (both ts >17.2, ps $<.001$), among parents and non-parents (both ts >26.1, ps $<.001$), and among full- and part-timers (both ts >18.1, ps $<.001$). Of the positive subscales, positive HWI ($M=1.15$) was reported more often than positive WHI ($M=.83$, $T_{(1857)}=22.3$, $p<.001$). This pattern of prevalence was also robust across the five samples (all ts >6.1, all ps $<.001$, except school, $t=1.44$, $p<.01$), across gender (both ts >16.5, ps $<.001$), across parental status (both ts >14.5, ps $<.001$), and across full-/part-time status (both ts >15.3, ps $<.001$). On request of interested readers, the first author can provide descriptive statistics (means and standard deviations) of the four SWING scales for each sample and subgroup.

Table IV. Means, standard deviations, intercorrelations and reliabilities of the four SWING scales (confirmatory sample, $N=1857$).

	(1)	(2)	(3)	(4)	*M*	*SD*	α
(1) Negative WHI	1.00				0.86	0.48	.84
(2) Negative HWI	.30	1.00			0.47	0.41	.75
(3) Positive WHI	.12	.12	1.00		0.83	0.57	.75
(4) Positive HWI	.03^{ns}	.11	.56	1.00	1.15	0.74	.81

All correlations significant at $p<.01$, except ^{ns}.

Relations with external variables (total sample)

The results reported above support the notion that the four types of WHI/HWI as measured with the SWING tap related but empirically distinct constructs. To substantiate this notion further, we examined the patterns of correlations with external variables. The results reported above presented no evidence for differences between the exploratory and confirmatory sample, both samples were pooled. Table V presents the partial correlations (only those that were significant at $p < .01$) of the four SWING scales with the three categories of external variables. Given the demographic differences among the separate samples, we controlled for sample, gender, parental status, and working hours (i.e. full-/part-time status). In case a correlation of a SWING scale with an external variable might be spurious due to their common variance with another SWING scale, additional partial correlations were calculated and discussed in the text.

Job characteristics. Higher levels of negative WHI were associated with higher job pressure ($r = .43$, $p < .001$; Hypothesis 2 supported) and lower levels of job control ($r = -.17$, $p < .001$) and job support ($r = -.24$, $p < .001$; Hypothesis 3a supported). There were two additional cross-domain relationships, that is, of negative HWI with job control ($r = -.16$, $p < .001$) and job support ($r = -.12$, $p < .001$). However, the latter cross-domain relationship was no longer significant ($r = -.05$, $p = ns$) after we controlled for the impact of negative WHI. The cross-domain relationship between negative HWI and job control remained significant ($r = -.12$, $p < .01$) after controlling for negative WHI, indicating that higher job control did co-vary with less interference from both domains. There was only partial support for Hypothesis 3b: Positive WHI was significantly related to job support ($r = .12$, $p < .001$), but its association with job control ($r = .07$, $p < 001$) fell short of what we considered to be meaningful (i.e. $r \geq .10$; Hypothesis 3b supported for only job support).

Home characteristics. Higher home pressure was strongly associated with more negative HWI ($r = .30$, $p < .001$; Hypothesis 4 supported). The cross-domain association between home

Table V. Partial correlations (controlled for sample, gender, parental status and working hours) between the SWING scales and external variables (total sample, $N = 2472$).

	Negative WHI	Positive WHI	Negative HWI	Positive HWI
Job characteristics				
Job pressure (samples 1,3,4 and 5, $n = 1740$)	.43 [H2]	–	.08	–
Job control (samples 1,3,4 and 5, $n = 1740$)	−.17 [H3a]	.07 [H3b]	−.16	–
Job support (samples 1,3,4 and 5, $n = 1740$)	−.24 [H3a]	.12 [H3b]	−.12	.08
Home characteristics				
Home pressure (samples 1 and 4, $n = 722$)	.29	.12	.30 [H4]	.11
Home control (samples 1,4 and 5, $n = 1123$)	−.24	–	– [H5a]	– [H5b]
Home support (samples 1 and 4, $n = 722$)	–	–	−.15 [H5a]	– [H5b]
Health and well-being indicators				
Fatigue (samples 1,4 and 5, $n = 1123$)	.52 [H6]	–	.37 [H6]	–
Organizational commitment (samples 1,3,4 and 5, $n = 1740$)	–	.19 [H7]	−.13	.15

Sample 1 = Mancom; Sample 3 = Fincom; Sample 4 = School; Sample 5 = Public. H2 to H7 refer to the respective hypotheses.
All partial correlations are significant at $p < .01$.

pressure and negative WHI ($r = .29$, $p < .001$) remained strong ($r = .21$, $p < .001$) after controlling for negative HWI, indicating that higher home pressure was positively related to interference from both domains. The observed positive associations of home pressure with both positive SWING scales ($r = .12$ and $r = .11$, ps $< .01$) were no longer meaningful ($r = .08$, $p < .05$, $r = .05$, $p =$ ns) after controlling for the impact of the other positive SWING scale. Whereas more home support was associated with less negative HWI ($r = -.15$, $p < .001$), home control did not show a similar association (Hypothesis 5a supported for home support only). Instead, higher levels of home control were associated with less negative WHI ($r = -.24$, $p < .001$). Home control and home support were not associated with positive HWI (Hypothesis 5b not supported).

Indicators of health and well-being. Both negative WHI and negative HWI were associated with higher levels of fatigue ($r = .52$, $p < .001$ and $r = .37$, $p < .001$, respectively; Hypothesis 6 supported), and these correlations remained strong ($r = .45$ and $r = .24$, respectively) after controlling for the impact of the other negative SWING scale. Positive WHI did co-vary with more organizational commitment ($r = .19$, $p < .001$; Hypothesis 7 supported). The association of positive HWI with organizational commitment ($r = .15$, $p < .001$) was no longer significant ($r = .05$, $p < .05$) after controlling for positive WHI. Negative HWI was (moderately) associated with organizational commitment ($r = -.13$, $p < .001$), suggesting that workers felt less committed to their organization, the more interference from home they experienced.

Discussion

The purpose of the present research was to develop a questionnaire for measuring negative and positive work-home interaction. Inspired by insights from work psychology, more specifically from E-R theory (Meijman & Mulder, 1998), we provided validity evidence based on (1) the internal structure, and (2) relations with other (theoretically relevant) variables by using data from five large cross-sectional samples (total $N = 2472$).

Evidence based on the internal structure

The final version of the questionnaire included 22 items, of which 13 items were newly developed. The results of CFAs lend credit to the notion that the four derived SWING components tapped theoretically and empirically distinct, albeit related, constructs. The observed 4-dimensional structure of the SWING appeared to be basically invariant across the five samples and across relevant subgroups, providing evidence regarding its robustness across a wide variety of workers. The largely invariant factor loadings, factor covariances and item error variances across samples and subgroups demonstrated that the SWING items did not function differently in any of these groups.

Negative influence appeared to originate more often from the work than from the home domain. This corresponds to previous research suggesting that work boundaries are less flexible than home boundaries due to the forced structure and obligatory nature of paid work (Frone, Russell, & Cooper, 1992b; Gutek et al., 1991). Conversely, and similar to Grzywacz and Marks' (2000) finding, positive influence originated more often from the home than from the work domain. Drawing on our theoretical outline, these findings suggest that the home domain may offer more possibilities to adjust behaviour to one's current need for recovery than the work domain, lowering the risk of negative load reactions and increasing the probability of positive load reactions to spill over to the other domain.

Evidence based on relations with external variables

The four derived SWING components were differentially related to job and home characteristics and indicators of health and well-being. In accordance with our expectations, the two negative SWING scales were uniquely associated with fatigue, which corresponds with our assumption that interference impedes recovery and is associated with the spillover of negative load reactions to the other domain. Positive WHI was distinctively associated with commitment, suggesting that positive work experiences (e.g. good mood, skills acquisition) are accompanied by feelings of loyalty to the organization.

The observations that higher job pressure and lower levels of job control and job support were related to more interference from work, support our notion that when individuals are exposed to high job demands and when they have low regulation possibilities (i.e. control and support) to deal with these demands, negative load reactions are likely to develop and to spill over to the home domain. Whereas job pressure and job support were uniquely related to interference from work, higher job control was also (albeit weakly) related to less interference from home. This latter finding suggests that when workers can regulate their work demands and align their work behaviour with their current need for recovery, not only negative load reactions are less likely to develop at work, but also functioning at work is impeded less by negative experiences at home.

In the home domain, we found support for similar relations as were observed in the work domain: higher home pressure and lower home support were associated with more interference from home. In contrast with home support, home pressure was not uniquely related to interference from that same domain. The positive cross-domain association of home pressure with interference from work may indicate that when individuals are exposed to high home demands, they are more likely to experience that their functioning at home is hampered by work obligations. A closer inspection of our home control measure increases our understanding of this at first sight counterintuitive finding. Respondents were asked whether they were able 'to arrange things (e.g. by taking a day off or working from home) when something unexpected happened in their home situation'. This formulation leaves aside, though, in *which* domain things are arranged. In fact, the examples given are more illustrative of flexibility in the *work* domain than in the home domain. This cross-domain association may thus indicate that when flexibility at work is utilized to solve sudden calamities at home, work impedes private life to a lesser extent.

Whereas the results generally supported the hypothesized relations of the two negative SWING scales with the external variables, the hypothesized relations of the two positive SWING scales with the external variables were less supported. Although we assumed that positive load reactions would develop in an environment that provides high levels of control and support, only support in the work domain (reflecting primarily instrumental 'hands on' support and emotional support) did co-vary with positive influence from that domain. The fact that home support was not associated with positive HWI may be explained by its item content. Our home support measure captured particularly emotional and appraisal support, while instrumental support (i.e. practical help, for example by taking home tasks off someone's hands) may be more important for preventing negative and promoting positive spillover. The lack of significant relationships between control (in both domains) and positive WHI/HWI raises the question of whether other motivational characteristics, not incorporated in the present study, might have more potential to elicit positive load reactions (e.g. learning or career opportunities, possibilities for professional development, and/or psychological rewards, Bakker & Geurts, 2004; Voydanoff, 2004; Wagena & Geurts, 2000).

Strengths, limitations and future research

The authors believe that their instrument for measuring work-home interaction potentially complements current tools in this research area in at least four regards. First, the SWING is one of the first instruments that was developed and validated with insights used from work psychology. E-R theory was utilized to define various components of work-home interaction (and item selection and item development for the SWING were based on these definitions), and to formulate hypotheses about how these components would embed in a nomological network of theoretically-related concepts. Second, the SWING is one of the few instruments that provides a relatively broad picture of the work-home interface, addressing both its negative and its positive side. Third, we incorporated five different and independent samples composed of employees from a wide range of organizations, and we provided evidence for the proposed four-dimensional factor structure of the SWING and its invariance across samples and subgroups, verifying its robustness and generalizability. Finally, the SWING is the first questionnaire on work-home interaction that was developed for and validated on samples drawn from a European country (the large majority of scales in this area have been developed for and validated on US samples).

Despite these positive points, several weaknesses of this study should be mentioned as well. First, the mean scores and standard deviations for the SWING scales were generally low (Table IV). It is not possible to compare these levels with those obtained in previous studies using other instruments because of different metrics. For instance, Kopelman et al. (1983) used a 5-response format varying from 'strongly disagree' (1) to 'strongly agree' (5) (with 3 = 'neither agree, nor disagree'), whereas we used a 4-reponse format varying from '(practically) never' (0) to '(practically) always' (3). It is important to note, however, that although the four SWING components showed differential relationships with the external variables under study, the low mean levels and restricted variation of the SWING scales might have caused underestimations of the true relationships.

A second limitation concerned our general means of data collection. That is, we only used one source and method (i.e. self-reports from workers) to examine the structure of work-home interaction and its associations with external variables. The use of one source or method may result in common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003, for an overview). Future research should take this limitation into account by using multiple sources of information (e.g. the partner, adolescent children, supervisors) and multiple methods (e.g. physiological indicators of effort expenditure) to examine work-home interaction and its associations (Semmer, Grebner, & Elfering, 2004, for a critical evaluation).

A third limitation is the restricted set of outcome variables included in the current study, that is, two indicators of health and well-being. Only fatigue and organizational commitment were used as they were identically measured in the majority of the samples. From a theoretical point of view, using a broader set of possible outcome variables would be desirable. As previous studies (Frone et al., 1992a) suggested that interference from a specific domain may have unique domain-related outcomes, a suggestion for future research is to include both general and domain-related 'outcomes' (e.g. job satisfaction, family satisfaction, context-related affect, and other indicators of health and well-being; Rothbard, 2001, Van Horn, Taris, Schaufeli, & Schreurs, 2004).

A fourth point concerns the quality of the instruments used to assess the home characteristics (i.e. home pressure, home control, home support). Whereas the measures used to assess the work characteristics (i.e. job pressure, job control and job support) were all adapted from extensively validated instruments, the home measures were largely self-

developed. Moreover, given the few items representing the home characteristics (e.g. a single-item measure was representing home control), their content validity might be at issue. A suggestion for future research is to use a broader set of items representing each home construct (see the previous discussion on home support and home control).

A fifth and related point is that positive WHI/HWI is less well explained than negative WHI/HWI, as evidenced by the lower partial correlations with the first two concepts. Besides the earlier discussed query of relevant, but unmeasured, motivational characteristics our positive WHI/HWI items may also reflect a rather narrow set of positive attributes that may improve functioning in the other domain. In future research we might, therefore, consider expanding the current set of items (covering the transfer of learning experiences, skills and, to a lesser extent, good mood) with items covering, for instance, a sense of security or fulfilment originating from relevant others in one's private life or from having a pleasant job.

A sixth and obvious limitation was the use of cross-sectional data, making it impossible to establish causal relationships with presumed antecedents and consequences. Although this was not the goal of the present study, one suggestion for future research is to examine these associations in a longitudinal design in which all variables are measured at various (preferably theoretically chosen) points in time (Taris & Kompier, 2003). Longitudinal studies employing short time lags (e.g. diary studies, Sonnentag, 2001) may disclose what type of work and home activities individuals are engaged in (i.e. activity patterns) and to what extent certain activity patterns (e.g. frequently working overtime) are associated with certain types of work-home interaction (e.g. negative WHI). Longitudinal studies employing long time lags (e.g. Van Hooff et al., 2005) may reveal to what extent and by what mechanisms, work and home characteristics and work-home interaction affect health and well-being in the long run.

A final limitation is that all data used in the current study were collected with a Dutch version of the questionnaire and from organizations located in the Netherlands. Future research should reveal whether the current research findings can be replicated in cross-national research that employs translated versions of the SWING. Such studies can be expected in the not-too-distant future.

Notwithstanding these limitations, we believe that the current study has contributed to previous research by demonstrating that the work-home interface merits a broad conceptualization, distinguishing between the quality and direction of influence between both domains. By developing an instrument that fits this broad conceptualization, and by providing validity evidence based on its internal structure and its relations with theoretically relevant variables, we believe that the SWING offers a promising tool to measure multiple components of work-home interaction among a wide variety of workers.

Acknowledgements

This study was supported by grants #580-02-104 and #015.000.027 from the Netherlands Organization for Scientific Research (NWO) to Sabine Geurts. We thank Edwin Wagena and Floor van den Heuvel for their valuable contribution to the SWING construction. The authors are also grateful that Laura den Dulk and Bram Peper made the Fincom and Public data sets available for validation purposes.

References

Allen, N. J., & Meyer, J. P. (1990). The measurement and antecedents of affective, continuance and normative commitment to the organization. *Journal of Occupational Psychology*, *63*, 1–18.

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.

American Psychological Association [APA] (1999). *Standards for educational and psychological testing*. Washington, DC: APA.

Bacharach, S., Bamberger, P., & Conley, S. (1991). Work-home conflict among nurses and engineers: Mediating the impact of role stress on burnout and satisfaction at work. *Journal of Organizational Behavior*, *12*, 39–53.

Bakker, A. B., & Geurts, S. A. E. (2004). Towards a dual-process model of work-home interference. *Work & Occupations*, *31*, 345–366.

Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin*, *88*, 588–606.

Bohen, H. C., & Viveros-Long, A. (1981). *Balancing jobs and family life: Do flexible work schedules help?*. Philadelphia, PA: Temple University Press.

Burley, K. (1989). *Work-family conflict and marital adjustment in dual career couples: A comparison of three time models*. Ph.D. thesis, Claremont Graduate School, Claremont, CA.

Byrne, B. M. (2001). *Structural equation modeling with AMOS*. Mahwah, NJ: Erlbaum.

Carlson, D. S., Kacmar, M. K., & Williams, L. J. (2000). Construction and validation of a multidimensional measure of work-family conflict. *Journal of Vocational Behavior*, *56*, 249–276.

Carlson, D. S., Kacmar, M. K., Wayne, J. H., & Grzywacz, J. G. (in press). Measuring the positive side of the work-family interface: Development and validation of a work-family enrichment scale. *Journal of Vocational Behavior*.

Cohen, A. (1997). Personal and organizational responses to work-nonwork interface as related to organizational commitment. *Journal of Applied Social Psychology*, *27*, 1085–1114.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Erlbaum.

De Lange, A. H., Taris, T. W., Kompier, M. A. J., Houtman, I. L. D., & Bongers, P. M. (2003). The very best of the millennium: Longitudinal research on the Job demands-Control model. *Journal of Occupational Health Psychology*, *8*, 282–305.

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.

DeVellis, R. F. (1991). *Scale development: Theory and applications*. Thousand Oaks, CA: Sage.

Drory, A., & Shamir, B. (1988). Effects of organizational and life variables on job satisfaction and burnout. *Group & Organization Studies*, *13*, 441–455.

Edwards, J. R., & Rothbard, N. P. (2000). Mechanisms linking work and family: Clarifying the relationship between work and family constructs. *Academy of Management Review*, *25*, 178–199.

Field, S., & Bramwell, R. (1988). An investigation into the relationship between caring responsibilities and the levels of perceived pressure reported by female employees. *Journal of Occupational and Organizational Psychology*, *17*, 165–170.

Frone, M. R., Russell, M., & Cooper, M. L. (1992a). 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. (1992b). Prevalence of work-family conflict: Are work and family boundaries asymmetrically permeable? *Journal of Organizational Behavior*, *13*, 723–729.

Geurts, S. A. E., & Demerouti, E. (2003). Work/non-work interface: A review of theories and findings. In M. Schabracq, J. Winnubst, & C. L. Cooper (Eds), *Handbook of Work and Health Psychology* (pp. 279–312). Chichester: John Wiley.

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. G., & Peeters, M. C. W. (1999). Antecedents and consequences of work-home interference among medical residents. *Social Science & Medicine*, *48*, 1135–1148.

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

Greenhaus, J. H., & Powell, G. N. (in press). When work and family are allies: A theory of work-family enrichment. *Academy of Management Review*.

Grzywacz, J. G., & Marks, N. F. (2000). Reconceptualizing 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.

Gutek, B. A., Searle, S., & Klepa, L. (1991). Rational versus gender role explanations for work-family conflict. *Journal of Applied Psychology*, *76*, 560–568.

Higgins, C. A., Duxbury, L. E., & Irving, R. H. (1992). Work-family conflict in the dual-career family. *Organizational Behavior and Human Decision Processes*, *51*, 51–75.

Hox, J. (2002). *Multilevel analysis: Techniques and applications*. Mahwah, NJ: Erlbaum.

Jöreskog, K. G., & Sörbom, D. (1993). *LISREL 8: Structural equation modeling with the SIMPLIS command language*. Chicago, IL: Scientific Software International.

Karasek, R. A. (1985). *Job content instrument: Questionnaire and user's guide*. Los Angeles: Department of Industrial and Systems Engineering, University of Southern California.

Karasek, R. A. (1998). Demand-Control Model: A social, emotional, and physiological approach to stress risk and active behaviour development. In J. M. Stellmann (Ed.), *Encyclopaedia of occupational health and safety* (4th ed) (pp. 34.6–34.14). Geneva: International Labour Office.

Kirchmeyer, C. (1992). Perceptions of nonwork-to-work spillover: Challenging the common view of conflict-ridden domain relationships. *Basic and Applied Psychology*, *13*, 231–249.

Kopelman, R. E., Greenhaus, J. H., & Connolly, T. F. (1983). A model of work, family, and interrole conflict: A construct validation study. *Organizational Behavior and Human Performance*, *32*, 198–213.

Little, R. A., & Rubin, D. B. (2002). *Statistical analysis with missing data* (2nd ed). Hoboken: Wiley.

MacCallum, R. C., Roznowski, M., & Necowitz, L. B. (1992). Model modifications in covariance structure analysis: The problem of capitalization on chance. *Psychological Bulletin*, *111*, 490–504.

Marks, S. R. (1977). Multiple roles and role strain: Some notes on human energy, time and commitment. *American Sociological Review*, *42*, 921–936.

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* (pp. 5–33). Hove: Psychology Press.

Michielsen, H. J., De Vries, J., & Van Hecke, G. L. (2003). Psychometric qualities of a brief self-rated fatigue measure: The Fatigue Assessment Scale (FAS). *Journal of Psychosomatic Research*, *54*, 345–352.

Nelson, D. L., Quick, J. C., Hitt, M. A., & Moesel, D. (1990). Politics, lack of career progress and work/home conflict: Stress and strain for working women. *Sex Roles*, *23*, 169–183.

Netemeyer, R. G., Boles, J. S., & McMurrian, R. (1996). Development and validation of work-family conflict and family-work conflict scales. *Journal of Applied Psychology*, *81*, 400–410.

Nunnally, J. C. (1978). *Psychometric theory*. New York: McGraw-Hill.

O'Driscoll, M. P., Ilgen, D. R., & Hildreth, K. (1992). Time devoted to job and off-job activities, interrole conflict, and affective experiences. *Journal of Applied Psychology*, *77*, 272–279.

Peeters, M. C. W., & Le Blanc, P. P. M. (2001). Towards a match between job demands and sources of social support: A study among oncology care providers. *European Journal of Work and Organizational Psychology*, *10*, 53–72.

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, *88*, 897–903.

Rothbard, N. P. (2001). Enriching or depleting? The dynamics of engagement in work and family roles. *Administrative Science Quarterly*, *46*, 655–684.

Semmer, N. K., Grebner, S., & Elfering, A. (2004). Beyond self-report: Using observation, physiological, and situation-based measures in research on occupational stress. In P. L. Perrewé, & D. G. Ganster (Eds.), *Research in occupational stress and well being*, Vol. 3: *Emotional and physiological processes and positive intervention strategie* (pp. 205–263). Amsterdam: JAI Press.

Sluiter, J. K, Frings-Dresen, M. H. W., Van der Beek, A. J., & Meijman, T. F. (2001). The relation between work-induced neuroendocrine reactivity and recovery, subjective need for recovery, and health status. *Journal of Psychosomatic Research*, *50*, 29–37.

Small, S. A., & Riley, D. (1990). Toward a multidimensional assessment of work spillover into family life. *Journal of Marriage and the Family*, *52*, 51–61.

Sonnentag, S. (2001). Work, recovery activities, and individual well-being: A diary study. *Journal of Occupational Health Psychology*, *6*, 196–210.

Stephens, G. K., & Sommer, S. M. (1996). The measurement of work to family conflict. *Educational and Psychological Measurement*, *56*, 475–486.

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

Taris, T., & Kompier, M. A. J. (2003). Challenges in longitudinal designs in occupational health psychology. *Scandinavian Journal of Work, Environment and Health*, *29*, 1–4.

Taris, T., & Kompier, M. A. J. (2005). Job characteristics and learning behavior: Review and psychological mechanisms. In P. L. Perrewé, & D. C. Ganster (Eds.), *Research in occupational stress and well being*, Vol. 4: *Exploring interpersonal dynamics* (pp. 127–166). Amsterdam: JAI Press.

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 Press.

Van Hooff, M., Geurts, S. A. E., Taris, T. W., Kompier, M. A. J., Dikkers, J. S. E., Houtman, I. L. D., & Van den Heuvel, F. (2005). Disentangling the relationships between work-home interference and employee health: A longitudinal study among Dutch police officers. *Scandinavian Journal of Work, Environment and Health*, *31*, 15–29.

Van Horn, J. E., Taris, T. W., Schaufeli, W. B., & Schreurs, P. J. G. (2004). The structure of occupational well-being: A study among Dutch teachers. *Journal of Occupational and Organizational Psychology*, *77*, 365–375.

Van Veldhoven, M., De Jonge, J., Broersen, S., Kompier, M., & Meijman, T. (2002). Specific relationships between psychosocial job-conditions and job-related stress: A three level analytic approach. *Work & Stress*, *16*, 207–228.

Voydanoff, P. (2004). The effects of work demands and resources on work-to-family conflict and facilitation. *Journal of Marriage and Family*, *66*, 398–412.

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.

Wortman, C., Biernat, M., & Lang, E. (1991). Coping with role overload. In M. Frankenhaueser, U. Lundberg, & M. Chesnewy (Eds), *Women, Work and Health: Stress and Opportunities* (pp. 85–110). New York: Plenum.