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Work–family conflict and depressive complaints among Dutch employees: examining reciprocal associations in a longitudinal study

by Yoy Bergs, MSc,[1, 2] Huub Hoofs, MSc,[1] IJmert Kant, PhD,[1] Jos JM Slangen,[1] Nicole WH Jansen, PhD [1]

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Objectives The aim of this study was to examine the reciprocal association between work–family conflict and depressive complaints over time.

Methods Cross-lagged structural equation modeling (SEM) was used and three-wave follow-up data from the Maastricht Cohort Study with six years of follow-up [2416 men and 585 women at T1 (2008)]. Work–family conflict was operationalized by distinguishing both work–home interference and home–work interference, as assessed with two subscales of the Survey Work–Home Interference Nijmegen. Depressive complaints were assessed with a subscale of the Hospital Anxiety and Depression scale.

Results The results showed a positive cross-lagged relation between home–work interference and depressive complaints. The results of the χ^2 difference test indicated that the model with cross-lagged reciprocal relationships resulted in a significantly better fit to the data compared to the causal ($\Delta\chi^2$ (2)=9.89, P=0.001), reversed causation model ($\Delta\chi^2$ (2)=9.25, P=0.01), and the starting model ($\Delta\chi^2$ (4)=16.34, P=0.002). For work–home interference and depressive complaints, the starting model with no cross-lagged associations over time had the best fit to the empirical data.

Conclusions The findings suggest a reciprocal association between home–work interference and depressive complaints since the concepts appear to affect each other mutually across time. This highlights the importance of targeting modifiable risk factors in the etiology of both home–work interference and depressive complaints when designing preventive measures since the two concepts may potentiate each other over time.

Key terms conservation of resources theory; home–work interference; prospective cohort study; SEM; structural equation modeling; work–family balance; work–home interference.

Workers are increasingly confronted with challenges balancing their work and family life in our 24-hour society. The incompatibility between work and family domains is typically called work–family conflict (WFC). WFC can be defined as "a form of inter-role conflict in which role pressures from the work and family domains are mutually incompatible in some respect" (1). WFC has been reported to be a perception of insufficient energy or time to perform both the work and family roles successfully (2). Research suggests that WFC can occur in two directions: work can interfere with the home situation, that is, work–home interference (WHI), and the home situation can interfere with work, that is, home–work interference (HWI) (2). It has been demonstrated that some 18% of European workers indicate having problems with their work–family balance (3). Work–family balance was defined by Clark (4) as: "the satisfaction and good functioning at work and at home, with a minimum of role conflict. Therefore, workers having problems with their work–family balance experience difficulties in managing and negotiating the work and family domains and the borders between them, making it difficult to attain a desired balance (4). While WFC is undesirable in itself, it may also be related to other adverse outcomes. Various studies and reviews have reported on outcomes associated with WFC (eg, 5–7).

[1] Department of Epidemiology, Care and Public Health Research Institute, Maastricht University, Maastricht, The Netherlands.
[2] Academy of Hotel and Facility Management, NHTV Breda University of Applied Sciences, Breda, The Netherlands.

Correspondence to: Nicole WH Jansen, Department of Epidemiology, School CAPHRI, Maastricht University, PO Box 616, 6200 MD Maastricht, The Netherlands. [E-mail: nicole.jansen@maastrichtuniversity.nl]

Negative consequences associated with WFC include for example psychological distress (8), a decrease in sleep quality (9), elevated levels of need for recovery and fatigue (10), and sickness absence (11).

Depressive complaints

In the present study, the focus will be on the associations between WFC and depressive complaints. Depressive complaints have been proposed as a continuum of complaints, ranging from no complaints at one end of the spectrum to severe complaints at the other end (12). This continuum of complaints could be considered as a possible forerunner of a clinical diagnosis of depression (13). A report on population trends in the Netherlands demonstrated that 9.5% of the Dutch population reported depressive complaints in 2009, with a prevalence of 7.4% for men and 11.4% for women (14). Depressive complaints can have severe consequences. People with severe symptoms of depression are likely to withdraw from work, domestic, and/or social activities (15). Earlier research demonstrated associations between depressive complaints and a decrease in work performance (16), future sickness absence (12), an increase of health care use and finally work disability (17). A rise in long-term sickness absence and work disability is in turn associated with increasing costs for society (18).

Cross-sectional studies already reported an association between both directions of WFC and depressive complaints (19, 20). Yet such studies unfortunately cannot provide any insights into the direction of the effect (21). The common assumption is that both directions of WFC would predict depressive complaints. It is, however, also plausible to suggest a reverse relationship between the concepts, asserting that WFC would be the consequence of depressive complaints. Evidence regarding this reversed causation is mixed (22). Since the few studies available so far reported mixed evidence, no conclusions can be drawn on a possible reversed relationship yet. Moreover, it is conceivable that reciprocal effects exist (23), meaning that WFC predicts depressive complaints over time and that depressive complaints in turn predict WFC. Such reciprocal effects between the concepts may represent a vicious cycle of WFC and depressive complaints that may aggravate each other over time, which eventually may lead to more severe symptomatology or even the clinical diagnosis of depression. The current study uses a three-wave panel study to increase our knowledge about possible reciprocal relationships between both directions of WFC and depressive complaints.

The relation between WFC and depressive complaints

Different complementary theoretical frameworks exist that may shed more light on the mechanisms underlying the complex relation between directions of WFC and depressive complaints over time. The conservation of resources (COR) theory for instance postulates that individuals strive to obtain, retain, protect, and foster the things that they value, so-called resources (24). Psychological distress occurs when individuals are threatened with resource loss. Thus, if an employee experiences a high level of conflict or demands at work, this might tap available resources and leave fewer resources available for family demands and vice versa. The process of juggling between both work and family roles may result in resource loss, which is straining mainly since the individual then must use his/her resources to prevent further resource loss (25). Workers exposed to these losses may be more prone to go into negative states, and experience burnout, ill health (25), or depressive complaints.

COR theory has parallels to, eg, the spillover theory (26). Spillover theory explains that, while there are temporal boundaries between work and family, emotions and behaviors in one sphere (eg, a bad day at work) can spillover to the other sphere (eg, a bad mood when returning home) (26). According to the effort–recovery model (27) both the quantity and quality of recovery play a crucial role. As described by Demerouti et al (28), although daily work usually involves loads that are not necessarily harmful, they recur day-after-day and may consequently function as a permanent source of tension. If there is a high necessity for recovery, such as in the case of WFC, psychobiological systems are activated again before they have had a chance to stabilize. The worker, still in a suboptimal state, will then need to make additional or compensatory effort. This may result in an increased intensity of load reactions, which in turn puts higher demands on the recovery process. Nohe et al (23) reported that, through the lens of the effort–recovery model, WFC causes strain because it reduces opportunities for recovery in the family domain. Hence, an accumulative process may yield a draining of one's energy and a state of breakdown, exhaustion (29), or depressive complaints. Theoretical frameworks such as these may help explain why and how directions of WFC may affect or cause depressive complaints over time.

Further, also arguments for a reverse relationship may be drawn. According to the "drift hypothesis" (30, 31), one could also argue that depressive complaints are the starting-point that can lead to WFC. According to the drift hypothesis, people with health complaints might be absent more often and, in turn, eventually drift to worse jobs with higher stressors. Additionally, Demerouti et al (28) reported that workers who experience exhaustion might have trouble keeping up with the workflow, resulting in an increase of eg work pressure, a process which may also apply to depressive complaints, and which potentially gives rise to WFC. Finally, people with depressive complaints have the tendency to assess

the environment more negatively (32), potentially contributing to a more negative perception of the work–family balance.

Apart from potentially normal causation and reverse causation between the concepts of WFC and depressive complaints, it also seems plausible to expect reciprocal relationships between the concepts. In this respect, the notion of "loss spirals" from the COR theory (24) should be considered. This notion explains that when resources are initially lost, either because workers experience WFC or depressive complaints, they become more vulnerable to lose more resources in the future since restoring one resource might deplete another resource (23). Consequently, loss spirals can follow initial losses representing a vicious cycle of WFC and depressive complaints aggravating each other over time. Demerouti et al (28) already suggested to use more elaborated models that include reciprocal relationships between work characteristics, WHI and employee well-being. Van Hooff et al (22) reported in their longitudinal study that the normal causal model, in which strain-based work–home interference was related to increased depressive complaints one year later, fitted the data well, and significantly better than the reversed causal model. Nohe et al (23) provided support for reciprocal effects between both directions of WFC and strain, yet this study did not focus on depressive complaints in particular. Jensen & Knudsen (25) provided with their longitudinal design support for reciprocal relationships among WFC, emotional exhaustion, and psychological health complaints. A study by Neto et al (33) demonstrated a reciprocal relationship between WHI and employee psychological well-being over 18 months of follow-up. This study, however, solely focused on one direction of WFC.

Disentangling the relations of WHI, HWI and depressive complaints in the Maastricht Cohort Study

In order to further disentangle the complex relationship between both directions of WFC and depressive complaints, the present study considers both a cross-sectional association and a longitudinal reciprocal association between the concepts. Because both the directions of WFC and depressive complaints originate from complex interactions between different domains, including demographic characteristics, work-related factors, private life and health status (eg, 34–36), factors from these multiple domains may play important roles as confounding or intermediate variables since they may be associated with both constructs. For example, gender may be viewed as a confounding variable because gender differences were found for both concepts (37, 38). Furthermore, characteristics of the private situation, such as cohabiting with a partner, should be taken into account (39). Finally, work-related factors need to be considered. It has for example been demonstrated that both WFC (40) and depressive complaints (41) differ between shift- and dayworkers.

This study extends earlier research in providing longitudinal evidence by using a three-wave 6-year follow-up data set from the Maastricht Cohort Study (42). This cross-lagged panel design makes it possible to test causal effects, reversed effects and reciprocal effects (21). Insight into the pattern of the relationships is important to decide whether the focus of prevention should lay on preventing depressive complaints, or preventing WHI/HWI.

In order to examine the relationship between the directions of WFC and depressive complaints, four research questions were set-up: (i) Is there a cross-sectional association between WHI and/or HWI and depressive complaints? (ii) What is the impact of both directions of WFC on depressive complaints over time? (iii) What is the impact of depressive complaints on both directions of WFC over time? (iv) Is there a reciprocal association between both directions of WFC and depressive complaints over a follow-up period of six years?

Methods

Study population

The study is based on data from the Maastricht Cohort Study (MCS), an ongoing cohort in the Dutch working population. The study was conducted in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. The baseline study population in 1998 consisted of 12 140 employees from 45 different companies, employed in different jobs, sectors and trades. A broad range of (non)work-related factors, individual factors and health-status variables are measured on an individual level by means of self-administered questionnaires during follow-up. Detailed information on the cohort has been reported elsewhere (42).

For the present study, the follow-up wave of 2008 was defined as T1 since the measurement of both depressive complaints and the directions of WFC were included in 2008 (N=6082, of which N=4497 men and N=1577 women and N=8 with no gender identification due to missing values) and repeated in subsequent follow-ups in 2012 (N=4783, overall response rate 82.3%) and 2014. At the follow-up in October 2014, questionnaires were no longer sent to participants who had permanently retired, based on the information of earlier follow-ups. Of the in 2014 targeted cohort participants presumed to still be employed (N=3450), 2945 responded (response rate of 85.4%).

Several inclusion and exclusion criteria were applied on the 2008 wave. First, all retired employees were

excluded (excluded N=1130). Then employees who reported being currently absent from work were excluded (excluded N=681). Next, participants working <26 hours a week (excluded N=1146) and employees holding multiple jobs (excluded N=119) were excluded. Finally pregnant women were excluded as they might experience depressive complaints and WFC specifically related to their pregnancy (excluded N=3). These exclusion criteria resulted in a final study population at T1 of 3003 employees, of which 2416 (80.5%) men and 585 (19.5%) women and 2 with no gender identification. For the longitudinal analyses, we additionally excluded the employees holding multiple jobs (excluded N=47) and pregnant women (excluded N=3) in 2012, as well as the employees holding multiple jobs in 2014 (excluded N=29). There were no additional pregnant women to be excluded in the 2014 follow-up. This resulted in a final study population for the longitudinal analyses of 2924 employees, of which N=2359 men, N=563 women, and N=2 with no gender identification due to missing values. In addition, for the retired persons and workers that reported being absent from work in 2012 and 2014 but unwittingly completed the questions of the SWING scale on these waves, all values of this scale were coded as missing when analyzing the association between depressive complaints and subsequent WHI/HWI. By doing so, these workers were still included when analyzing the direction of effect from WHI/HWI to depressive complaints over time.

Measures

Depressive complaints

A subscale of the Hospital Anxiety and Depression (HAD) scale, the HAD-D, was used to measure the presence and severity of depressive complaints (43). This subscale consists of seven items which are scored on a 4-point Likert scale from 0–3 (range 0–21). An example item is "I can enjoy a good book, or radio or TV show". The Cronbach's α for the HAD-D has been demonstrated to be 0.86 for women and 0.85 for men (44).

Directions of work–family conflict

Two subscales of a shortened, 11-item version of the Survey Work–Home Interference Nijmegen (SWING) (45) were used to assess the two directions of work–family conflict, namely, work–home interference and home–work interference. All items are scored on a 4-point Likert scale ranging from "seldom or never" to "very often". The subscale WHI consists of six items (Cronbach's α=0.81), with a total score ranging from 6–24. Example items of this subscale are "How often do you have to cancel appointments with your partner, family or friends because of obligations at work?" and "How often do your work hours cause difficulties in meeting the demands at home?" The subscale HWI consists of five items (Cronbach's α=0.74), with a total score ranging from 5–20. Example items of this subscale are "How often does it happen that your domestic obligations make it difficult to arrive at work on time?" and "How often do you have little pleasure in your work because you are worrying about your home situation?".

Demographics, work-related factors and characteristics of the private situation

At T1, self-report data on gender and age were gathered. Highest level of education was assessed at baseline measurement of the cohort in 1998. It was recoded in three categories: low, medium, and high. The Dutch version of the Job Content Questionnaire (JCQ) was used to assess psychological job demands and decision latitude (46). Psychological job demands were assessed by taking the sum of five items (range 12–48) (Cronbach's α=0.69). Decision latitude was assessed by taking the sum of two subscales: skill discretion and decision authority (range 24–96) (Cronbach's α=0.81). Social support was inventoried by using two scales of the JCQ (supervisor and coworker support), each assessed by means of four items (range 4–16). Response options ranged from "strongly disagree" to "strongly agree" on a 4-point Likert scale. Work schedule was assessed by one dichotomous item to distinguish between shift- and day workers. Demands at home (having dependent children, caring for someone with a chronic disease/handicap at home, caring for family/friend outside home, responsibility for housekeeping) and support at home (domestic help) were assessed as characteristics of the private situation, each item with the response option yes/no, except for the responsibility for housekeeping item which had three response options (ie, none, shared, fully).

Statistical analysis

First descriptive statistics were provided for the final sample. Structural equation modelling (SEM) was used for all analyses. To define the measurement model, preliminary confirmatory factor analysis (CFA) was conducted to determine the quality of the measurement model of the three latent constructs (ie, WHI, HWI, and depressive complaints). If a CFA model indicated a poor overall fit, modification indices were requested. In combination with the wording of the items these indices were used as guideline for potential improvements to the model. After establishing a strong measurement structure for each of the constructs, two-factor structural models were set-up to analyze the first research question

regarding the cross-sectional association (ie, correlation) between WHI/HWI and depressive complaints.

For the longitudinal analyses, comprising the second, third, and fourth research question, preliminary analyses first examined whether measurement equivalence/invariance (ME/I) was present over time. It was tested, therefore, if a cross-lagged model in which the factor loadings and threshold were constrained over time (M2) showed comparable fit to the configural model (M1) in which these parameters were freely estimated over time. If free estimation results in a better model fit this suggests that there is a difference in measurement over time, hence compromising causal inference. Based on the findings of the ME/I analyses for the two sets, a final model was set-up, which controlled for a selection of confounders (ie, age, gender, and work schedule as assessed at T1). Afterwards, cross-lagged structural equation models were fitted to the data in several steps as proposed by Farrell (47), to examine the association with depressive complaints separately for HWI and WHI. First, the starting model ($M3_{start}$) was specified*:* this model includes autoregressive effects over time of each latent variable, in order to control for baseline levels (ie, HWI1–HWI2 and HWI2–HWI3) (48). This model does not include any cross-lagged effects between the different constructs. $M3_{start}$ is similar to the configural model but includes the different confounders (ie, age, gender and work schedule as assessed at T1). $M3_{start}$ was compared with more complex models. The causality model ($M3_{caus}$) includes the autoregressive effects as in $M3_{start}$ combined with the causal relationships as hypothesized in research question 2 (ie, HWI1–Dep2); The reversed causation model ($M3_{rev}$): this model includes the autoregressive effects as in $M3_{start}$ combined with reversed causal effects as hypothesized in research question 3 (ie, Dep1–HWI2); The reciprocal model ($M3_{rec}$): which includes all paths of the causal model as well as the reversed causation model, as hypothesized in research question 4.

Since the items of the constructs were rated on a 4-point Likert scale, they were estimated as categorical data with the weighted least squares (WLSMV) estimator. For the assessment of model fit the root mean square error of approximation (RMSEA) (49) and the comparative fit index (CFI) (50) were used. The model was considered acceptable if the CFI was >0.90 (51). An RMSEA of ≤0.08 is accepted, but an RMSEA≤0.05 is preferred (51). Alternatively, 90% confidence intervals (CI) for the RMSEA measures are presented where the upper CI of the RMSEA should not be >0.08 for a good fit (49). For comparison of the cross-lagged (nested) models, the χ^2 difference test with an α of 0.05 was used (52). Within these analyses $M3_{caus}$ and $M3_{rev}$ were not tested against each other as they are not nested. For the assessment of ME/I the guidelines as indicated by Chen (53) ΔCFI≤-0.01, ΔRMSEA≥0.01 were used to indicate substantial differences between the model with free estimated parameters (M1) over time and the model with constrained parameters over time (M2) to assess ME/I. Both within the assessment of the cross-lagged nested models and within the assessment of ME/I, the more parsimonious models should be preferred if there are no substantial differences between models. If there is a difference between two models the model with the best fit should be preferred. Only the final models of the HWI and WHI model are shown. All models were fitted using the MPLUS (version 6.11) computer software package.

Results

Descriptives

Table 1 presents the descriptive characteristics for the total study population at T1 (2008).

Cross-sectional analyses

For each of the constructs, a one-factor measurement model was set-up. Based on the modification indices and wording, one error correlation was added to the single

Table 1. Descriptive characteristics for the total study population at T1 (2008). [SD=standard deviation]

	Total study population (N=3003)		
	Mean	SD	%
Gender			
Men			80.5
Women			19.5
Age (years)	49.3	6.9	
Educational level			
Low			24.7
Medium			32.6
High			42.7
Demands at home			
Having dependent children (yes)			50.3
Caring for someone with chronic disease (yes)			20.2
Caring for family / friend outside home (yes)			5.4
Responsibility housekeeping			
None			22.5
Fully			15.4
Shared			62.1
Domestic help (yes)			18.6
Work schedule			
Day work			82.2
Shift work			17.8
Psychological job demands (range 12–48)	31.73	5.66	
Decision latitude (range 24–96)	74.06	10.32	
Social support			
Social support supervisor (range 4–16)	10.64	2.32	
Social support co-workers (range 4–16)	12.00	1.43	
Depressive complaints (range 0–21)	5.91	3.01	
Work–home interference (range 6–24)	9.05	2.89	
Home–work interference (range 5–20)	5.95	1.41	

factor model of depressive complaints, resulting in an acceptable fit [χ^2 (13)=63.482, P<0.001, RMSEA=0.036, 90% CI 0.028–0.045, CFI=0.997]. For the single factor model of WHI, an error correlation was also included on the basis of the modification indices and wording, resulting in an adequate fit [χ^2 (8)=111.886, P<0.001, RMSEA=0.066, 90% CI 0.056–0.077, CFI=0.991]. Finally, the single factor model for HWI demonstrated a good fit with the data [χ^2 (5)=6.720, P<0.242, RMSEA=0.011, 90% CI 0.000–0.029, CFI=1.000]**.** A strong measurement model was therefore found for each of the latent constructs.

A two-factor model between WHI and HWI was established to statistically confirm that WHI and HWI can be considered as distinct constructs. The association between WHI and HWI [χ^2 (42)=401.232, P<0.001, RMSEA=0.054, 90% CI 0.049–0.059, CFI=0.977] was found to be moderate (r=0.316, P<0.001). Based on the results of the standardized coefficient, it is statistically confirmed that WHI and HWI are related, yet should be considered as distinct constructs. The baseline association between WHI and depressive complaints [χ^2 (62)=880.109, P<0.001, RMSEA=0.067, 90% CI 0.063–0.071, CFI=0.965] was statistically significant (r=0.521, P<0.001). The baseline association between HWI and depressive complaints [χ^2 (52)=162.239, P<0.001, RMSEA=0.027, 90% CI 0.022–0.031, CFI=0.994] was statistically significant (r=0.239, P<0.001). A cross-sectional association was therefore established for both WHI and HWI with depressive complaints.

Longitudinal analyses

The configural model (M1) of WHI and depressive complaints demonstrated good fit (table 2). The nested model comparison for WHI and depressive complaints with constrained factor loadings (M2) demonstrated presence of ME/I (ΔRMSEA=0.004, ΔCFI=-0.007; table 2), indicating that there was some variation in the relation between the different latent factors and measurement items in the models across the three different time points. After adding the potential confounders age, gender and work schedule in the model which only included the stability paths ($M3_{start}$) a good fit was established (table 2). The results of the χ^2 difference test indicated that the causal ($M3_{caus}$), reversed causation ($M3_{rev}$) and reciprocal ($M3_{rec}$) model did not fit significantly better than the start model. There was therefore no indication of any relation of the different constructs over time (figure 1).

The configural model (M1) of HWI and depressive complaints demonstrated good fit (table 3). The nested model comparison for HWI and depressive complaints with constrained factor loadings (M2) demonstrated presence of ME/I (ΔRMSEA=0.003, ΔCFI=-0.003; table 3), indicating that there was some variation in the relation between the different latent factors and measurement items in the models across the three different time points. After adding the potential confounders age, gender, and work schedule in the model which only included the stability path a good fit was established (table 3). The results of the χ^2 difference test showed that the reciprocal model ($M3_{rec}$) had a significantly better fit compared to the start ($M3_{start}$), causal ($M3_{caus}$), and reversed causation model ($M3_{rev}$). It should be noted, however, that not all paths were significant (figure 2). Overall, however, this model fitting procedure clearly showed that the reciprocal model ($M3_{rec}$) fitted the empirical data best, indicating a reciprocal effect between HWI and depressive complaints over time.

Table 2. Fit statistics for the different models of work–home interference (WHI) and depressive complaints. [RMSEA=root mean square error of approximation; CFI=comparative fit index; ME/I=measurement equivalence/invariance.]

Model	Description	χ^2	df	P-value	RMSEA	CFI	Versus $M3_{start}$			Versus $M3_{caus}$			Versus $M3_{rev}$		
							$\Delta\chi^2$	df	P-value	$\Delta\chi^2$	df	P-value	$\Delta\chi^2$	df	P-value
M1	Configural model unconstrained	5179.52	760	<0.001	0.045 [0.044–0.046]	0.919									
M2	Configural model constrained (full ME/I)	5466.01	583	<0.001	0.049 [0.048–0.050]	0.912									
$M3_{start}$	Starting model in which confounders are added	5411.72	904	<0.001	0.042 [0.041–0.043]	0.920									
$M3_{caus}$	Causality model (WHI predicts depressive complaints)	5582.88	902	<0.001	0.043 [0.042–0.044]	0.917	1.46	2	0.48						
$M3_{rev}$	Reversed causation model (depressive complaints predict WHI)	5581.98	902	<0.001	0.043 [0.042–0.044]	0.917	1.80	2	0.41						
$M3_{rec}$	Reciprocal model ($M3_{caus}$ + $M3_{rev}$)	5743.75	900	<0.001	0.044 [0.043–0.045]	0.914	3.26	4	0.52	2.53	2	0.28	2.14	2	0.34

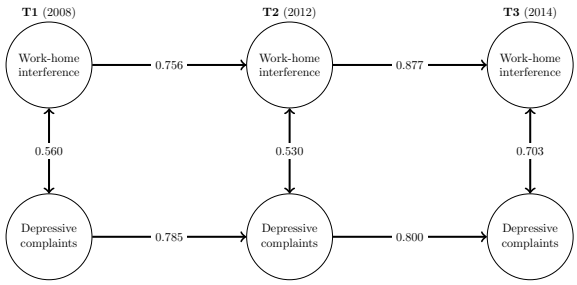

Figure 1. Final model of work–home interference (WHI) and depressive complaints controlled for covariates gender, age and work schedule: standardized coefficients.

Discussion

This study aimed to investigate both the cross-sectional association and the longitudinal reciprocal association between both directions of WFC and depressive complaints. A three-wave 6-year follow-up data set from the MCS was used.

In line with findings of earlier studies, it was demonstrated that all three of the constructs were fairly stable over time (28, 54). Employees that scored either high or low on WHI or HWI or depressive complaints at T1 were likely to maintain this score over the ensuing measurement points four- and two- years later.

Similar to previous research on WFC (eg, 19, 20), a clear cross-sectional association was found between both directions of WFC and depressive complaints. Moreover, our findings indicate a reciprocal relation between HWI and depressive complaints over a period of six years. Significance testing indicated, however, that not all the cross-lagged parameters were significant. In line with the COR theory, the findings suggest that when the resources of employees are initially lost because of depressive complaints, they become more vulnerable for HWI. HWI may, in turn, contribute to progression of depressive complaints resulting in a vicious cycle (23, 24). This is also in line with the spillover theory (26). A reciprocal association between directions of WFC and employee health and well-being was already suggested by previous research (25, 28). The current results demonstrate the importance of investigating long-term reciprocal effects in a multiple-wave study. Further research is however required to examine the full reciprocal association.

The current study only found a reciprocal association between HWI and depressive complaints, yet a similar result for WHI was lacking. Previous research reported that WHI was positively related to depression for both men and women over a short time period of on average 18 working days (55). Van Hooff et al (22) showed a temporal relationship between strain-based work–home interference and increased levels of depressive complaints one year later, but found no support for a reversed causal relationship between prior health complaints and increased levels of work–home interference either. Frone et al (56) found that WHI was longitudinally unrelated to elevated levels of depression. The present study did not find support for either normal causation as for reversed causation between WHI and depressive complaints. One explanation for the different findings for WHI and HWI in relation to depressive complaints might be that due to the relatively high average age of the participants in the present study, the nature, type, or severity of WHI and HWI may be different, eg, compared to younger workers. Second, employees may prefer, and/or see more possibilities, to solve WFC by solving WHI. Third, we cannot rule out that the time course of cause and effect may be different for WHI versus HWI in relation to depressive complaints.

Table 3. Fit statistics for the different models of home–work interference (HWI) and depressive complaints. [RMSEA=root mean square error of approximation; CFI=comparative fit index; ME/I=measurement equivalence/invariance.]

Model	Description	χ^2	df	P-value	RMSEA	CFI	Versus $M3_{start}$			Versus $M3_{caus}$			Versus $M3_{rev}$		
							$\Delta\chi^2$	df	P-value	$\Delta\chi^2$	df	P-value	$\Delta\chi^2$	df	P-value
M1	Configural model unconstrained	2977.60	647	<0.001	0.035 [0.034–0.037]	0.952									
M2	Configural model constrained (full ME/I)	3059.36	583	<0.001	0.038 [0.037–0.040]	0.949									
$M3_{start}$	Starting model in which confounders are added	3030.04	779	<0.001	0.032 [0.031–0.033]	0.955									
$M3_{caus}$	Causality model (HWI predicts depressive complaints)	3073.98	777	<0.001	0.032 [0.031–0.034]	0.954	7.62	2	0.03						
$M3_{rev}$	Reversed causation model (depressive complaints predict HWI)	3085.07	777	<0.001	0.032 [0.031–0.034]	0.954	8.14	2	0.02						
$M3_{rec}$	Reciprocal model ($M3_{caus}$ + $M3_{rev}$)	3114.32	775	<0.001	0.033 [0.031–0.034]	0.953	16.34	4	0.002	9.89	2	0.001	9.25	2	0.01

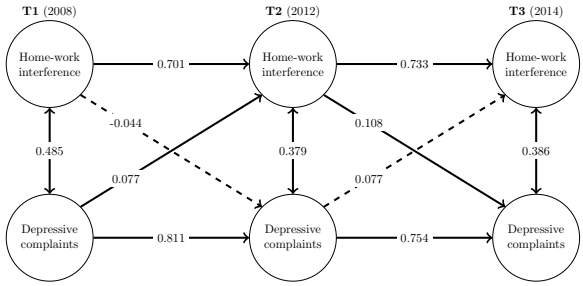

Figure 2. Final model of home–work interference (HWI) and depressive complaints controlled for covariates gender, age and work schedule: standardized coefficients. Dotted line for non-significant path (α =0.05)

Strengths and limitations

Several conceptual and methodological considerations should be acknowledged. Because of the multifactorial etiology of the concepts and their complex associations, estimating the causal relationships was not straightforward. The availability of three-wave measurement data helped to test the dynamics of the associations over a longer period of time and to elucidate a reciprocal association (21). In addition, a major strength of SEM is that it allows dependent variables in the model equation to become independent variables in other parts of the model (57).

This study sought to prevent over-control by making a selection of a few well-researched confounding variables. That is, these factors might constitute risk factors for both depressive complaints and for WFC. Even though we were able to control for this limited amount of confounding variables at T1, future research should try to explore a more complete range of confounding variables and additionally take the dynamics of these factors over time into account.

The use of the SWING scale enabled us to assess the different directions of WFC separately. The HAD-D scale permitted to measure the presence and severity of depressive complaints among employees. The present study only included self-report data, potentially implying that the observed associations might have been biased due to reporting bias (58). This would mean that the reported relationships could be contaminated since individuals with depressive complaints might overestimate the adversity of their work/home environment, including their perception of WFC. Yet, since this study tried to gain more insight into the employees' well-being reactions to their perceptions of WFC, self-report data was considered most appropriate to capture a person's personal perceptions of the variables (33). Future research might, however, include more "objective" data from different sources, such as colleagues or family, to reflect on the idea that WFC is a dynamic process, which occurs in a context of mutually interdependent significant others (59).

The present study used a large heterogeneous study sample. Since only employees that worked ≥26 hours per week were included in the analyses, our findings cannot be generalized to employees working fewer hours a week. To make maximum use of this heterogeneity, employees who were not part of the working population during the second and/or third wave were still included in the longitudinal analyses. While measures of WFC are not applicable for these employees, and were therefore missing for these employees, depressive complaints could still exist. Entirely excluding this limited number of employees from the study population would be spurious as this would artificially limit the extent to which depressive complaints might influence the working situation. That is, high depressive symptoms could result in (in)voluntarily withdrawal from the labor market. While these missings could introduce some none random error into the model, it does do justice to the dynamics of SEM models examining the complex relation between depressive symptoms and WFC. Finally, the effects that were found might have been underestimated since the average age of the sample is 49.3 years. This most likely reflects a group of employees that have been at the labor market for quite some years and where several selections already have taken place in order to deal with WHI and HWI.

Concluding remarks

In summary, the results of the study provide support for a reciprocal association between depressive complaints and HWI over a follow-up period of six years. This association represents the vicious cycle as proposed by the COR's notion of loss spirals since the concepts seem to affect each other mutually across time. This implies a need for more elaborated theoretical models that incorporate reciprocal relations between the concepts. Future research should explore different time windows and study populations, as well as unravel potential mediators and moderators to provide a more complete picture of the reciprocal association between HWI and depressive complaints. Despite the fact that we were able to control for gender as a covariate in the present study, future research should also consider evaluating the consistency of the cross-lagged model across gender, since pronounced gender differences are reported in the literature for both WFC (37) and depressive complaints (38). In addition, future research can focus on a possible long-term "gain spiral", as proposed by the COR theory (24).

The current results are important for the development of (future) preventive measures. Being aware of

the reciprocal relationship between HWI and depressive complaints helps to understand the importance of looking at the etiology of both constructs at the same time. Primary and secondary intervention strategies can be used to reduce both HWI and depressive complaints in conjunction. Occupational health professionals need to be aware that a worker does not end up in the vicious cycle and assist employees in managing the boundaries between work- and home domains.

From the present study we conclude that WHI and HWI are clearly conceptually and empirically different constructs and that there is a cross-lagged association between HWI and depressive complaints over time, suggesting a reciprocal association. These associations suggest that prevention of HWI and depressive complaints is important since the two constructs may aggravate each other over time.

Conflict of interest

The authors declare no conflicts of interest

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