

FEAR OF WORKLOAD, JOB AUTONOMY, AND WORK-RELATED STRESS: THE MEDIATING ROLE OF WORK-HOME INTERFERENCE

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The study examines the mediating role of work-home interference (WHI) in the relation between job demands/resources and psycho-physic strain which, in its turn, predicts sickness absences. To do so we carried out a multi-method study in a public administration office ($N = 409$). Workload, job autonomy, and WHI were revealed through a self-report instrument at the beginning of 2010. Workers then underwent the annual medical check-up, in which the occupational physician revealed psycho-physic strain. Lastly, the medically certified sickness absences (MCSA) relative to 2010 were collected from the company database. A positive association emerged between workload and WHI, while there was no association between job autonomy and WHI. Moreover, a positive association emerged between WHI and psycho-physic strain. Finally, psycho-physic strain predicts MCSA. Overall, WHI mediates the relation between workload and psycho-physic strain which, in turn, mediates the relation between WHI and MCSA.

Key words: Work-home interference; Workload; Job autonomy; Psycho-physic strain; Sickness absences.

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INTRODUCTION

Originally, Greenhaus and Beutell (1985) defined the conflict between work and family as a form of interrole conflict in which the role pressures from the work and family domains are mutually incompatible. In other words, the conflict between work and private life manifests itself whenever aspects of working life interfere with family-related responsibilities. This definition refers to the concept of interrole conflict taken from role theory (Kahn, Wolfe, Quinn, Snoek, & Rosenthal, 1964), according to which interrole conflict is a form of role conflict in which the pressures associated with membership in a group/organization are in conflict with pressures originating from membership in other groups/organizations. Over time, the concept of work-family conflict has expanded, up to the point of including, apart from family-related responsibilities, also the free-time activities carried out by the individual and, in general, his/her private life. For this reason researchers refer to interference between work and home (work-home interference, WHI; Geurts, Kompier, Roxburgh, & Houtman, 2003; Peeters, Montgomery, Bakker, & Schaufeli, 2005; van Hooff et al., 2005).

Van Hooff et al. (2005) define, in accordance with Greenhaus and Beutell (1985), three dimensions of WHI. A first dimension refers to a time-related conflict (*time-based work-home interference*), which occurs when the time dedicated to work makes it physically impossible to cope with commitments in private life. A second dimension is represented by conflict due to strain (*strain-based work-home interference*), in which the tension generated in response to work has repercussions on private life (e.g., the worker finds it difficult to relax at home following a stressful workday). Lastly, the third dimension refers to a behavior-related conflict (*behavior-based work-home interference*), where some behaviors connected to the work domain are incompatible with expected behavior in private life (e.g., teachers who continue to behave like teachers also with their own children).

The aim of the study consists of looking deeper, through a multi-method approach, at the role covered by WHI in the process which leads to the formation of psycho-physic strain in response to potentially stressful working conditions. Although in numerous studies an association emerged between WHI and stressors on one hand (Byron, 2005; Michel, Kotrba, Mitchelson, Clark, & Baltes, 2011), as well as between WHI and strain on the other (Amstad, Meier, Fasel, Elfering, & Semmer, 2011) to date a theoretical framework is lacking which integrates WHI in the models most diffused in the literature which predict a relation between stressors and strain (Bakker & Demerouti, 2007; Bakker & Geurts, 2004; Bakker, ten Brummelhuis, Prins, & van der Heijden, 2011; Hart & Cooper, 2001). In fact, because WHI can depend on some work situations and, at the same time, can determine negative consequences for the wellbeing of the individual, it is possible to hypothesize that WHI mediates the relation between stressors and psycho-physic strain.

THE EFFORT-RECOVERY MODEL

Accordingly, some authors (Geurts et al., 2003; Geurts, Beckers, Taris, Kompier, & Smulders, 2009; Höge, 2009) proposed integrating WHI in the theoretical Effort-Recovery model (E-R model; Meijman & Mulder, 1998). According to this model, performing one's work requires effort, which determines acute reactions (i.e., acute load reactions) both at a psychological level and at a physiological level (e.g., quickened heart beat, increase in blood pressure, fatigue). These reactions are reversible if the effort is followed by an adequate recovery, defined as a process of relaxation through which the psycho-physiological activation is restored to its initial level (baseline), corresponding to the absence of effort. In this situation the worker can begin a new workday in an optimal condition (Geurts & Sonnentag, 2006).

However, in certain circumstances it is possible that the recovery is not sufficient, such as cases in which a person has to continue working at home (Sonnentag, 2001) or finds it difficult to relax after a tiring day (Ilies et al., 2007). In this case the psycho-physiological activation does not stop completely (i.e., sustained sympathetic activation; Bakker, Demerouti, Oerlemans, & Sonnentag, 2013) and the worker is forced to start a new day in a sub-optimal condition. Further effort is, therefore, necessary to carry out one's job, which affects the necessity for a longer recovery. Thus a vicious circle is established, in which prolonged psycho-physiological activation can have negative consequences in terms of fatigue, sleep-related problems, and psycho-physical disturbances (van Hooff et al., 2005). This, in the long run, can lead the worker to absences from work (De Croon, Sluiter, & Frings-Dresen, 2003).

Within this theoretical frame work-home interference assumes a central role, since recovery takes place primarily in free time (in the evening, at the weekend, during holidays; *external recovery*) and, to a decidedly lesser extent, during work breaks (*internal recovery*) (Geurts & Sonnentag, 2006). If work life interferes with private life the possibility and quality of recovery diminishes (Geurts et al., 2009; Geurts et al., 2005; Höge, 2009). During free time, in fact, the individual can devote him/herself to relaxing activities or activities which in any case require an investment of resources which is different from those normally employed to carry out work activities. These activities favor the recovery process. Among these Sonnentag (2001) cites passive activities (e.g., reading a book, listening to music), physical activities (e.g., walking, practicing sport), and social activities (e.g., social contacts with relatives or friends). According to the author, social activities also offer the opportunity to receive social support from relatives and friends.

In keeping with this theoretical framework, a model was elaborated according to which some characteristics of work can determine a conflicting situation between the work domain and private life of the individual (job demands), while other characteristics can help in preventing it (job resources) (Benevene & Pantanella, 2012). Among the former is included workload, among the latter job autonomy. Work-home interference, in line with the E-R model, prevents the worker from relaxing or undertaking activities which can favor the recovery process. This leads to a prolonged psycho-physiological activation which can give rise to the onset of psycho-physic symptoms linked to work stress, which, in the long run, can lead the individual to being absent from work. The theoretical model is shown in Figure 1.

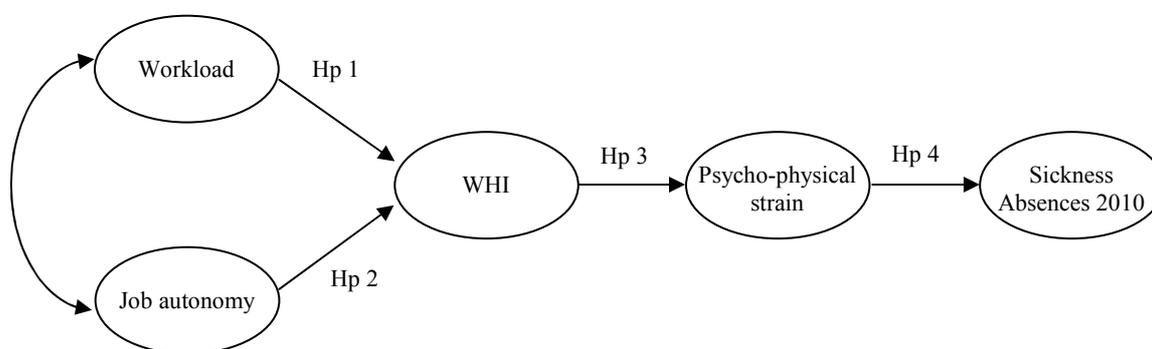


FIGURE 1
The theoretical model.

ANTECEDENTS OF WHI: WORKLOAD AND JOB AUTONOMY

Workload is intended as the characteristics of work, in terms both of quantity of work to be done and of time pressure, which requires from the employee a physical and/or psychological effort (Ilies et al., 2007). In the literature two mechanisms are identified through which workload can influence WHI (Geurts et al., 2009). A first mechanism, closely linked to the time-based dimension of WHI proposed by van Hooff et al. (2005), predicts that the time dedicated to work activity, in terms of both time spent at work and time dedicated to work during the evening/weekend, reduces the time available for private life and, therefore, opportunities for recovery (Voydanoff, 2004). Some authors, in fact, evidenced a positive association between hours spent at work and WHI (Byron, 2005; Ford, Heinen, & Langkamer, 2007; Major, Klein, & Ehrhart, 2002).

In accordance with the second mechanism, linked to the strain-based dimension of WHI (van Hooff et al., 2005), the concentration of work to be done generates negative emotions, stress and fatigue which has repercussions on the individual's private life (*spillover effect*; Höge, 2009; Voydanoff, 2004). According to Ilies et al. (2007) a heavy workload determines in the worker a negative affective state, which tends to persist even after his/her return home. The authors for this reason talk about affective spillover. Other authors moreover maintain that workers can recall to memory the stressful situations which occurred during the day, or anticipate future situations, once the working activity has ended (i.e., perseverative cognitions; Berset, Elfering, Lüthy, Lüthi, & Semmer, 2011). The mechanism which determines the spillover in this case is cognitive, more than affective. This spillover effect, whether it is of an affective or cognitive nature, interferes with the process of recovery, reducing its efficacy or even compromising it (Berset et al., 2011; Demerouti, Bakker, & Bulters, 2004). We therefore expect a positive association between workload and WHI.

HYPOTHESIS 1:

WORKLOAD IS POSITIVELY ASSOCIATED WITH WORK-HOME INTERFERENCE

Job autonomy is intended as the extent to which the job guarantees the worker liberty, independence, and discretion in making decisions about the organization of his/her own work, in terms of both flexibility of working hours and ways of carrying out the work (Pousette & Hanse, 2002). Greater autonomy is associated with more opportunities to deal with stressful situations (Väänänen et al., 2003). Job autonomy acts therefore as a resource which the worker can use to balance the demands from the family domain and the work domain. A greater autonomy in managing working hours and ways of carrying out own work can help the worker fit together work and family-related activities (e.g., by bringing forward or postponing when a task must be done, time-based dimension; Premeaux, Adkins, & Mossholder, 2007) and to reduce job-generated stress and, as a consequence, the spillover effect (e.g., by taking a break if necessary, strain-based dimension; Voydanoff, 2004). In a meta-analysis carried out by Byron (2005) a negative association emerged between flexibility of working hours and WHI. Other studies evidenced a negative association between job autonomy and WHI (Lu, Kao, Chang, Wu, & Cooper, 2008; Michel et al., 2011). We therefore expect a negative association between job autonomy and work-home interference.

HYPOTHESIS 2:

JOB AUTONOMY IS NEGATIVELY ASSOCIATED WITH WORK-HOME INTERFERENCE

Consequences of WHI: Psycho-Physic Strain and Sickness Absences

In line with the E-R model, WHI limits the possibilities and quality of recovery, which determines a prolonged psycho-physiological activation and the onset of negative consequences for the individual, at both a psychological and physical level (Geurts & Sonnentag, 2006). In a recent meta-analysis, Amstad et al. (2011) evidenced a positive association between WHI and emotional exhaus-

tion, work-related stress, anxiety symptoms, depression symptoms, somatic symptoms and turnover intentions. We therefore expect a positive association between WHI and psycho-physic strain.

HYPOTHESIS 3:

WORK-HOME INTERFERENCE IS POSITIVELY ASSOCIATED WITH PSYCHO-PHYSIC STRAIN

Lastly, the persistence and/or worsening over time of these symptoms lead the individual to being absent from work (Bakker, Demerouti, & Schaufeli, 2003; Cooper & Dewe, 2008; Darr & Johns, 2008; Duijts, Kant, Swaen, van den Brandt, & Zeegers, 2007; Marmot, Feeney, Shipley, North, & Syme, 1995; Schaufeli, Bakker, & van Rhenen, 2009; Väänänen et al., 2003). Sickness absences is intended as the non presence of a worker at work because of illness or reduced well-being of the worker (Darr & Johns, 2008; Taimela et al., 2007). However, as sickness absences can depend on other factors, apart from the worker's health, in this study we took into account medically certified sickness absences (MCSA). MCSA are considered as a valid indicator of the worker's health (Kivimäki, Elovainio, & Vahtera, 2000; Väänänen et al., 2003). Some studies, in fact, evidenced an association between MCSA and future long-term self-rated health status (Vahtera et al., 2010), future disability pension (Kivimäki et al., 2004), and mortality (Vahtera, Pentti, & Kivimäki, 2004). Moreover, MCSA are registered in the company database. The use of this measure thus reduces recall bias by the worker, and allows us to analyze the relation between psycho-physic strain and MCSA longitudinally (Darr & Johns, 2008; De Croon et al., 2003).

According to Darr and Johns (2008), work-related stress can be viewed as a process in which the individual gradually develops psychological responses (i.e., psychological strain), physical responses (i.e., physic strain), and behavioral responses (i.e., sickness absences) when faced with characteristics of the work environment perceived as threatening or potentially harmful. In their meta-analysis Darr and Johns showed that the perception of stressors determines psycho-physic strain and, consequently, sickness absences. We therefore hypothesize that psycho-physic strain predicts MCSA.

HYPOTHESIS 4:

PSYCHO-PHYSIC STRAIN POSITIVELY PREDICTS MEDICALLY CERTIFIED SICKNESS ABSENCES

Overall, the present study aims to test a theoretical model in which, in line with what is already hypothesized by the Effort-Recovery model, WHI mediates the relation between job demands/resources and psycho-physic strain which, in turn, predicts sickness absences.

METHOD

Participants and Procedure

The study involved, for the period of one year (from the 1st of January 2010 to the 31st of December), 409 employees belonging to an Italian public administration, constituting about a third of the entire workforce. The sample, whose characteristics are presented in Table 1, is representative with respect to the variables gender and position held. At the beginning of 2010 the

employees took part in the annual medical check-up, carried out by the occupational physician. Before undergoing the actual check up, a self-report instrument was administered to the employees, named Q_u-Bo_R, aimed at revealing the perception of risk factors (De Carlo, Falco, & Capozza, 2008). At the end of the medical examination the occupational physician carried out the evaluation of psycho-physical symptoms linked to work-related stress, using Form 4 of the V.I.S. method. The survey was performed at the end of the annual medical check-up, with workers being informed that the aim of the survey was to identify eventual symptoms linked to work-related stress (for further information concerning the Form 4 of the V.I.S., see Falco, Girardi, et al., 2012). Then, the medically certified sickness absences for the whole 2010 were collected from the company database.

TABLE 1
 Characteristics of the study participants

	Valid % (N = 409)
Age	
< 40 years	20.5
Between 40 and 50 years	44.5
> 50 years	35.0
Gender	
Male	39.9
Female	60.1
Marital status	
Married/cohabiting	71.3
Not married/cohabiting	28.7
Parental status	
Without children	29.5
With children	70.5
Position	
Manager	7.8
Clerk	64.7
Workmen	27.5
Type of contract	
Permanent contract	92.1
Temporary contract	7.9

Materials

To assess the constructs represented in Figure 1, we used the following measures.

Workload. Self-evaluation by the worker (Q_u-Bo_R) was assessed by using five items with a response scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*); alpha was .71. The scale considers both the time dedicated to working activities (time-based dimension, item exam-

ple “Your job requires you to work overtime”) and the concentration of work to be done (strain-based dimension, item example “Your job requires you to work very fast”).

Job autonomy. For this self-report measure (Q_u - B_{OR}), three items were used with a response scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). One item was “Your job allows you to plan the pace of work by yourself?”; alpha was .72.

Work-home interference. For this self-report measure (Q_u - B_{OR}), two items were used with a response scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). One item was: “You think that the time spent at work prevents you from cultivating personal interests?”; alpha was .90.

Psycho-physic strain was revealed by using Form 4 of the V.I.S. Method, an instrument elaborated for obtaining the evaluations of the occupational physician (see Falco, Girardi, et al., 2012). The instrument is composed of 31 items which measure four dimensions of psycho-physic strain, namely: *anxiety symptoms*, *depression symptoms*, *sleeping disorders*, and *somatic symptoms*. The response alternatives are included in a 6-interval scale, from 1 (*never*) to 6 (*on a daily basis*). Anxiety symptoms were revealed using eight items, for instance tense, strained, nervous; alpha was .71. The scale of depression symptoms was composed of eight items, for instance feeling asthenia, weariness, fatigue; alpha was .64. Sleeping disorders were revealed using five items, for instance having difficulty in getting to sleep; alpha was .71. Finally, the scale somatic symptoms was composed of 10 items, for instance nausea, a lump in the throat; alpha was .75.

Medically certified sickness absences were measured in terms of number of episodes of medically certified absences throughout 2010, collected from the company database.

Statistical Analyses

The hypothesized relations were tested by estimating a structural equation model with latent variables. We used the software Lisrel 8.8 (Jöreskog & Sörbom, 2006). In order to assess model fit, we considered, apart from χ^2 , the following fit indices: root mean square error of approximation (RMSEA), comparative fit index (CFI), and standardized root mean square residual (SRMR). For RMSEA and SRMR, values close to or smaller than .08 indicate a good fit. For CFI, values close to or greater than .95 indicate a good fit (Hu & Bentler, 1999).

Prior to estimating the model, the metric properties were evaluated, in terms of convergent and discriminant validity, of the self-report scales used to reveal work-home interference and the perceived risk factors, namely workload and job autonomy. Therefore, confirmatory factor analysis (CFA; Kline, 2010) was carried out. The theoretical model hypothesized includes 10 observed variables, namely the single items of the three scales, and three latent variables (i.e., WHI, workload, and job autonomy). The fit indices showed a good fit of the model: $\chi^2(32, N = 374) = 70.97, p < .001$; RMSEA = .058, CFI = .965, SRMR = .053. The standardized factor loadings were all higher than .41, while correlations between latent factors were included between $-.07$ e $.31$. Overall, the three self-report scales showed good metric properties and appeared to be distinct factors.

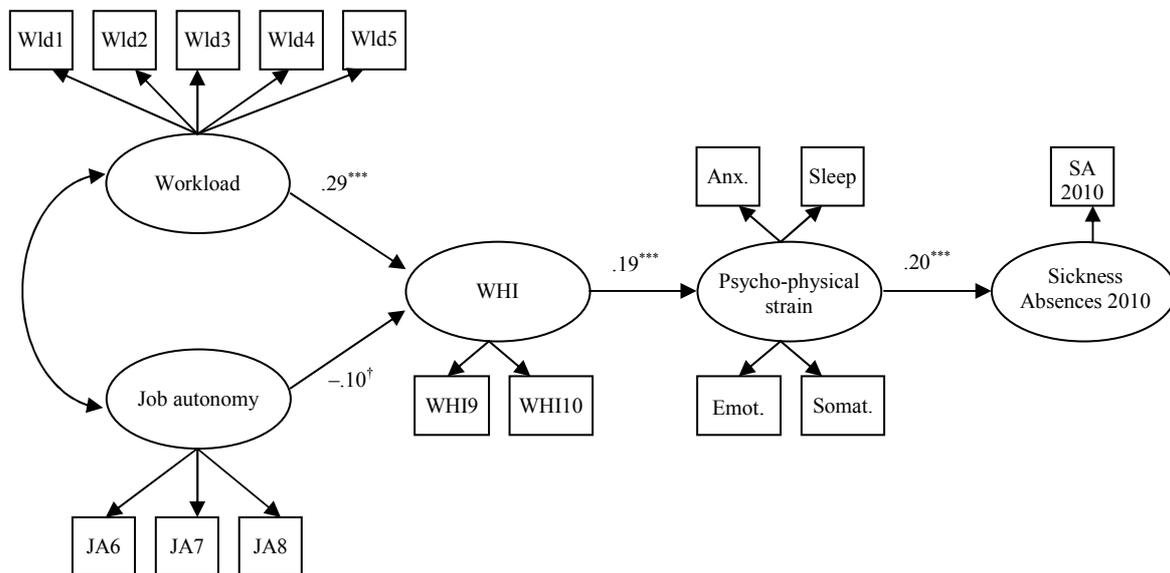
The complete structural model (Model 1) was then tested. This includes 15 observed variables and five latent variables. Workload, job autonomy, and work-home interference were measured using as observed variables the single items of the respective scales. For the multidimensional

mensional construct of psycho-physic strain, four indicators of items were created, which reflect the dimensions in which the construct of strain is articulated, namely anxiety symptoms, depression symptoms, sleeping disorders, and somatic symptoms. Each indicator corresponds to the mean of items of the respective subscale (*internal-consistency approach*; Little, Cunningham, Shahar, & Widaman, 2002). Work absences were measured by a single indicator corresponding to the number of absences throughout 2010. Factor loading was fixed as one, while error variance was fixed as zero (see Kenny, Kashy, & Bolger, 1998).

The significance of the indirect effect (i.e., mediation) was tested using the Sobel test (Baron & Kenny, 1986). To test whether WHI fully or partially mediated the relationship between workload/job autonomy and psycho-physic strain, two further models were estimated. In Model 2 the direct effect of workload on psycho-physic strain was estimated, while in Model 3 the direct effect of job autonomy on psycho-physic strain was estimated. The fit of each of these alternative models was compared to that of Model 1 using the chi-square difference statistic (χ^2_d) for nested models (Wheaton, 1987). Prior to analyzing data we removed participants with at least one missing value in the variables considered (listwise deletion; Schafer & Graham, 2002). The final sample comprised, therefore, 374 workers. The null hypothesis was rejected when $p < .05$.

RESULTS

Fit indices showed a good fit to the data for Model 1: $\chi^2(86, N = 374) = 132.54, p = .001$; RMSEA = .037, CFI = .977, SRMR = .049. The model is shown in Figure 2.



Note. Dotted lines represent nonsignificant paths.
 † $p = .079$. *** $p < .001$.

FIGURE 2
 Standardized solution for the hypothesized model.

A positive association emerged between workload and WHI ($\gamma = .29, p < .001$), while the association between job autonomy and WHI was marginally significant ($\gamma = -.10, p = .079$). Hypothesis 1 was, thus, confirmed, whereas Hypothesis 2 was not. Moreover, a positive association was found between WHI and psycho-physic strain as measured by the occupational physician ($\beta = .19, p < .001$). Psycho-physic strain, in turn, predicted absences ($\beta = .20, p < .001$). Hypothesis 3 and Hypothesis 4 were, therefore, confirmed.

Sobel test showed that workload had a significant indirect effect on psycho-physic strain through WHI ($z = 2.65, p = .01$), while this did not occur for job autonomy ($z = -1.56, p = .12$).¹ WHI, thus, mediated the relationship between workload and psycho-physic strain, but did not mediate the relationship between job autonomy and psycho-physic strain. Finally, WHI exhibited a significant indirect effect on sickness absences through psycho-physic strain ($z = 2.48, p = .01$),² namely psycho-physic strain mediated the relationship between work-home interference and absences.

To test whether WHI fully or partially mediated the relationship between workload and psycho-physic strain, the fit of the hypothesized theoretical model (Model 1) was compared to that of an alternative model (Model 2), in which the direct effect of workload on psycho-physic strain was estimated. Since the previous analyses showed that WHI did not mediate the relationship between job autonomy and psycho-physic strain, we did not compare Model 1 with the alternative model in which the direct effect of job autonomy on psycho-physic strain was estimated (Model 3). The alternative model (Model 2), less parsimonious, did not show a better fit compared to Model 1: $\chi^2_d(1, N = 374) = .05, p = .83$. Workload did not have a direct effect on strain ($\gamma = -.01, ns$). Thus, it can be concluded that work-home interference fully mediates the relationship between workload and psycho-physic strain (MacKinnon, Fairchild, & Fritz, 2007).

DISCUSSION

The aim of the present study was to examine, using a multi-method approach, the role covered by work-home interference in the process which leads to the formation of work-related stress. Specifically, we formulated a theoretical model in which workload (job demands) is positively associated with work-home interference, while job autonomy (job resources) is negatively associated with WHI. In accordance with the proposed model, this interference between the work domain and private life determines the onset of negative consequences for the individual, at both a psychological level and at a physical level, which can lead the worker to being absent from work. Findings allowed a partial confirmation of the hypothesized model.

Workload, in line with what emerged in earlier studies (Byron, 2005; Ghislieri, Ricotta, & Colombo, 2012; Höge, 2009; Michel et al., 2011), was positively associated with work-home interference. Hypothesis 1 was therefore confirmed. In relation to Hypothesis 2, we found a weak negative association (marginally significant) between job autonomy and WHI. Hypothesis 2 was therefore not confirmed. This is in conflict with findings present in some earlier studies (Byron, 2005; Michel et al., 2011; Voydanoff, 2004) in which a significant association emerged between job autonomy and WHI. Other studies, however, did not evidence an association between job autonomy and WHI (Batt & Valcour, 2003; Parasuraman, Purohit, Godshalk, & Beutell, 1996), while other studies found an association for women but not for men (Grandey, Cordeiro, &

Crouter, 2005). For a deeper analysis of this result, see further in the text concerning the theoretical consequences of the study and future developments.

WHI was positively associated with psycho-physic strain measured by the occupational physician during the annual medical check-up. This confirms what emerged in earlier research (Amstad et al., 2011; Montgomery, Panagopolou, & Benos, 2006). Hypothesis 3 was therefore confirmed. Finally, psycho-physic strain predicted subsequent medically certified sickness absences regarding 2010 (Darr & Johns, 2008; Duijts et al., 2007; Schaufeli et al., 2009; Taimela et al., 2007; Väänänen et al., 2003). Also Hypothesis 4 was confirmed.

The mediation analyses evidenced a significant indirect effect of workload on psycho-physic strain through work-home interference. Instead, an indirect effect of job autonomy on strain did not emerge. WHI, therefore, mediates the relationship between workload and psycho-physic strain. Since the direct effect of workload on psycho-physic strain was not significant, the relation between workload and strain was fully mediated by WHI (MacKinnon et al., 2007). Finally, since the direct effect of WHI on sickness absences was not significant (see Note 2), psycho-physic strain fully mediated the relation between WHI and sickness absences.

These findings have important implications, at both theoretical and practical level; they open up interesting scenarios for future research. At a theoretical level, it emerges that results, on the whole, are in line with what was hypothesized by the Effort-Recovery model. A heavy workload, both in terms of time devoted to working activities and concentration of work to be done, determines a difficult integration between work domain and private life. This limits the possibilities and quality of recovery during free time, which determines a prolonged psycho-physiological activation, and, in the long run, the onset of negative consequences for the individual, at both a psychological level and physical level. This can lead the worker to being absent from work. The Effort-Recovery model therefore offers an interesting framework to collocate the phenomenon of interference between work and home, which in literature, apart from some exceptions (Geurts et al., 2003; Höge, 2009), is considered from time to time as a stressor or as a consequence of specific characteristics of the work environment.

A possible future development could therefore concern a deeper study of the E-R model. For example, future research on the relationship between WHI and psycho-physic strain should be able to examine directly indicators of incomplete recovery, with the aim of verifying the goodness of fit of the theoretical framework provided by the E-R model. These indicators can be either subjective or objective (Geurts & Sonnentag, 2006). Among the first is the psychological construct of need for recovery, intended as the necessity to recover after a tiring or stressful period of work (De Croon, Sluiter, Blonk, Broersen, & Frings-Dresen, 2004; Sonnentag, Kuttler, & Fritz, 2010). Among the objective indicators of incomplete recovery the literature indicates the role of some physiological indicators, such as catecholamines or cortisol (Ganster & Rosen, 2013; Geurts & Sonnentag, 2006; Sluiter, Frings-Dresen, Meijman, & van der Beek, 2000).

What is also interesting to note is that workload, in terms both of time dedicated to working activities and the concentration of work to be done, does not have a direct effect on strain, but only an indirect effect, through WHI. This is a result worthy of note given that, to the authors' knowledge, similar results emerged only in another two studies (Geurts et al., 2003; Major et al., 2002). This result, if confirmed in future studies, could lead to interesting conclusions: it is possible that workload does not constitute in itself a risk factor, as instead evidenced in numerous studies (Belkic, Landsbergis, Schnall, & Baker, 2004; Kivimäki et al., 2006; Netterstrøm et al.,

2008), but can be considered as such in as much as the time dedicated to work or the strain generated by a stressful working day determine a difficult integration between the work domain and private life.

A central role in this process is therefore played by spillover, both affective and cognitive, which interferes with recovery, by reducing its quality and quantity (Geurts et al., 2003). From this point of view individual characteristics (e.g., coping styles, personality characteristics of the worker) would therefore assume an important, central role. It is in fact probable that subjects characterized by high negative affectivity and by coping styles centered on emotions (emotion focused coping) perceive in a more threatening way a heavy workload, as well as responding more intensely, in terms of negative emotions, with respect to subjects characterized by low negative affectivity and by coping styles centered on the problem (Dal Corso, Floretta, Falco, Benevene, & De Carlo, 2013; Di Sipio, Falco, Kravina, & De Carlo, 2012; Hart & Cooper, 2001; Rodell & Judge, 2009). These negative emotions generate a spillover effect on the individual's private life, determining an interference between the work domain and private life and compromising the possibility of an adequate recovery. An idea for future research could therefore be that of considering the individual characteristics of the worker as moderators of the relationship between workload and psycho-physic strain.

Contrary to what was hypothesized, our study did not evidence an association between job autonomy and WHI. This result deserves some comments, since the literature presents contrasting findings. In some cases in fact an association emerges between job autonomy and WHI (Byron, 2005; Michel et al., 2011; Voydanoff, 2004), whereas in others this does not occur (Batt & Valcour, 2003; Parasuraman et al., 1996). Above all, some studies evidenced that job autonomy can both exercise a direct negative effect on WHI, and moderate the relationship between workload and WHI (Geurts et al., 2009; Hughes & Parkes, 2007). Moreover, Geurts et al. (2009) distinguish between two distinct dimensions of job autonomy, namely the possibility to choose when to take days off or decide short holiday periods (leave control) and the possibility to plan when own working activity starts and finishes (flextime). While leave control exercises a direct negative effect on WHI, flextime moderates the relationship between workload and strain (Geurts et al., 2009). In line with these results, the role of job autonomy deserves to be looked into more deeply, considering different aspects of the construct (leave control and flextime) and testing its moderating effects on the relation between workload and psycho-physic strain.

Moreover, according to some studies it is convenient to consider the positive aspects (i.e., work family facilitation, WFF), as well as the negative ones (i.e., WHI), of the relationship between work domain and private life (Ghislieri et al., 2012; Grzywacz & Marks, 2000; Hill, 2005). WFF is intended as the degree to which the resources associated with a role (e.g., work) increase or facilitate participation in the other role (e.g., private life; Wayne, Grzywacz, Carlson, & Michele, 2007; Wayne, Musisca, & Fleeson, 2004). According to Voydanoff (2004), job demands, among which the author includes workload, are more closely linked to WHI with respect to job resources (among which job autonomy features), the latter being more closely linked to WFF. According to the theoretical model proposed by the author however, crossover effects are not excluded, in which job demands exercise a direct negative effect on WFF, while job resources can help to prevent/reduce WHI. A future study can broaden the theoretical model tested, by evaluating the role played by job resources in favoring work family facilitation, the eventual presence of crossover effects, as well as the role of some individual characteristics (e.g., resilience, self effi-

cacy, workaholism) in the relationship between job resources, WFF and the wellbeing of the worker (Bakker et al., 2010; Falco, 2007; Falco, Piccirelli, Girardi, Dal Corso, & De Carlo, 2013; Kravina, Falco, Girardi, & De Carlo, 2010).

Finally, as previously recalled, psycho-physic strain predicts sickness absences. It is interesting to note that psycho-physic strain, on the whole, explains a small percentage of variance of sickness absences, equal to about 5%. This value is in line with what is reported in the meta-analysis carried out by Darr and Johns (2008). A possible explanation may depend on the fact that workers decide to go to work even if they are ill (presenteeism; Johns, 2011). In addition, it is possible that the decision to be absent from work does not depend exclusively on the worker's state of health, the predictor considered in the hypothesized theoretical model, but also on other circumstances such as, for example, family-related responsibilities, company policy concerning absences, the fear of losing one's job or being subject to a reduction in salary (Mastrangelo et al., 2008; Vahtera, Kivimäki, Pentti, & Theorell, 2000).

The present work is characterized by some innovative aspects and strong points, at both a theoretical and methodological level. From a theoretical point of view the hypothesized model proposes to grasp various aspects of the process which leads to the formation of work-related stress, integrating them into the theoretical framework defined by the E-R model. Given that few studies exist aimed at integrating into a single theoretical frame work job demands/resources, work-home interference and psycho-physic strain, we believe that the present work offers an important contribution to the reference literature, providing, at the same time, numerous suggestions for future research.

Among the strong points it should be noted that, at a methodological level, in this study we adopt a multi-method approach which integrates self-evaluations, an evaluation by the occupational physician, and an objective indicator of malaise, namely medically certified sickness absences. This constitutes an innovative approach with respect to the previous studies carried out on this theme, based almost exclusively on self-report measures. Overall, in fact, this approach allows us to obtain more valid measures (with particular reference to the evaluation of psycho-physical symptoms carried out by the occupational physician; Waldenström et al., 2008), to limit the role of individual differences (i.e., Negative Affectivity) in revealing work-related stress (Falco, Girardi, Marcuzzo, De Carlo, & Bartolucci, 2013; Girardi, Falco, Dal Corso, Kravina, & De Carlo, 2011), and to reduce the effects of common method bias (Conway & Lance, 2010; Falco, Kravina, et al., 2012; Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Moreover, medically certified sickness absences are revealed prospectively at Time 2. This allows us, on the one hand, to contain recall bias linked to self-report measures for sickness absences (De Croon et al., 2003), and on the other to collect information regarding causality direction (Zapf, Dormann, & Frese, 1996). Also, a further advantage of this study consists in the use of structural equation models with latent variables. This allows us to examine the structural model (i.e., the relations between the examined constructs) while controlling for measurement errors (Kline, 2010).

The study also presents some limits. Above all, the causal relationship between job demands/resources, work-home interference and psycho-physic strain is defined only at a theoretical level, these dimensions being revealed not longitudinally at the same time (Time 1). In order to obtain information about the causality direction of workload/job autonomy→psycho physic strain it would have been necessary to collect data in three distinct waves (if we consider workload/job autonomy, WHI, and psycho-physic strain), something which was not possible for us to

do. However, the theoretical model presented in this study was formulated in the light of longitudinal studies showing that job demands/resources determine WHI (Britt & Dawson, 2005; Peeters, de Jonge, Janssen, & van der Linden, 2004), and WHI predicts psycho-physic strain over time (Grant-Vallone & Donaldson, 2001; Hammer, Cullen, Neal, Sinclair, & Shafiro, 2005; Kinunen, Geurts, & Mauno, 2004; Lidwall, Marklund, & Voss, 2010).

Our study also has practical implications for occupational psychologists and occupational physicians. Since our study highlighted the role of workload, in terms of both time dedicated to working activities and the concentration of work to be done, in predicting work-home interference, the occupational psychologist/physician can implement interventions aimed at containing the effect of workload on WHI and, indirectly, on psycho-physic strain. A first type of intervention, linked to the time-based dimension of WHI, could concern the restructuring of methods of working, by discouraging or preventing working activities which can interfere with the recovery of invested energy. Such activities could be, for example, working overtime or working at home/at the weekend. This objective could be pursued, for instance, by blocking access, both physical (e.g., impossibility of entering the office) and virtual (e.g., email), to the workplace, or by promoting incentives which reward those workers who reach objectives operating exclusively within working hours.

A second type of intervention, connected to the strain-based dimension of WHI, could be aimed at containing the negative spillover effect between work domain and private life. This could be pursued through promoting activities which favor recovery during both work breaks (internal recovery) and at home, in free time (external recovery). Regarding the first point (internal recovery) interventions can concern the requalification of work breaks (booster breaks; Taylor, 2005). For example, it is possible to guarantee workers the possibility to plan autonomously their work breaks, so as to offer them the possibility of detaching themselves from work (psychological detachment; van Wijhe, Peeters, Schaufeli, & Ouweneel, 2012), both physically and psychologically, after carrying out a particularly stressful task. Moreover, it is possible to teach workers simple physical exercises (e.g., stretching) or relaxation techniques to practice, in specifically designated places, during work breaks (Taylor, 2005; van der Klink, Blonk, Schene, & van Dijk, 2001).

In relation to the second point (external recovery), the occupational psychologist/physician can, either personally or through psychotherapists, propose cognitive-behavioral interventions aimed at reducing spillover, both cognitive and affective, between work domain and private life. One type of intervention could be aimed at helping workers to control recurrent thoughts related to working activities (perseverative cognitions; Berset et al., 2011; Brosschot & van der Doef, 2006), which can interfere with the recovery process.

At a practical level, finally, strong points and weak points of the objective indicators of malaise are highlighted, such as, in this case, sickness absences, in the evaluation of work-related stress. From a theoretical viewpoint, sickness absences are situated at the end of the complex process which leads to the formation of work stress, an assumption which finds confirmation in the results presented earlier (Darr & Johns, 2008). Among the strong points of this indicator there is the possibility of revealing data which do not depend on the perceptions and emotional experiences of the worker. However, only a small percentage of variance of sickness absences can be explained by psycho-physic strain, since other motives exist which can induce the worker to be absent from work, or to turn up for work even when ill (presenteism; Falco, Girardi, Parmiani, et al., 2013; Johns, 2010, 2011). Hence, in our opinion, objective indicators of malaise cannot substitute the

workers' self-reports in evaluating work-related stress, but the two measures should be integrated in a multi- method approach.

NOTES

1. It should be noted that the Sobel test was significant also in Model 2 ($z = 2.58, p = .01$), in which the path WHI→strain was estimated controlling for the direct effect workload→strain.
2. We tested mediation also after having added the direct path from WHI to sickness absences in the baseline model. The direct path was marginally significant ($\beta = .10, p = .06$) and Sobel test remained significant ($z = 2.32, p = .02$).

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