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RESEARCH ARTICLE

Work-life interaction as a mediator between work factors and outcomes

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Abstract

While work-home interaction has been studied as a mediator between work factors and outcomes, less is known about work-home interaction as a mediator between work factors and mental and physical health. This study analyzes, from a Job Demands-Resources Model framework, whether negative work-home interaction mediates the relationship between job demands and mental/physical health complaints and whether positive work-home interaction mediates the relationship between job resources and health complaints. The statistical results supported our hypotheses, indicating that negative work-home interaction mediated the relationship between job demands (i.e., job insecurity, overload) and health complaints and that positive work-home interaction mediated the relationship between job resources (i.e., growth opportunities, advancement, organizational support) and mental health complaints. These findings broaden the JD-R framework by furthering the understanding of the mechanisms by which work-home interaction impacts an end outcome of interest to organizational psychology – employee health.

Keywords

work-life interaction, work factors, mental health, physical health.

Introduction

Several attempts have been made to identify work-life interaction - the way in which work interferes with home life and the other way around - as a mediator between work factors and outcomes (e.g., Geurts, Kompier, Roxburgh, & Houtman, 2003; Montgomery, Panagopolou, & Benos, 2006; Montgomery, Peeters, Schaufeli, & Ouden, 2003). However, studies focusing on work-life interaction as a mediator between work factors and health as a job outcome are few. For example, we know work-life interference mediates the relationship between workload and depressive mood and health complaints (Geurts et al., 2003), between job demands (i.e., emotional, quantitative, physical) and general health (van der Heijden, Demerouti, Bakker, & NEXT Study Group coordinated by Hans-Martin Hasselhorn, 2008) and between job demands (i.e., cognitive, emotional, physical) and psychosomatic health complaints (Peeters, de Jonge, Janssen, & van der Linden, 2004). However, we do not know the extent to which work-life interaction mediates the relationship between other job demands and health outcomes. To our knowledge, there are no studies testing the role of positive work-home interaction as a

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mediator in the relationship between job resources and health outcomes.

Hence, not only is this area underexplored, but further developments would help understand the mechanisms for positive and negative processes, as well as justify the creation of more programs focusing on job resources as a means to improve employee health.

This study analyzes whether the negative work-home interaction mediates the relationship between job demands — the work factors that negatively impact employees, and health: both mental and physical (see Figure 1) — and also whether the positive work-home interaction acts as a mediator between job resources — the work factors that positively impact employees and mental and physical health (see Figure 2). The study is based on the theoretical perspective provided by the Job Demands-Resources Model/JD-R (Bakker & Demerouti, 2007) and the Effort-Recovery Model (Meijman & Mulder, 1998) assumptions based on which the JD-R framework was developed.

Employee health

Despite our current limited knowledge, employee health is a consequential topic in I/O psychology, as its correlates are directly tied to organizational outcomes. First of all, employee health is associated with presenteeism directly, via health conditions (e.g., arthritis), or indirectly, via healthy behaviors (e.g., exercise) (Schultz & Edington, 2007) or its opposite, absenteeism (Merrill et al., 2013). Employees who cannot come to work due to health problems can pose serious problems for companies, as trained employees cannot do their jobs for various periods of time, which potentially means missed deadlines, costs associated with substitutes and others. At the same time, sickness presenteeism is also challenging, as in the long run it can increase the risk of poor general health and future sickness absence (Taloyan et al., 2012).

Job demands / Resources and health outcomes

According to the JD-R Model (Bakker & Demerouti, 2007), when employees in an organization encounter high job demands (e.g., physical, emotional, mental), they will face higher strain, whereas when they have higher resources (e.g., support, autonomy), employees will become more motivated. At the same time, the authors of the JD-R model defined job demands as physical, psychological, social, or organizational elements in the workplace which require sustained efforts associated with physiological and/or psychological costs, and job resources as the physical, psychological, social, or organizational aspects which help employees reach their goals, reduce the physiological and psychological costs, and stimulate growth (Bakker & Demerouti, 2007). However, most of the studies using this model have focused on outcomes such as engagement and burnout (e.g., Demerouti, Bakker, Nachreiner, & Schaufeli, 2000, 2001), and fewer have also included health problems (e.g., Bakker, Demerouti, & Schaufeli, 2003; Hakanen, Bakker, & Schaufeli, 2006). We will discuss the theoretical basis for the paths from demands to health and from resources to health.

There is an established relationship between high job demands and poor health outcomes. Job demands have been associated with negative health outcomes, both mental and physical (Burgard & Lin, 2013), some groups with high job demands (low control, high work demand) showing a threefold risk of increased health problems, when compared to groups with medium work demands (Sundquist & Johansson, 2000).

There is strong evidence linking mental health to demands. For example, high psychological demands, low decision latitude and bullying are related to depressive symptoms (Theorell et al., 2015). Also, less compelling evidence shows that psychological demands, effort-reward imbalance, low support, hostile social climate, lack of work justice, conflicts, limited skill discretion, job insecurity and long working hours predict the existence of depressive symptoms (Theorell et al., 2015). In a similar vein, psychological

demands in the workplace lead to depressive symptoms in both men and women (Kawakami, Haratani, & Araki, 1992; Niedhammer, Goldberg, Leclerc, Bugel, & David, 1998), as well as to other common mental health problems (Stansfeld, Fuhrer, Shipley, & Marmot, 1999).

In respect to physical health, intense and/or hazardous work can have a detrimental effect on physical health, such as cardiac disease (Bosma, Peter, Siegrist, & Marmot, 1998; Kivimäki et al., 2002), neck and upper limb problems (Bongers, Ijmker, van den Heuvel, & Blatter, 2006) or lung cancer (Yano, Wang, Wang, Wang, & Lan, 2001). Women and older employees seem to be affected more by these links (Fletcher, Sindelar, & Yamaguchi, 2011). There is also evidence that physical health is impacted by less palpable work stressors. For example, job insecurity increases the odds of having poor self-rated health; high job demands and low organizational justice increase the odds of having a physician diagnosed illness, while long work hours and low job control increase the odds of mortality (Rongen, Robroek, van Lenthe, & Burdorf, 2013).

In this paper, we study two job demands, namely job insecurity and overload, and three resources, namely growth opportunities, advancement and organizational support. We have chosen these job factors because they are prevalent in the workplace and explained by the JD-R model. Albeit the JD-R Model is a flexible framework, we focused on already established factors within the model (Jackson & Rothmann, 2005) to avoid potential biases resulting from the integration of new variables. Moreover, all the selected job factors have already been associated with health outcomes, as shown in the following paragraphs.

Job insecurity describes an uncertainty about the future of one's job, while overload refers to the rhythm and amount of work, as well as emotional and mental load (Rothmann, Mostert, & Strydom, 2006). Job insecurity is one of the demands associated with poor health outcomes, with self-rated morbidity, and specific physiological characteristics in women, such as higher blood pressure and a lower BMI (Ferrie, Shipley, Stansfeld, & Marmot, 2002). Effects of job insecurity on general health and emotional exhaustion have also been observed in employees (Geuskens, Koppes, van den Bossche, & Joling, 2012). After including studies showing strong (e.g., Wilson, Larson, & Stone, 1993), moderate (e.g., Bussing, 1999; De Witte, 1999), weak (e.g., Kinnunen & Nätti, 1994) and no correlations (e.g., Fox & Chancey, 1998; Lindstrom, Leino, Seitsamo, & Torstila, 1997) between job insecurity and both mental and physical health, one meta-analysis showed that job insecurity is indeed related to physical health and even more strongly so with mental health (Sverke, Hellgren, & Näswall, 2002).

Another job demand associated with poor health is overload. Work overload has been associated with a variety of negative health outcomes, including stress, heart disease, skin problems, various aches, anxiety, irritability (Shultz, Wang, & Olson, 2010) or burnout (Khamisa, Peltzer, & Oldenburg, 2013).

Job resources are also linked to health outcomes. Resources have been tied to health problems especially indirectly. For example, job resources, alongside job demands, predict burnout, which in turn predicts psychosomatic health problems (Martinussen, Richardsen, & Burke, 2007; Schaufeli & Bakker, 2004). Although fewer, some studies have analyzed the direct connection between resources and health, showing that job resources are negatively correlated with health problems (Bakker et al., 2003) or that training programs designed to increase worksite coping resources reduced depression symptoms and somatization (Heaney, Price, & Rafferty, 1995).

Growth opportunities is a construct which refers to having enough variety, independence in the workplace and the opportunity to learn, organizational support tackles both the relationship with supervisors and colleagues, the flow of information, communication, role clarity and participation in decision-making, while advancement deals with payments, career possibilities and training opportunities (Rothmann et al., 2006).

These job resources have been identified as particularly relevant to employee well-being. For instance, employee development (included in growth opportunities), communication (included in organizational support), a conflict-free working environment,

among others, predicted stress (Lim & Murphy, 1999). Perceptions on organizational support were also associated with physical health (Arnold & Dupré, 2012). At the same time, a perceived better relationship with the supervisor reduces perceived work exhaustion (Moideenkutty, Blau, & Al-Mandhari, 2008), and supervisors' support of recovery was associated with less emotional detachment and fewer health complaints (e.g., backaches, headaches) in employees (Bennett, Gabriel, Calderwood, Dahling, & Trougakos, 2016).

Resources may lead to lower health complaints through a series of ways. For example, the employee may perceive work activities which are related to growth opportunities as serving a personal goal rather than an organizational one. Therefore, such actions are regarded as less stressful, which can lead to a positive spillover in the personal life area and better health outcomes. Similarly, employees with high organizational support may be able to meet their deadlines sooner or face unexpected situations better, by resorting to their colleagues' help or by asking their supervisor for advice. This can not only reduce stress but also reduce workload. Employees who benefit from advancement have more career opportunities and better pay which can lead to a better home life: for instance, the person can seek a position that has a better schedule, more rewarding tasks, a shorter commute or can use the money to pay other people to take over part of the home tasks, such as cleaning or cooking. Consequently, employees with job resources will benefit from better home lives which will help maintain better mental and physical health (e.g., Demerouti & Geurts, 2004; Grzywacz, 2000).

Work-Life interaction – antecedents

Work-life interaction (WHI) is a construct which describes the manner in which work-life interferes with home life. Work-home interference acts dually, as a mediator between job resources and outcomes (i.e., engagement) and between job demands and outcomes (i.e., burnout) (Montgomery et al., 2003). Work-life interaction has shown to be associated with both predictors (job characteristics), and criteria (health outcomes).

Job demands lead to a negative spillover from work to personal life (Demerouti, Geurts, & Kompier, 2004), while job resources are associated with a positive spillover from work to family/personal life (Bianchi & Milkie, 2010). For instance, job demands such as workload and emotional demands lead to negative work-home interaction, while job resources such as autonomy, possibilities for professional development and performance feedback lead to positive work-home interaction (Bakker & Geurts, 2004). Similarly, family supportive supervision predicts work interference with family, the latter acting as a mediator between work supervision and family dinner frequency (Allen, Shockley, & Poteat, 2008). Also, work-family specific supervisor and organizational support are strongly correlated with work-family conflict (Kossek, Pichler, Bodner, & Hammer, 2011).

The causality direction from work factors and work-home interaction has been well researched: studies have shown that work factors cause a work-home interaction, and not the other way around. For example, one meta-analytic review revealed that work domain variables, such as job involvement, hours spent at work, work support, schedule flexibility or work stress, function more strongly as antecedents for work interference with family, than nonwork domain variables (e.g., family support, family stress, number of children, marital status, spousal employment), the latter being stronger antecedents for family interference with work (Byron, 2005).

However, work-life interaction was studied as part of the JD-R model, being included in a "loss spiral" of work-home interference, according to which work pressure, a job demand, led to work-home interference and exhaustion, but also exhaustion led to more work-home interference and work pressure (Demerouti, Bakker, & Bulters, 2004). These findings made the authors claim that theoretical models supporting a simple causal chain were inadequate.

Results indicating reciprocal relationships between job demands and general health over

time, with work-home interference as an intermediary variable have also been reported (van der Heijden et al., 2008), authors claiming these to be superior to both causation and reversed causation. The same authors draw support for the logic of such relationships from findings (Kohn & Schooler, 1982) showing that the workplace has an influence over personality, and that over time people move to jobs more in tune with their personality, by hypothesizing that employees with poor health will choose worse jobs with higher stressors, while also arguing that employees with poor health could have a worse perception of job demands, and that such demands could actually be influenced by the more negative perceptions. While some employees do go to worse jobs, with higher job demands, others, according to the same findings, might choose something more suitable to their personality or situation, which may also mean part-time jobs or less demanding ones. Similarly, employees with poor health may go into early retirement or go on sickness absence, from which many return (Dewa, Loong, & Bonato, 2014). Hence, while a portion of employees may experience reciprocal relationships, the stressor – WHI – strain mechanism will apply to most, an assumption supported by studies showing that job stressors lead to work-home interaction, but not the other way around (Peeters et al., 2004).

The negative mediation mechanism

Work-life interaction intervenes, through a negative mechanism, between job demands and various outcomes. Work-life interaction has been identified as a partial mediator between work factors and burnout, i.e., between emotional job demands, and both emotional exhaustion and depersonalization (Montgomery et al., 2006); between psychological job demands and emotional exhaustion (Janssen, Peeters, Jonge, Houkes, & Tummers, 2004) or between cognitive, emotional and physical stressors and exhaustion (Peeters et al., 2004). Work-to-family enrichment mediates the relation between job characteristics and job outcomes (Baral & Bhargava, 2010), and work-family conflict is a mediator between job schedule demands and emotional exhaustion (Lingard & Francis, 2005). Work-life interference also fully mediates the relation between workload, and depressive mood and health complaints, and partially mediates the relationship with work-related negative affect (Geurts et al., 2003).

A negative spillover from work to family, or the impaired ability to fulfill family life requirements due to work responsibilities (Greenhaus & Beutell, 1985), is known to be associated with reduced mental health. For instance, work-family conflict is related to depression (Frone, Russell, & Barnes, 1996; Frone, Russell, & Cooper, 1997; Grzywacz & Bass, 2003), generalized anxiety disorder and panic disorder (Grzywacz & Bass, 2003) or in a broader sense to having a mood, anxiety and substance abuse disorder (Frone, 2000). Employees who experience negative work-home interaction are those with most psychological health complaints (Demerouti & Geurts, 2004). Negative work-home interaction has also been associated with reduced physical health outcomes, both directly and indirectly. For example, work-life conflict has been tied to a series of negative health outcomes, such as poor general physical health (Frone, 2000; Frone et al., 1997; Winter, Roos, Rahkonen, Martikainen, & Lahelma, 2006), musculoskeletal disorders (Hämmig, Knecht, Läubli, & Bauer, 2011) or hypertension (Frone et al., 1997). Negative work-home interaction has been associated with fatigue and health complaints (Demerouti, Geurts, & Kompier, 2004). Indirectly, this negative mechanism is related to unhealthy behaviors that may impact an individual's health status. In this sense, work-family conflict has been linked to high alcohol consumption (Frone et al., 1996, 1997; Grzywacz & Bass, 2003), cigarette use (Frone, Barnes, & Farrell, 1994), and a lower intake of healthy foods (Allen & Armstrong, 2006).

Similarly to other studies (e.g. van der Heijden et al., 2008), we explain this negative mechanism through the Effort-Recovery / E-R Model (Meijman & Mulder, 1998), which states that people are activated when faced with demands. When there is no period of recovery, the normal load reactions become negative load effects (i.e. impairment, illness).

In this context, high job demands lead to a high load, which is transferred at home or has an impact on work-life balance. In turn, a lack of work-life balance that can stimulate recovery and the accumulated personal duties (e.g. time spent with spouse or children, house chores, formalities) lead to a higher load which eventually turns into health complaints.

We therefore hypothesize that there is a negative mechanism according to which:

1. *Negative work-home interaction (WHI-) mediates the relationship between job demands and employee health (see Figure 1).*

a. WHI- mediates the relationship between job insecurity and mental health.

b. WHI- mediates the relationship between job insecurity and physical health.

c. WHI- mediates the relationship between overload and mental health.

d. WHI- mediates the relationship between overload and physical health.

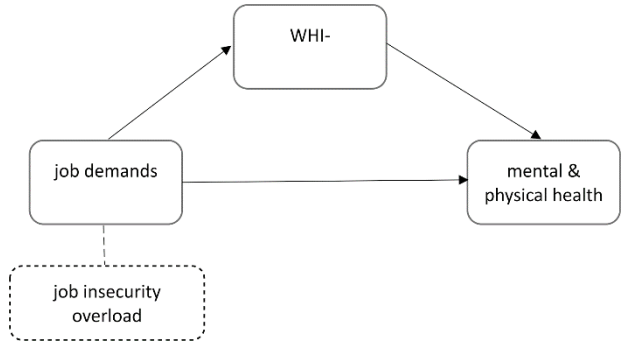


Figure 1. Negative work-home interaction mediates the relation between job demands and employee health.

The positive mediation mechanism

There is also a positive mechanism, through which work-home interaction acts as a mediator between job resources and outcomes. For example, regarding mental health, a positive work-home interaction is associated with a lower risk of depression (Nitzsche, Jung, Pfaff, & Driller, 2013). Positive work-home interaction mediates the relation between job resources (i.e. organizational support, possibilities for advancement, growth opportunities, contact with colleagues) and work engagement (Mostert, 2006). The relationship between work and family can be a positive one, with employees having a positive spillover from work to family. A positive home-work interaction has been associated with better health, both physical and mental (Demerouti & Geurts, 2004; Grzywacz, 2000). Moreover, these empirical findings also have a theoretical framework in the role enhancement hypothesis (Greenhaus & Powell, 2006), according to which work can produce positive effects on family life.

While the Effort-Recovery Model was used to explain the negative mechanism in the JD-R Model, the theoretical justification of one model of work-life interaction (Geurts et al., 2005) uses the E-R model to substantiate a "positive load reaction", or a positive spillover, from work to home life. In this sense, the positive activation from work (to the extent that the employee has resources) can be transferred to home life. Regarding health, a less stressful work experience may translate into better personal relationships, fewer family conflicts or more positive personal life experiences which can then lead to better mental health or better/healthier lifestyles.

We thus hypothesize there is also a positive mechanism, according to which:

2. *Positive work-home interaction (WHI+) mediates the relationship between job resources and employee health (see Figure 2).*

a. WHI+ mediates the relationship between growth opportunities and mental health.

b. WHI+ mediates the relationship between growth opportunities and physical health.

c. WHI+ mediates the relationship between advancement and mental health.

d. WHI+ mediates the relationship between advancement and physical health.

e. WHI+ mediates the relationship between organizational support and mental health.

f. WHI+ mediates the relationship between organizational support and physical health.

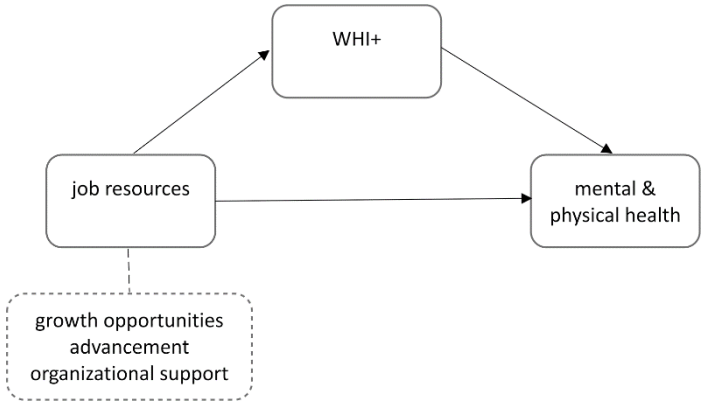


Figure 2. Positive work-home interaction mediates the relation between job resources and employee health.

Method

Participants

Participants in this study were 195 adult employees, among them 91 women (46.7%), with ages between 20 and 59 (M = 34.60, SD = 9.49). About one fifth (21.5%) were single, 45.6% were married and 25.6% were in a relationship. About half of the participants (46.2%) had a college education, 11.3% had graduated high school, while 42.6% had a graduate degree. The participants had a total employment period ranging from 1 to 35 years (M = 12.27, SD = 9.17) and a period of employment in the current position between 1 month and 34 years (M = 5.48, SD = 5.82).

Procedure

The measures were administered online. The questionnaires were disseminated via social networks. All participants were informed of their rights as participants, including the right to confidentiality, to withdraw from the research at any time and to ask further questions. No compensations were granted for participating in this study. Procedures regarding research involving human subjects were followed.

Measures

Job demands and resources. Both job demands and resources were measured with the Job Demands-Resources Scale/JDRS (Jackson & Rothmann, 2005), which has five factors (Rothmann et al., 2006): growth opportunities, organizational support, advancement – job resources, and overload, job insecurity – job demands. The 42 items of the instrument were rated on a scale from 1 (never) to 5 (always). Some example items are: “Do you have enough variety in your work?” (growth opportunities), “Can you count on your colleagues when you come across difficulties in your work?” (organizational support), “Do you think your organization pays good salaries?” (advancement), “Do you have too much work to do?” (overload), “Do you need to be more

secure that you will still be working in one year's time?" (job insecurity). For this study, we used the subscales of this instrument separately, which, in the order above, had an Alpha Cronbach of .86 (8 items), .92 (17 items), .87 (6 items), .83 (8 items), .96 (3 items).

Work-home interaction. Work-home interaction was measured with the Survey Work-home Interaction-Nijmegen/SWING (Wagena & Geurts, 2000). Only the 8-item subscale of Work negatively influencing home/WHI- and the 5-item Work positively influencing home subscale/WHI+ were used for this study. Some example items are "How often does it happen that you are irritable at home because your work is demanding?" or "How often does it happen that you fulfill your domestic obligations better because of the things you have learned on your job?". Alpha Cronbach was .91 for WHI- and .83 for WHI+.

Mental health. Mental health complaints were measured with the Mental Health Inventory/MHI-5 (Berwick et al., 1991) comprised of five items, rated on a Likert scale from 1 (never) to 6 (always). Some example items are: "How much of the time, during the last month, have you been a nervous person?" or "How much of the time, during the last month, have you felt calm and peaceful?". Three of the items were normally scored, while two were reversed (positive wording). Alpha Cronbach was .84.

Physical health. Physical health complaints were measured using four items of the General Health Scale from the SF-36 Health Survey (Ware, 1999), rated on a Likert scale from 1 (totally disagree) to 5 (totally agree). One example item is "My health is excellent". Two of the four items were normally scored, while the other two were reverse scored (positive working). Alpha Cronbach was .78.

Analytic strategy

The descriptive statistics were conducted with IBM Statistics SPSS 22 (IBM Corp, 2013). For the mediation analysis, we used Process macro (Hayes, 2013) in SPSS, while the confirmatory factor analyses (CFA) for all measures was conducted with R via the Jupyter Notebook platform and the lavaan library.

Results

Descriptive statistics and correlation coefficients

Table 1 shows all descriptive statistics.

Table 1. *Descriptive statistics and correlations among variables in model*

	M	*SD*	*α*	*JI*	*O*	*GO*	*OS*	*A*	*WHI-*	*WHI+*	*MC*	*PC*
Job insecurity (JI)	7.85	4.11	.96	1								
Overload (O)	28.58	6.12	.83	.22**	1							
Growth opportunities (GO)	27.85	6.96	.86	-.25**	-.08	1						
Organizational support (OS)	64.57	12.94	.92	-.22**	-.31***	.57***	1					
Advancement (A)	17.82	6.37	.87	-.24**	-.26***	.53***	.56***	1				
WHI-	16.15	4.95	.91	.19**	.53***	-.17*	-.33***	-.2**	1			
WHI+	10.80	3.43	.83	-.08	-.02	.29***	.26***	.21**	-.13	1		
Mental complaints (MC)	14.68	5.06	.84	.30***	.38***	-.38***	-.44***	-.33***	.59***	-.28***	1	
Physical complaints (PC)	9.14	3.44	.78	.28***	.15*	-.19**	-.19**	-.12	.29***	-.18**	.55***	1

Note: * $p < .05$; ** $p < .01$; *** $p < .001$
WHI- = negative work-home interaction
WHI+ = positive work-home interaction

Since this a study which only uses self-reported scales, we analyzed whether common method variance was an issue that affected the observed relations between constructs, for which we used Harman's single factor test (Andersson & Bateman, 1997; Aulakh & Gencturk, 2000; Greene & Organ, 1973; Schriesheim, 1979). We introduced all 66 items into an unrotated principal components analysis with one fixed factor, which revealed that the single factor only accounted for 23.25% of the variance. We thus concluded that even though common method bias cannot be excluded, it is unlikely to influence the results of the present study.

The CFAs for the measures used in the study are presented in Table 2.

Table 2. *Confirmatory factor analyses for the measures*

Measure	Model	χ^2(df)	CFI	RMSEA (90% CI)	SRMR
JDRS					
	5 factors (8 correlated errors)	1787.59(805)	.81	.07	.09
Mental Complaints					
	1 factor (1 correlated error)	25.22(4)	.95	.16	.03
Physical Complaints	1 factor	9.09(2)	.97	.14	.04
SWING	4 factors (4 correlated errors)	2675.28 (231)	.91	.07	.07

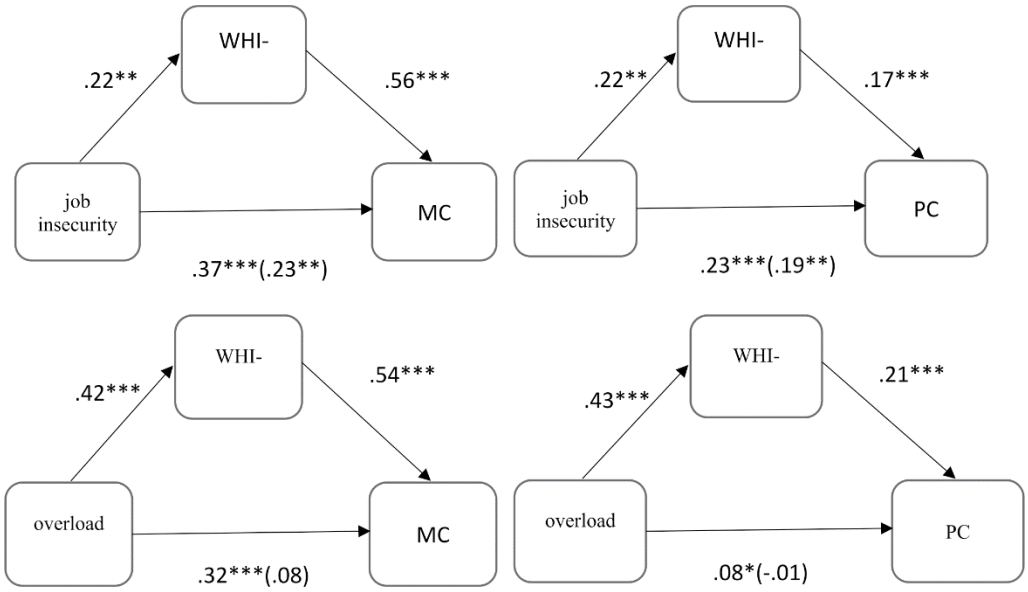
Mediation results

In testing whether negative work-life interaction (WHI-) mediates the relationship between job insecurity and mental complaints, we found that job insecurity is by itself a significant predictor of mental complaints, $b = .37$, $t(193) = 4.36$, $p < .001$. Job insecurity is also a significant predictor of WHI-, $b = .23$, $t(193) = 2.67$, $p = .008$. When controlling for WHI- in predicting mental complaints, $b = .56$, $t(192) = 9.46$, $p < .001$, job insecurity remains a significant predictor of mental complaints, $b = .24$, $t(192) = 3.38$, $p < .001$. A Sobel test was conducted and revealed a mediation ($z = 2.56$, $p = .01$). Our results indicate that the relationship between job insecurity and mental complaints is partially mediated by WHI-, thus supporting *Hypothesis 1a*.

In testing whether negative work-life interaction (WHI-) mediates the relationship between job insecurity and physical complaints, we found that job insecurity is by itself a significant predictor of physical complaints, $b = .23$, $t(193) = 3.98$, $p < .001$. Job insecurity is also a significant predictor of WHI-, $b = .23$, $t(193) = 2.67$, $p = .008$. When controlling for WHI- in predicting physical complaints, $b = .17$, $t(192) = 3.61$, $p < .001$, job insecurity was still a significant predictor of physical complaints, $b = .19$, $t(192) = 3.35$, $p < .001$. A Sobel test was conducted and revealed a mediation ($z = 2.10$, $p = .04$). Our results indicate that the relationship between job insecurity and physical complaints is partially mediated by WHI-, thus supporting *Hypothesis 1b*.

In testing whether negative work-life interaction (WHI-) mediates the relationship between overload and mental complaints, we found that overload is by itself a significant predictor of mental complaints, $b = .32$, $t(193) = 5.74$, $p < .001$. Overload is also a significant predictor of WHI-, $b = .43$, $t(193) = 8.66$, $p < .001$. When controlling for WHI- in predicting mental complaints, $b = .54$, $t(192)$

= 7.75, $p < .001$, overload was no longer a significant predictor of mental complaints, $b = .08$, $t(192) = 1.46$, $p = .15$. A Sobel test was conducted and revealed a mediation ($z = 5.75$, $p < .001$). Our results indicate that the relationship between overload and mental complaints is fully mediated by WHI-, thus supporting *Hypothesis 1c*.



Note 1: * $p < .05$; ** $p < .01$; *** $p < .001$
Note 2: MC = mental complaints; PC = physical complaints; WHI- = negative work-home interaction

Figure 3. Results of negative work-home interaction as mediator in the relation between job demands and health complaints

In testing whether negative work-life interaction (WHI-) mediates the relationship between overload and physical complaints, we found that overload is by itself a significant predictor of physical complaints, $b = .08$, $t(193) = 2.05$, $p = .04$. Overload is also a significant predictor of WHI-, $b = .42$, $t(193) = 8.66$, $p < .001$. When controlling for WHI- in predicting mental complaints, $b = .21$, $t(192) = 3.63$, $p < .001$, overload was no longer a significant predictor of mental complaints, $b = -.01$, $t(192) = -.13$, $p = .90$. A Sobel test was conducted and revealed a mediation ($z = 3.33$, $p < .001$). Our results indicate that the relationship between overload and physical complaints is fully mediated by WHI-, thus supporting *Hypothesis 1d*.

In respect to job resources, we tested whether positive work-life interaction (WHI+) mediates the relationship between growth opportunities and mental complaints, and we found that growth opportunities are by themselves a significant predictor of mental complaints, $b = -.26$, $t(193) = -5.31$, $p < .001$. Growth opportunities are also a significant predictor of WHI+, $b = .14$, $t(193) = 4.27$, $p < .001$. When controlling for WHI+ in predicting mental complaints, $b = -.33$, $t(192) = -3.33$, $p = .001$, growth opportunities were still a significant predictor of mental complaints, $b = -.22$, $t(192) = -4.09$, $p < .001$. A Sobel test was conducted and revealed a mediation ($z = -2.15$, $p = .03$). Our results indicate that the relationship between growth opportunities and mental complaints is partially mediated by WHI+, thus supporting *Hypothesis 2b*.

Table 3. *Mediation effects of negative work-home interaction (WHI-) on the relationship between job demands and a) mental complaints (MC) and b) physical complaints (PC)*

Regression paths	*B*	*t*	*p*
Mediation *a* path (job insecurity on WHI-)	.23	2.67	< .01
Mediation *b* path (WHI- on MC)	.56	9.46	< .001
Total effect, *c* path (job insecurity on MC, no mediator)	.37	4.36	< .001
Direct effect *c'* (job insecurity on MC, including mediator)	.24	3.38	< .001
Indirect effect bootstrapped *(c-c')* with bootstrapped 95% CI	.13 [.03, .24]		
Mediation *a* path (job insecurity on WHI-)	.23	2.67	< .01
Mediation *b* path (WHI- on PC)	.17	3.61	< .001
Total effect, *c* path (job insecurity on PC, no mediator)	.23	3.98	< .001
Direct effect *c'* (job insecurity on PC, including mediator)	.19	3.34	< .001
Indirect effect bootstrapped (*c-c'*) with bootstrapped 95% CI	.04 [.01, .09]		
Mediation *a* path (overload on WHI-)	.43	8.66	< .001
Mediation *b* path (WHI- on MC)	.54	7.75	< .001
Total effect, *c* path (overload on MC, no mediator)	.32	5.73	< .001
Direct effect *c'* (overload on MC, including mediator)	.08	1.46	.14
Indirect effect bootstrapped (*c-c'*) with bootstrapped 95% CI	.23 [.17, .32]		
Mediation *a* path (overload on WHI-)	.42	8.66	< .001
Mediation *b* path (WHI- on PC)	.20	3.63	< .001
Total effect, *c* path (overload on PC, no mediator)	.08	2.05	.04
Direct effect *c'* (overload on PC, including mediator)	-.01	-.13	.90
Indirect effect bootstrapped (*c-c'*) with bootstrapped 95% CI	.09 [.03, .15]		

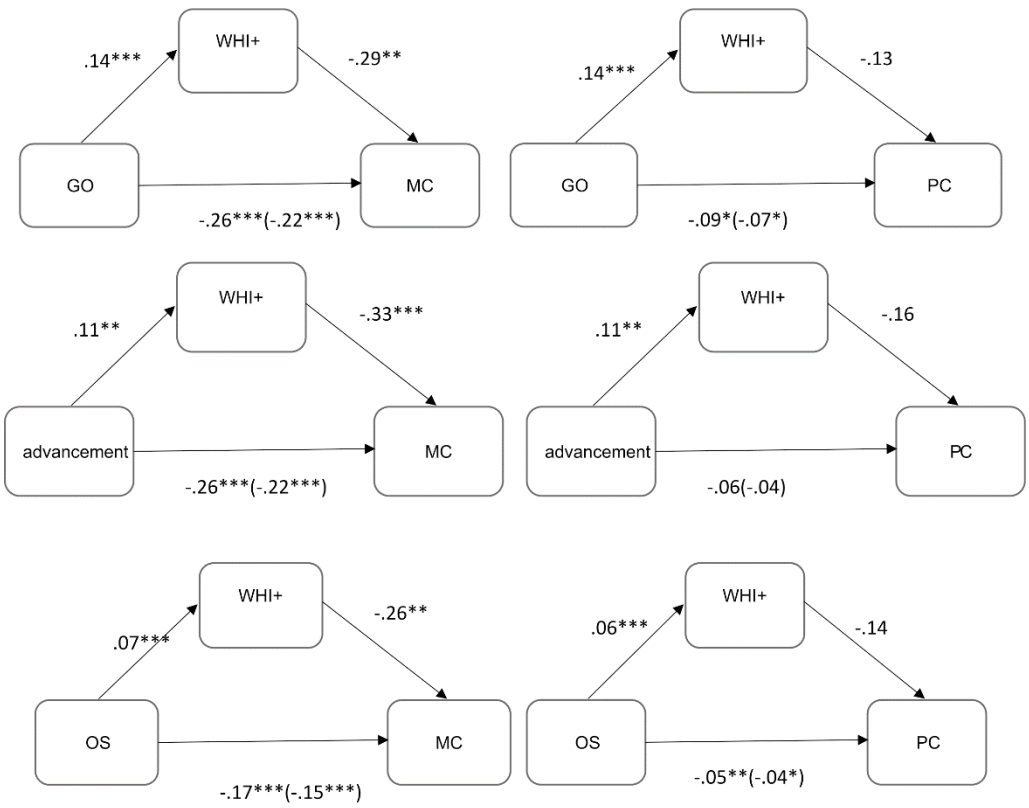
We also tested whether positive work-life interaction (WHI+) mediates the relationship between growth opportunities and physical complaints, and we found that growth opportunities are by themselves a significant predictor of physical complaints, b = -.09, $t(193)$ = -2.68, p = .008. Growth opportunities are also a significant predictor of WHI+, b = .14, $t(193)$ = 4.27, p < .001. When controlling for WHI+ in predicting physical complaints, b = -.13, $t(192)$ = -1.833, p = .07, growth opportunities remained a significant predictor of physical complaints, b = -.07, $t(192)$ = -2.04, p =.04. A Sobel test was conducted and revealed a non-significant effect (z = -1.64, p = .1). Our results indicate that the relationship between growth opportunities and physical complaints is not mediated by WHI+, thus failing to support *Hypothesis 2a*.

When testing whether positive work-life interaction (WHI+) mediates the relationship between advancement and mental complaints, we found that advancement is by itself a significant predictor of mental complaints, b = -.26, $t(193)$ = -4.77, p = < .001. Advancement is also a significant predictor of WHI+, b = .11, $t(193)$ = 2.95, p =.003. When controlling for WHI+ in predicting mental complaints, b = -.33, $t(192)$ = -3.33, p = .001, advancement remained a significant predictor of mental complaints, b = -.22, $t(192)$ = -4.09, p = < .001. A Sobel test was conducted and revealed a mediation (z = -2.16, p = .03). Our results indicate that the relationship between advancement and mental complaints is partially mediated by WHI+, thus supporting *Hypothesis 2c*.

When testing whether positive work-life interaction (WHI+) mediates the relationship between advancement and physical complaints, we found that advancement was not a significant predictor of physical complaints, b = -.06, $t(193)$ = -1.63, p = .105. Advancement was a significant predictor of

WHI+, b = .11, $t(193)$ = 2.95, p =.003. When controlling for WHI+ in predicting physical complaints, b = -.16, $t(192)$ = -.2.23, p = .026, advancement remained a non-significant predictor of physical complaints, b = -.04, $t(192)$ = -1.14, p = .254. A Sobel test was conducted and revealed a mediation (z = -1.72, p = .08). Our results indicate that the relationship between advancement and mental complaints is not mediated by WHI+, thus failing to support *Hypothesis 2c*.

In testing whether positive work-life interaction (WHI+) mediates the relationship between organizational support and mental complaints, we found that organizational is by itself a significant predictor of mental complaints, b = -.17, $t(193)$ = -6.89, p < .001. Organizational support is also a significant predictor of WHI+, b = .07, $t(193)$ = 3.72, p < .001. When controlling for WHI+ in predicting mental complaints, b = -.26, $t(192)$ = -2.76, p = .006, organizational support remained a significant predictor of mental complaints, b = -.16, $t(192)$ = -6.05, p = < .001. A Sobel test was conducted and revealed a mediation (z = -2.17, p = .03.). Our results indicate that the relationship between organizational support and mental complaints is partially mediated by WHI+, thus supporting *Hypothesis 2e*.



Note 1: * p < .05; ** p < .01; *** p < .001
Note 2: MC = mental complaints; PC = physical complaints; WHI+ = positive work-home interaction; GO = growth opportunities; OS = organizational support

Figure 4. Results of positive work-home interaction as mediator in the relation between job resources and health complaints

In testing whether positive work-life interaction (WHI+) mediates the relationship between organizational support and physical complaints, we found that organizational is by itself a significant predictor of physical complaints, b = -.05, $t(193)$ = -2.68, p = .008. Organizational support is also a significant predictor of WHI+, b = .07, $t(193)$ = 3.72, p < .001. When controlling for WHI+ in predicting physical complaints, b = -.14, $t(192)$ = -1.91, p = .057, organizational support was still a significant predictor of physical complaints, b = -.04, $t(192)$ = -2.11, p = .04. A Sobel test was conducted and revealed a non-significant effect (z = -1.65, p = .1.). Our results indicate that the relationship between organizational support and physical complaints is not mediated by WHI+, thus failing to support *Hypothesis 2f.*

Table 4. *Mediation effects of positive work-home interaction (WHI+) on the relationship between job resources and a) mental complaints (MC) and b) physical complaints (PC)*

Regression paths	*B*	*t*	*p*
Mediation *a* path (growth opportunities on WHI+)	.14	4.27	< .001
Mediation *b* path (WHI+ on MC)	-.29	-2.83	<.01
Total effect, *c* path (growth opportunities on MC, no mediator)	-.26	-5.31	< .001
Direct effect *c'* (growth opportunities on MC, including mediator)	-.22	-4.34	< .001
Indirect effect bootstrapped *(c-c')* with bootstrapped 95% CI	-.04 [-.09, -.01]		
Mediation *a* path (growth opportunities on WHI+)	.14	4.27	< .001
Mediation *b* path (WHI+ on PC)	-.13	-1.83	.07
Total effect, *c* path (growth opportunities on PC, no mediator)	-.09	-2.68	< .01
Direct effect *c'* (growth opportunities on PC, including mediator)	-.07	-2.04	.04
Indirect effect bootstrapped (*c-c'*) with bootstrapped 95% CI	-.02 [-.05, .001]		
Mediation *a* path (advancement on WHI+)	.11	2.95	< .01
Mediation *b* path (WHI+ on MC)	-.33	-3.33	< .001
Total effect, *c* path (advancement on MC, no mediator)	-.26	-4.77	< .001
Direct effect *c'* (advancement on MC, including mediator)	-.22	-4.09	< .001
Indirect effect bootstrapped (*c-c'*) with bootstrapped 95% CI	-.04 [-.08, -.01]		
Mediation *a* path (advancement on WHI+)	.11	2.95	< .01
Mediation *b* path (WHI+ on PC)	-.16	-2.23	.026
Total effect, *c* path (advancement on MC, no mediator)	-.06	-1.62	.105
Direct effect *c'* (advancement on MC, including mediator)	-.04	-1.14	.254
Indirect effect bootstrapped (*c-c'*) with bootstrapped 95% CI	-.01[-.04, -002]		
Mediation *a* path (organizational support on WHI+)	.07	3.72	< .001
Mediation *b* path (WHI+ on MC)	-.27	-2.76	< .01
Total effect, *c* path (organizational support on MC, no mediator)	-.17	-6.89	< .001
Direct effect *c'* (organizational support on MC, including mediator)	-.16	-6.05	< .001
Indirect effect bootstrapped (*c-c'*) with bootstrapped 95% CI	-.02 [-.04, -.004]		
Mediation *a* path (organizational support on WHI+)	.07	3.72	< .001
Mediation *b* path (WHI+ on PC)	-.14	-1.91	.057
Total effect, *c* path (organizational support on PC, no mediator)	-.05	-2.68	< .01
Direct effect *c'* (organizational support on PC, including mediator)	-.04	-2.11	.036
Indirect effect bootstrapped (*c-c'*) with bootstrapped 95% CI	-.01 [-.02, -.0005]		

Discussion

Our findings show that the negative work-home interaction is a mediator in the relationship between job demands, on one hand, and both mental and physical complaints, on the other. However, positive work-home interaction was a mediator only in the relationship between job resources and mental health.

One first conclusion that can be drawn from these results is that the way work interacts with home life explains the pathway between job factors and health consequences among employees.

A second finding is that while for some job demands, such as overload, work-home interference fully explains mental and physical complaints, for others it only partially explains such complaints. This could mean that the mechanisms for certain job factors are more intricate than for others. In this respect, overload may affect employee's health only via work-home interference, since employees who have a high workload cannot fulfil their domestic duties in due time, often choose shorter vacations and are generally more stressed (Rao & Indla, 2010). This is also in keeping with the effort recovery theory on which some work-home interaction measures were built (Geurts et al., 2003).

A third finding is that the link between job resources and mental complaints was partially explained by positive work-home interaction, which however was not the case for the relation between job resources and physical complaints. This can be interpreted in several ways.

One explanation is that positive work-home interference, while good for mental health, is not sufficient to lower physical complaints, which might be better explained by a variety of other factors (i.e., lifestyle, genetics).

Another explanation for the difference between full and partial mediation may be statistical. In general, correlations between job factors and physical complaints were weaker overall than for mental complaints, while the statistical thresholds for the Sobel test in the mediation models for physical complaints were lower. Given the high correlation between mental and physical complaints, it is possible that these mediation models are more relevant for explaining mental health, than physical one.

One other interpretation for our findings is that in the absence of negative work-home interaction we are not as vulnerable to the negative effects of job demands but at the same time, the lack of positive work-home interaction makes it more difficult to benefit from job resources.

Theoretical implications

This study has several implications for I/O psychology, especially occupational psychology. First of all, it has theoretical implications. This research is relevant as it broadens our understanding of the phenomenon of mental and health complains among employees, which has been a significant topic for decades, and refines the theoretical underpinnings of the model used. The Job Demands-Resources Model (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001) framework relies on two equally critical mechanisms, a negative one, in which job demands lead to exhaustion and a positive one, in which job resources lead to engagement and this study is one of the few to analyze the relationship between job insecurity and both general physical and mental health, as mediated by negative WHI.

In this sense, both job insecurity and overload lead to higher stress among employees, less time for their home life and thus higher health complaints.

On the other hand, using job resources to predict a better state of health is equally important. However, few studies have been focused on showing the extent to and the mechanism through which the job resources can reduce health complaints among employees. This research shows that resources do indeed contribute to better health among employees. Hence, we can explain not only the

negative mechanism through an Effort-Recovery (Meijman & Mulder, 1998) process but also the positive one, by supporting the hypothesis of a "positive load reaction" and its effects after that.

It is possible that job resources can change employees' perception of work tasks, as in the case of activities associated with growth opportunities, or even decrease workload, by using advancement benefits such as higher pay to decrease home responsibilities such as cleaning, cooking or running errands. A reduced level of stress and better personal relationships can thus lead to fewer mental health problems.

Practical implications

From a practical standpoint, our study re-stresses the need for a healthy work-life balance and the inclusion of this area in organizational programs for employee health. Thus, focusing on the interaction between professional and personal life, by assessing potential negative effects and by intervening in assuring a better balance, may prevent and/or address the negative consequences associated with employee illness, such as absenteeism or work performance (de Graaf, Tuithof, van Dorsselaer, & ten Have, 2012). According to the JD-R model, there are some specific interventions that could be implemented within this framework (Bakker & Demerouti, 2014), at both an organizational (i.e., job redesign, training) and individual (e.g., strengths-based) level. For instance, since job resources can lead to fewer mental health complaints, offering employees with high workloads (e.g., those who have taken on their coworkers' tasks) or with higher job insecurity more resources (i.e., giving them more autonomy, offering promotions) may be an intervention which can help prevent employee illness from a job redesign perspective. Similarly, employees can receive training meant to increase coping abilities, time management skills or the ability to use resources to tackle job demands more efficiently.

Exploring more in-depth the mechanism by which mental and physical problems appear in employees is vital for organizations, as the latter can bring a more customized and targeted approach when trying to prevent or treat such issues. Despite the existence of many programs implemented and tested thus far, it has been shown that their effectiveness is limited and that the higher the methodology of such studies the lower their effect sizes (Rongen et al., 2013). Hence, not only is it relevant to better understand the mechanisms because better programs could be developed but, alternatively, such more complex applications could be better justified. To this end, based on the findings of this study, it would be crucially to not also include job demands but also job resources and work-life interaction into future personalized machine learning models for each organization.

Limits

One limit of this study is its cross-sectional design, mainly because causality cannot be inferred. This limit could be addressed by conducting future studies with a cross-lagged panel design or even an experimental design. The reason why this method was used is that we wanted a heterogeneous sample, which could make our findings more accessible to generalize. Hence, the participants were employed in various industries and had been employed for different periods of time. Notwithstanding generalization of results, this type of design avoids specific confounding variables, such as organizational climate, and produces less biased results. The second limitation of this study is common method variance, due to having self-report instruments applied at the same time. Nonetheless, Harman's single factor test indicated a low likelihood of having skewed results because of common method bias.

Future directions

Future studies could include longitudinal designs, as well as more elaborate surveys, including more job factors (both demands and resources), and more mental and physical health conditions (e.g. focusing on depression and anxiety rather than general mental complaints or on heart conditions rather than general physical health). These improved designs could allow organizations to identify whether the conditions most frequent among

their employees are caused by specific job factors or by other unrelated variables.

Furthermore, both the positive and negative mediation mechanisms could be further refined in future studies, to better understand the categories most vulnerable to job demands or most receptive to job resources. Such classes could include employees with specific job tasks or professional fields or with certain personality profiles.

The inclusion of new variables could provide a better understanding of which illnesses are more strongly associated with job factors, while also pinpointing the most relevant job factors for interventions.

Most importantly, the positive mechanism by which work-home interaction mediates the relation between job resources and health should be replicated in a longitudinal design or be integrated into an organizational intervention to explore the potential effects on health of increasing such resources.

Conclusion

According to our results, negative work-home interaction mediates the relation between job demands and both mental and physical complaints, while positive work-home interaction is a mediator in the association between job resources and mental complaints.

These findings stress the importance of work-life balance and its incorporation in screenings, prevention and intervention programs. By stimulating a positive spillover from work to home, employees may not only experience less burnout and more engagement, but also enjoy better health.

However, the study carries its limitations, and longitudinal designs should be conducted in the future to further support our findings.

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