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## THE DETERMINANTS OF TEACHERS' WELL-BEING

### The Mediating Role of Mental Fatigue

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In recent years, many studies have focused on the determinants and consequences of teacher stress. One of the most recent theoretical models concerning stress is the Job Demands-Resources (JD-R) model. This study examines one process – namely the energetic process – which supposes that high job demands exhaust employees' mental and physical resources and therefore cause ill health. Particularly, this study examines the mediating role of mental fatigue between three job demands of teachers (workload, inequity and work/family conflict) and three consequences of stress: psychological and physical symptoms and work satisfaction. An Italian version of the self-report Questionnaire for Psychosocial Work Environment and Stress (PWSQ) was administered to 697 teachers belonging to a random sample of 17 school organizations. The results showed that mental fatigue has a mediating role in the relationship between work/family conflict and the three outcomes considered, namely psychological and physical symptoms, and work satisfaction. This study has an important implication for intervention strategy because mental fatigue is a pre-strain condition which arises before more intense outcomes, such as stress-related diseases occur. Identification of this condition allows prevention of the consequences of stress.

**Keywords:** teachers, stress, mental fatigue, Job Demands-Resources model, health

**Faktoren des Wohlbefindens von Lehrern: Die Vermittlerrolle mentaler Erschöpfung:** In den vergangenen Jahren haben sich zahlreiche Studien damit befasst, welche Faktoren Stress bei Lehrern bedingen und welche Folgen dieser haben kann. Eines der neuesten theoretischen Modelle im Zusammenhang mit Stress stellt das Modell Anforderungen und Ressourcen am Arbeitsplatz (JD-R, Job Demands-Resources) dar. Dieser Artikel untersucht einen bestimmten Prozess – den Energie-Prozess –, ausgehend von der Annahme, dass durch die hohen Anforderungen am Arbeitsplatz alle mentalen und körperlichen Ressourcen von Angestellten ausgeschöpft werden, was negative Auswirkungen auf ihre Gesundheit hat. Die Studie untersucht insbesondere die Rolle, die mentale Erschöpfung als Mittlerin zwischen drei verschiedenen Anforderungen an Lehrer am Arbeitsplatz einerseits (Arbeitsbelastung, Ungleichheiten, Konflikt zwischen Arbeit und

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Familie) und drei unterschiedlichen Folgen von Stress (psychische und körperliche Symptome sowie Zufriedenheit am Arbeitsplatz) andererseits spielt. Die italienische Version des selbständig auszufüllenden Fragebogens PWSQ (Questionnaire for Psychosocial Work Environment and Stress) wurde von 697 zufällig ausgewählten Lehrern an 17 verschiedenen Bildungsinstitutionen beantwortet. Wie die Ergebnisse zeigen, spielt mentale Erschöpfung eine Vermittlerrolle zwischen dem Konflikt Arbeit/Familie und den drei untersuchten Folgen, d.h. den psychischen und körperlichen Symptomen sowie der Zufriedenheit am Arbeitsplatz. In der Studie wird eine wichtige Folgerung hinsichtlich einer Interventionsstrategie gezogen, da mentale Erschöpfung ein Zustand der Überreizung ist, der früher als alle anderen ausgeprägteren Erscheinungsformen (z.B. auf Stress zurückzuführende Krankheiten) auftritt. Eine Früherkennung dieses Zustands ermöglicht eine Prävention von Stressfolgen.

**Schlüsselbegriffe:** Lehrer, Stress, mentale Erschöpfung, Modell Anforderungen und Ressourcen am Arbeitsplatz, Gesundheit

## 1. Introduction

The study of teacher stress has a long history, and it has become a research topic with worldwide interest (KYRIACOU 2001; ZURLO et al. 2007). In comparison with other occupations, teaching has been consistently ranked as a high-stress job (JOHNSON et al. 2005; TRAVERS & COOPER 1996), with 33–37% of teachers frequently reporting being very or extremely stressed as a result of factors intrinsic to their work (BOYLE et al. 1995; CHAN & HUI 1995; KYRIACOU 2001). Many studies in several countries have focused on the determinants and consequences of teacher stress (BENMANSOUR 1998; BYRNE 1999; CHAN & HUI 1995; DUNHAM & VARMA 1998) and also in Italy (CAVALLI 2000) teaching has been confirmed as a ‘high-stress occupation’.

Stress is believed to contribute to physical illness, absence, and early retirement from the profession (CHAPLAIN 2008). Consequently, it may have a huge impact on an individuals’ well-being and on the school organization as a whole (JEPSON & FORREST 2006). High levels of occupational stress, when experienced in the long term, can lead to a state of burnout (MASLACH et al. 2001), exhaustion, psychosomatic complaints, and lack of work engagement (BÜLTMANN et al. 2002).

One of the most recent theoretical models concerning stress and burnout is the Job Demands-Resources (JD-R) model (DEMEROUTI et al. 2001; BAKKER et al. 2000, 2003a, 2003c). This assumes that whereas every occupation may have its own specific risk factors associated with job stress, these factors can be classified into two general categories: job demands and job resources. Job demands are those physical, psychological, social, or organizational aspects of the job that require physical and/or psychological effort, and are therefore related to physiological and/or psychological costs. Job resources are those physical, psychological, social, or organizational aspects of the job that are functional in achieving work goals, reduce job demands and the related physiological and psychological costs, and stimulate personal growth and development (BAKKER & DEMEROUTI 2007). Job demands and job resources trigger two different processes: on the one hand there is an *energetic process*, where high

job demands exhaust employees' mental and physical resources and therefore lead to the depletion of energy (i.e. a state of exhaustion) and to health problems (*health impairment process*); on the other hand, there is a *motivational process* where job resources foster engagement, which has a positive effect on well-being and work outcomes (SCHAUFELI & BAKKER 2004). Job stress and burnout develop, regardless of the type of job or occupation, when certain job demands are high and certain job resources are limited (DEMEROUTI et al. 2001). The JD-R model has stimulated much research and its main assumptions have been confirmed by cross-sectional and also by longitudinal studies (for a review see BAKKER & DEMEROUTI 2007). This research, using data from a large sample of school teachers, adapted the JD-R framework to this occupation.

The present study analyzes the concept of mental fatigue from within the framework of the JD-R model (DEMEROUTI et al. 2001). Other researchers have supported the validity of the JD-R model by replacing its components with other constructs, such as exhaustion and repetitive strain injury (e.g. KNUDSEN et al. 2009; BAKKER et al. 2003b) and bullying (e.g. MUNOZ et al. 2006).

In fact, one possible link between job demands and stress-related symptoms is mental fatigue due to high demands and lack of resources (AKERSTEDT et al. 2004). The long-term effect of greater activation and effort at work may be a draining of an individual's energy, eventually resulting in a breakdown and onset of psychological and physical symptoms.

Fatigue has been a recurrent topic in medicine and psychology and has recently attracted much attention as the central component of the chronic fatigue syndrome and of the burnout syndrome (WEBER & JAEKEL-REINHARD 2000; MASLACH et al. 2001; AKERSTEDT et al. 2004). The concept of mental fatigue will be illustrated in the following section.

## 2. Mental fatigue

Mental fatigue is a complex multi-faceted state difficult to define but which is a common phenomenon in daily life, for example as a syndrome due to a 'hard day's work', which involves several changes in mood, information processing, behaviour and psycho-physiological state (LINDEN et al. 2003; LINDEN & ELING 2006).

Prolonged fatigue is associated with impairments comparable to chronic medical conditions, and may affect the individual's performance and functioning in the occupational as well as home setting (BÜLTMANN et al. 2002; BÜLTMANN et al. 2003; JONG et al. 2003; HULST et al. 2006; JANSSEN et al. 2003). Mental fatigue is defined and operationalised in various ways, for example in terms of increased sleepiness, reduced alertness, reduction in motivation, reduction in activity, and reduction in concentration (JANSSEN et al. 2003; TARIS et al. 2006).

According to the theoretical background of the Effort-Recovery (E-R) model (MEIJMAN & MULDER 1998), fatigue is the change in the psycho-physiological con-

trol mechanism that regulates task behaviour resulting from preceding mental and/or physical efforts which have become burdensome to such an extent that the individual is not able to adequately meet the demands the job requires; or the individual is able to meet these demands only at the cost of increasing mental effort and mental resistance. This definition principally implies that fatigue in itself is not an adverse effect but rather a physiological adaptation or safety mechanism of the individual confronted with the risk of overstrain or exhaustion. The E-R model assumes that effort expenditure at work is associated with physiological and psychological costs, which are reversible: after a break, the psycho-biological system will return to a baseline level (recovery).

Repeated insufficient recovery from work-related fatigue gives rise to an unfavourable vicious circle in which extra effort must be made at the beginning of every new working period in order to rebalance the suboptimal psycho-physiological state, and prevent performance breakdown. The consequence is cumulated fatigue, which may be expressed as greater needs for recovery after working time. Subsequently, these greater needs for recovery are seen as precursors of ill health in the longer term (SLUITER et al. 2003).

On the one hand fatigue has been regarded as an antecedent of sickness, absenteeism, work disability, bad performance, stress, and depression (LINDEN & ELING 2006; LINDEN et al. 2003). On the other hand, fatigue may be a consequence of job demands and lack of resources (AKERSTEDT et al. 2004). This is supported by studies that reveal an indirect relationship between psychosocial work factors and psychological and musculoskeletal symptoms (LIM & CARAYON 1993; BYSTRÖM et al. 2004) through the dimensions of mental fatigue.

In this study we assume that mental fatigue has a mediating role in the energy-depleting process of the Job Demands-Resources model (JD-R), in which high job demands exhaust mental resources and therefore lead to the mental fatigue that has a negative impact on teachers' well-being and work satisfaction.

### **3. The energetic process**

In this research we focused on the energetic process that concerns job demands and their impact on health problems (DEMEROUTI et al. 2001). Specifically, we included three job demands that have been identified as important causes of psychological stress among teachers: 1) workload (KYRIACOU 2001); 2) inequity (HORN et al. 1999); and 3) work-family conflict (CINAMON & RICH 2005).

A review of the literature (KYRIACOU 2001) shows that one of the sources of stress most frequently reported by teachers is work overload concerning the management of student behaviour. Teachers themselves report that factors such as workload, initiative overload, a target-driven culture, and students' behaviour and discipline relate significantly to their desire to leave the profession (BROWN et al. 2002). Other research has highlighted how certain factors intrinsic to the teaching

profession can facilitate high levels of stress. For example, heavy workloads and long working hours (TRAVERS & COOPER 1996), overload of competing roles, inconsistent workloads over the academic year (KINNUNEN & LESKINEN 1989), the need for classroom management (LEWIS 1999; MORTON et al. 1997), and evaluation apprehension (CAPEL 1997; MORTON et al. 1997).

With regard to inequity, according to equity theory (ADAMS 1965) people pursue reciprocity in their interpersonal and organizational relationships. When they perceive relationships to be inequitable, they feel distressed and are motivated to restore equity (WALSTER et al. 1978; BUUNK & SCHAUFELI 1999; SCHAUFELI 2006). ELOVAINIO, KIVIMAKI and VAHTERA (2002) showed that the odds rates of poor self-related health, minor psychiatric disorders and absence due to sickness were associated with low levels of perceived justice, demonstrating that unfair procedures and treatment are risks to the health of workers, particularly for depression (YLIPAAVALNIEMI et al. 2005). If this lack of reciprocity turns into a chronic condition, it may foster the development of the burnout syndrome (e.g. FARBER 1991). Teachers who invest more in relationships (e.g. with students or colleagues) than they receive may suffer depletion of their emotional resources. In this regard, JARVIS (2002) reported that teaching is seen as hard, poorly paid, and held in low public esteem. Furthermore, the lack of chances for promotion, the low salary and the few opportunities for advancement are associated with dissatisfaction and maladjustment (KYRIACOU 2001). Also MOLINER, MARTÍNEZ-TUR, PEIRÒ and CROPANZANO (2005) found that the justice climate moderates the predictability of the level of burnout. Another aspect that may have serious negative consequences for well-being, such as burnout and depression, is the conflict between the work and family domains (ALLEN et al. 2000).

Many people believe that teaching is a profession that enables teachers to meet their work obligations without major interruptions from the family while maintaining a home that functions smoothly without significant disruptions by job demands (CINAMON & RICH 2005). However, some studies that have examined the assumption regarding the ease with which teachers blend family and professional roles have reported unexpected results (BIKLEN 1995). In fact, managing these multiple responsibilities is demanding and complicated, and research has demonstrated that many teachers are incapable of separating their professional and family roles effectively (ELBAZ-LUBISCH 2002).

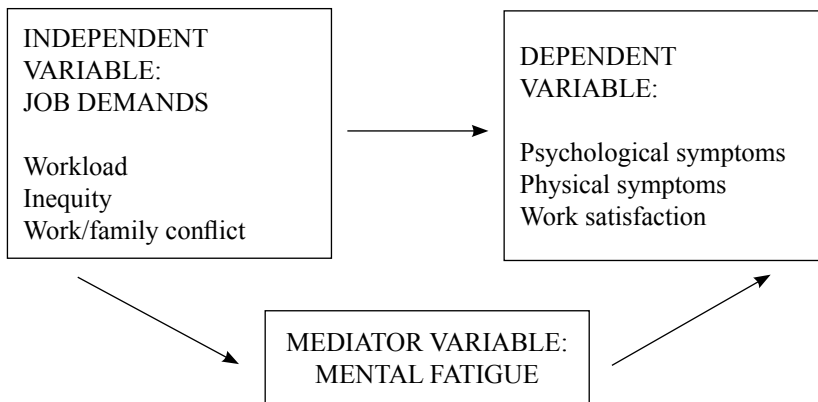
Although the three job demands considered (workload or overload, inequity, and work/family conflict) are not necessarily negative and related to stress-related diseases, they may turn into job stressors when meeting those demands requires great effort from which the employee has not adequately recovered (MEIJMAN & MULDER 1998). In fact, when job demands increase, compensatory effort must be mobilised in order to face the increased demand and maintain the performance level (HAKANEN et al. 2006). The constant mobilization of compensatory effort exhausts teachers' energy, producing a state of mental fatigue that may have negative outcome in terms of health.

#### 4. Aims

This study aims to gain insight in the energy-depleting process of the Job Demands-Resources model (JD-R) by examining whether job demands (workload, inequity and work/family conflict) predict work satisfaction and psychosomatic symptoms through mental fatigue.

In an attempt to explore this psychological mechanism that underlies the relationship between job demands and negative psychological and physical outcomes, the present study focuses on *mental fatigue*, considering it to be a result of difficulties in recovering after a day's work, and of the lack of coping strategies, meaning a lack of capacity to cope successfully with stressful situations at work (AGERVOLD & MIKKELSEN 2004).

The research model resulting from this theoretical framework is shown in *Figure 1*.



*Figure 1*

Theoretical model of the mediating role of mental fatigue

In sum, this study seeks to test the following three hypotheses:

*Hypothesis 1 (H1):* The effect of job demands (workload, inequity and work/family conflict) on psychological symptoms is mediated by mental fatigue.

*Hypothesis 2 (H2):* Mental fatigue mediates the relation between job demands (workload, inequity and work-family conflict) and physical symptoms.

*Hypothesis 3 (H3):* The effect of job demands (workload, inequity and work/family conflict) on work satisfaction is mediated by mental fatigue.

## 5. Method

### 5.1. Sample

The study was carried out among a random sample of 17 public schools of Bologna, Italy. 697 teachers, who participated voluntarily, completed a paper-and-pencil questionnaire. The questionnaire was accompanied by a letter in which the goal of the research was briefly introduced, and the confidentiality and anonymity of the answers were guaranteed. Most respondents were women (80.9%); and were middle-aged; only 4.9% of the teachers were aged 30 and under; 20.4% were aged between 31 and 40; 37.6% between 41 and 50; and 37.1% were aged over 50. Most respondents had considerable length of service, and 49.6% of them had over 20 years of teaching experience. Only 18.7% had some type of fixed-term contract.

### 5.2. Measures

*Workload* was assessed with one subscale of an adjusted and validated version of the *Psychosocial Work Environment and Stress Questionnaire (PWSQ)* (AGERVOLD & MIKKELSEN 2004; GUGLIELMI et al. 2011). The scale included 5 items referring to the perception of the workload and job pressure (e.g. 'I am often full of work'). All items were scored on a four-point frequency rating scale ranging from 1 ('never') to 4 ('always'). The scale's reliability was 0.72.

*Inequity* was measured with the scale developed by YPEREN, HAGENDOORN and GEURTZ (1996) and referred to the perception of fairness concerning payment and personal treatment (e.g. 'I invest more in my work than I get back from it'). The scale included 5 items scored on a four-point frequency rating scale ranging from 1 ('never') to 4 ('often'). The scale's reliability was 0.85.

*Work/family conflict* was measured with a three-item scale (GUGLIELMI et al. 2011) that referred to the imbalance between work and family life (e.g. 'The anxieties and the working worries interfere with my possibility to satisfy the needs of my family'). The respondents were asked to rate the frequency on a 4-point scale (from 1 = 'never' to 4 = 'often'). The scale's reliability was 0.80.

*Job satisfaction* was assessed with a single item (WANOUS et al. 1997). The statement was 'Overall, how satisfied are you with your job?', which was scored on a 5-point scale ranged from 1 ('totally unsatisfied') to 5 ('totally satisfied').

*Psychosomatic symptoms*. Two subscales of the *Psychosocial Work Environment and Stress Questionnaire (PWSQ)* (AGERVOLD 1998a,b) were used to assess *psychological symptoms* related to health such as nervousness, irritability, depression, and *physical symptoms* referred to stomach-aches, palpitation, absent-mindedness and restlessness. The 9 items were measured with a dichotomous scale (1 = no, 2 = yes). The scale items were added together to yield a sum score. A high score on this scale indicated the presence of health-related physical and psychological prob-

lems. The scale's reliability on physical and psychological symptoms was 0.73 and 0.71, respectively.

*Mental fatigue.* Five items concerning psychological fatigue, work reluctance and mental preoccupation with work were used to assess mental fatigue (AGERVOLD & MIKKELSEN 2004). Mental fatigue was measured with a four-point frequency rating scale ranging from 1 ('never') to 4 ('always'). The scale's reliability was 0.67.

## 6. Results

*Table 1* sets out the means, standard deviations and correlations among study variables.

*Table 1*  
Descriptive statistics and correlations among the variables studied (N = 697)

	<i>N</i> <i>item</i>	<i>Range</i>	<i>M</i>	<i>SD</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
<i>Workload</i>	5	1–4	3.19	0.50						
<i>Inequity</i>	5	1–4	2.85	0.72	0.43**					
<i>Work/family conflict</i>	3	1–4	1.98	0.70	0.28**	0.32**				
<i>Mental fatigue</i>	5	1–4	2.62	0.60	0.40**	0.31**	0.63**			
<i>Satisfaction</i>	1	1–5	3.62	0.81	–0.07	–0.24**	–0.22**	–0.23**		
<i>Physical symptoms</i>	4	4–8	4.96	1.05	0.15**	0.15**	0.34**	0.30**	–0.09*	
<i>Psychological symptoms</i>	5	5–10	6.92	1.60	0.27**	0.27**	0.46**	0.46**	–0.37**	0.31**

Note: \* $p < 0.05$ ; \*\* $p < 0.01$

As shown in *Table 1*, all the correlations were in the expected direction. In particular, the three job demands (workload, inequity and work/family conflict) were closely related to mental fatigue. Furthermore, work/family conflict showed a strong association with all the outcomes considered: work satisfaction, psychological and physical symptoms.

The three hypotheses formulated stated that mental fatigue performed a mediating role between job demands (workload, inequity and work/family conflict) and three outcomes: psychological symptoms (H1), physical symptoms (H2) and work satisfaction (H3).

Following BARON and KENNY (1986), we examined the conditions required for mediation: (a) the predictor should be related to the outcome (regression 1); (b) the predictor should be related to the mediator (regression 2); (c) the mediator should



be related to the outcome (regression 3); and (d) the predictor–outcome relationship becomes non-significant (full mediation), or becomes significantly weaker (partial mediation) after the inclusion of the mediator (regression 4). To examine the significance of the mediating effects, we applied the Sobel z-test. We tested all the conditions for each of the three outcomes considered separately.

The first hypothesis (H1) stated that the effect of job demands (workload, inequity and work/family conflict) on psychological symptoms was mediated by mental fatigue.

As shown in *Table 2*, workload, inequity and work/family conflict were positively associated with psychological symptoms, explaining 23% of the variance. Thus the first condition for the mediation is verified.

In order to test the second condition, a regression analysis (regression 2) was conducted. The results showed that condition 2 is met for all the independent variables. In fact, workload ( $\beta = 0.40, p < 0.001$ ), inequity ( $\beta = 0.31, p < 0.001$ ) and work/family conflict ( $\beta = 0.63, p < 0.001$ ) are significantly associated with mental fatigue.

A third regression was carried out to test if the mediator was associated with psychological symptoms. The analysis showed that mental fatigue predicts psychological symptoms ( $\beta = 0.46, p < 0.001$ ), so that the third condition is met.

*Table 2* summarises the results of the mediation model for psychological symptoms when mental fatigue is included in the multiple regression analysis (regression 4), compared with regression 1.

*Table 2*  
Mediation analysis of mental fatigue for psychological symptoms (N = 697)

	<i>Psychological symptoms</i>			
	<i>B</i>	<i>SE</i>	$\beta$	<i>Total R<sup>2</sup></i>
<i>Regression 1</i>				
<i>Workload</i>	0.27	0.13	0.08*	
<i>Inequity</i>	0.48	0.09	0.11**	
<i>Work/family conflict</i>	0.89	0.08	0.40***	0.23***
<i>Regression 4</i>				
<i>Workload</i>	0.08	0.13	0.02	
<i>Inequity</i>	0.24	0.09	0.11**	
<i>Work/family conflict</i>	0.57	0.11	0.25***	0.26***
<i>Mediator</i>				
<i>Mental fatigue</i>	0.66	0.13	0.25***	

Note: \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

As shown in *Table 2*, after the inclusion of the mediator in regression 4, the beta coefficient of workload turned into not significant. According to the above results, and on the basis of BARON and KENNY's (1986) criteria, one may conclude that a significant full mediation of mental fatigue exists in the relationship between workload and psychological symptoms. However, scholars have argued that it is not enough to show that the relationship between the predictor and the outcome is smaller or no longer significant after the inclusion of the mediator, but it is also necessary to provide evidence for the significance of the mediated effect (MACKINNON et al. 2002). The Sobel test result was not significant ( $z = 1.55, p = 0.12$ ), meaning that the detected effect is not significant. Furthermore, mental fatigue partially mediates the relationship between work/family conflict and psychological symptoms. The decrease in the beta coefficient, measured using Sobel's test, is statistically significant for work/family conflict ( $z = 5.38; p < 0.001$ ). Finally, mental fatigue does not perform a mediating role between inequity and psychological symptoms.

Hypothesis 1 was confirmed only for the work/family conflict. The second hypothesis (H2) stated that the effect of job demands (workload, inequity and work/family conflict) on physical symptoms was mediated by mental fatigue. In order to test the first condition (regression 1), a regression analysis was carried out. As shown in *Table 3*, only work/family conflict was positively associated with physical symptoms, explaining 12% of the variance. Thus the first condition for the mediation is verified for one of the three job demands considered. The second condition (predictor-mediator relation) was tested and met in the previous analysis presented above. A third regression analysis was carried out to test if the mediator was associated with physical symptoms. The analysis showed that mental fatigue predicts physical symptoms ( $\beta = 0.30, p < 0.001$ ), so the third condition is met.

*Table 3* presents the results of the mediation model for physical symptoms when mental fatigue is included in the multiple regression analysis (regression 4), compared with regression 1. As shown in *Table 3*, mental fatigue is a partial mediator between work/family conflict and physical symptoms. In fact, the decrease in the beta coefficient, measured using Sobel's test, is statistically significant ( $z = 5.21; p < 0.001$ ). Hypothesis 2 was confirmed for only the work/family conflict.

Hypothesis 3 stated that mental fatigue mediates the relation between job demands (workload, inequity and work/family conflict) and work satisfaction. As shown in *Table 4*, the first condition (regression 1) was met for inequity and work/family conflict, which are significantly associated with work satisfaction. The second condition (predictor-mediator relation) was met. In order to test the third condition, a regression analysis was carried out and showed that mental fatigue is associated with work satisfaction ( $\beta = -0.21, p < 0.001$ ). Thus mental fatigue was included in the multiple regression analysis (regression 4) with job demands.

*Table 3*  
Mediation analysis of mental fatigue for physical symptoms (N = 697)

<i>Physical symptoms</i>				
	<i>B</i>	<i>SE</i>	$\beta$	<i>Total R<sup>2</sup></i>
<i>Regression 1</i>				
<i>Workload</i>	0.13	0.09	0.06	
<i>Inequity</i>	0.23	0.06	0.03	
<i>Work/family conflict</i>	0.46	0.06	0.31***	
				0.12***
<i>Regression 4</i>				
<i>Workload</i>	0.07	0.10	0.03	
<i>Inequity</i>	0.05	0.06	0.03	
<i>Work/family conflict</i>	0.38	0.08	0.26***	
<i>Mediator</i>				
<i>Mental fatigue</i>	0.18	0.09	0.10*	
				0.13***

Note: \* $p < 0.05$ ; \*\*\* $p < 0.001$

*Table 4*  
Mediation analysis of mental fatigue for work satisfaction (N = 697)

<i>Work satisfaction</i>				
	<i>B</i>	<i>SE</i>	$\beta$	<i>Total R<sup>2</sup></i>
<i>Regression 1</i>				
<i>Workload</i>	0.10	0.07	0.06	
<i>Inequity</i>	-0.23	0.05	-0.21***	
<i>Work/family conflict</i>	-0.20	0.05	-0.17***	
				0.08***
<i>Regression 4</i>				
<i>Workload</i>	0.15	0.07	0.10*	
<i>Inequity</i>	-0.23	0.05	-0.21***	
<i>Work/family conflict</i>	-0.11	0.06	-0.10*	
<i>Mediator</i>				
<i>Mental fatigue</i>	-0.18	0.07	-0.13*	
				0.09***

Note: \* $p < 0.05$ ; \*\*\* $p < 0.001$

The decrease of beta coefficient, measured using Sobel's test, was statistically significant ( $z = -2.81$ ;  $p < 0.01$ ) showing that mental fatigue was a mediator between work/family conflict and work satisfaction. On the contrary, mental fatigue did not mediate the relationship between inequity and satisfaction. Again, Hypothesis 3 was confirmed only for work/family conflict.

## 7. Discussion

In line with the framework of the energetic process of the JD-R model, the main aim of this study has been to examine the mediating role of mental fatigue between three job demands (workload, inequity, and work/family conflict) and teachers' health and work satisfaction.

The results reveal that mental fatigue is a significant mediator in the relationship between work/family conflict and the three outcomes: psychological and physical symptoms and work satisfaction. Therefore our hypotheses are partially satisfied. These results support the energetic process of the Job Demands-Resources (JD-R) model by showing that high work/family conflicts increase mental fatigue in terms of work reluctance, which, in turn, have an influence on the psycho-physical health and work satisfaction of individuals that are unable to adequately meet the job demands. Furthermore, our results confirm the validity of the JD-R model by replacing its components (such as burnout) with other constructs, like mental fatigue.

To be noted in particular is that work/family conflict is the job demand that was most closely associated with both types of symptoms and satisfaction, and that mental fatigue mediated these associations. Many studies have shown that experiencing conflict between the work and family spheres may have serious negative consequences for well-being, such as burnout and depression (ALLEN et al. 2000). However, teachers have not often been considered a fruitful target for these studies because researchers expected teachers to experience low levels of work/family conflict.

In spite of these expectations, some studies have demonstrated that many teachers are unable to separate their professional and family roles effectively (ELBAZ-LUBISCH 2002). In fact, many female teachers attribute importance to their work role as well as to their family role, and they share certain work/family conflict issues with other women professionals. For example, CINAMON and RICH (2005) showed that the combination of being a teacher and a mother is not easy for teachers, and they report being forced into 'triple-shifts' of work consisting of teaching, housework, and childcare. Other researches have reported that teachers reveal very stressful aspects of filling family and professional roles concurrently, especially the chronic lack of energy necessary to care for one's own children and to be a good teacher.

In this light, we have identified a factor that mediates the effect of job demands on health and satisfaction, namely mental fatigue. The intervention on this mediating variable could allow reducing the effect of excessive demands.

In fact, on the one hand, it is important to recognise the psychosocial risk factors in the work environment related to health, and in this sense, work/family conflict must be considered an important antecedent of psycho-physiological symptoms; on the other hand, it is sometimes not possible to find strategies to reduce these aspects of work when organizations monitor psychosocial risk factors. For example, the combination of professional and family roles is a further aspect that is sometimes not easy to manage by workers and organization.

As a consequence, finding factors that have a mediating effect on health enables the organization to identify intervention areas in order to reduce these harmful aspects of work. In this sense, mental fatigue is viewed here as a phenomenon with a partly protective function that makes workers avoid further stress when exposure has reached a critical level. This means that perceived fatigue signals that recovery is needed and that, unless recovery is obtained, the individual may suffer harmful consequences such as musculoskeletal symptoms, anxiety and depression. Continuous or frequent exposure to high job demands triggers high mental fatigue, which may lead to an accumulation of negative load effects that may persist for a longer period of time (e.g. exhaustion, psychosomatic complaints, and lack of work engagement), eventually becoming irreversible and manifest (SLUITER et al. 2003). Seen in this way, the cumulated fatigue might be expressed as higher needs for recovery after working time. Repeated insufficient recovery from work-related fatigue is conceived as triggering an unfavourable vicious circle in which extra effort must be made at the beginning of every new working period in order to rebalance the sub-optimal psycho-physiological state, and prevent performance breakdown. Subsequently, these greater needs for recovery are seen as precursors of ill health in the longer term (SLUITER et al. 2003).

A practical implication of our findings is that a critical factor, like work/family conflict, does not necessarily have adverse health consequences if the pre-strain condition is identified and spent resources can be recouped (TARIS et al. 2006). Mental fatigue and the consequent need for recovery is a pre-strain condition that develops before more intense outcomes such as burnout or stress-related diseases (SHIROM 2003). In fact it is an intervening psychophysical state arising between perceiving stressors and experiencing strain (SLUITER et al. 2001).

According to the Effort-Recovery Model of MEIJMAN and MULDER (1998), with adequate recovery, individuals can return to baseline levels and re-establish their psychobiological balance without falling into exhaustion and depression and developing stress-related diseases. When the reduction of stressors is not feasible, the next best strategy may be to ensure that workers can regularly recover spent resources (HULST et al. 2006). In this sense the need for resource recovery can be used as a marker of early strain development.

This study also has some limitations that should be mentioned. The first concerns the cross-sectional design of the study, which prevents establishing the direction of the hypothesised causal relations. Secondly, the concept of mental fatigue is a complex one, and it has different dimensions. As a consequence, future research

could be important in order to operationalise this construct better, pointing out its role in the work contexts. Thirdly, we used only mental fatigue as mediator of the relationship between job demands and work outcomes. Actually, the work context is more complex and future research will have to examine different models with multiple mediators, as well as the role of job resources, by considering also the motivational process of the JD-R model.

In our opinion, mental fatigue has an applicative impact because its role and the need to monitor the recovery involve the debate on the variable work time considered relevant in terms of psychosocial risk factors by various European publications (e.g. PAOLI & MERLLIÉ 2001).

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