APPLIED PSYCHOLOGY

APPLIED PSYCHOLOGY: AN INTERNATIONAL REVIEW, 2010, *59* (4), 539–565
doi: 10.1111/j.1464-0597.2009.00411.x

Work Hours and Caseload as Predictors of Physician Burnout: The Mediating Effects by Perceived Workload and by Autonomy

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We tested a model in which perceived workload and autonomy were hypothesised to mediate the effects of work hours and caseload on physician burnout. The study was based on data provided by 890 specialists representing six medical specialties. We used structural equation modeling to test our hypotheses. Controlling for the effects of gender, seniority, and the specialists' academic affiliation, we found that the study data fit the hypothesised model—reflecting these hypotheses—quite well. As expected, workload predicted higher levels of global burnout and physical fatigue, while autonomy predicted lower levels of global burnout. Work hours and caseload predicted global burnout only indirectly, via their effects on either perceived workload or autonomy. These findings suggest that public policies, designed to reduce physician work hours in order to reduce burnout and improve patients' safety, should take into account physician perceived workload and autonomy.

Nous avons mis à l'épreuve un modèle centré sur l'hypothèse selon laquelle la charge de travail perçue et l'autonomie régulaient l'impact de la durée du travail médical et administratif sur le burnout des médecins. La recherche a exploité des données fournies par 890 spécialistes relevant de six spécialités médicales. On a fait appel à une modélisation en équations structurales pour valider nos hypothèses. En contrôlant l'action du genre, de l'âge et du type de spécialité, il est apparu que les données correspondaient parfaitement au modèle hypothétique. Comme prévu, la charge de travail prédisait des niveaux

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The authors would like to acknowledge the financial support of the Israeli National Institute for Health Policy Research.

plus élevés de burnout global et de fatigue physique, alors que l'autonomie débouchait sur des niveaux plus faibles de burnout global. La durée du travail ne prédisait qu'indirectement le burnout global, par l'entremise des retombées sur la charge de travail perçue et l'autonomie. Ces résultats montrent que la réglementation publique qui envisage de réduire le temps de travail des médecins dans le souci d'atténuer le burnout et d'améliorer la sécurité des malades devrait prendre en considération la charge de travail perçue et l'autonomie des médecins.

INTRODUCTION

Our major objective was to investigate work hours and caseload effects on physicians' burnout, as mediated by their perceived workload and autonomy. We focused on physicians' burnout because accumulating evidence indicates that burnout is associated with negative health consequences, including increased risk of cardiovascular disease (for a recent review, see Melamed, Shirom, Toker, Berliner, & Shapira, 2006). Physicians have reported that depletion in their energetic resources tended to lead to the provision of less than optimal patient care (Firth-Cozens & Greenhalgh, 1997; Shanafelt, Bradley, Wipf, & Back, 2002; Shirom, Nirel, & Vinokur, 2006). Additionally, physicians' level of burnout was found to be positively related to the likelihood of their making medical errors (West, Huschka, Novotny, Sloan, Kolars, Habermann, & Shanafelt, 2006), and to their patients' longer recovery period after hospital discharge (Halbesleben & Rathert, 2008). Previous research consistently found that one's level of burnout may affect one's co-workers; this is also true for teams of physicians (cf. Bakker, Schaufeli, Sixma, & Bosveld, 2001). Recent developments in the delivery of health care, such as evidence-based medicine and patient-focused treatment, have been increasing the demands made on the content, subject matter, and organisational context of physicians' work (e.g. Shortell, Rundall, & Hsu, 2007). These developments are related to the growing prevalence of physicians' burnout in many countries (Kushnir, Levhar, & Cohen, 2004; Visser, Smets, Oort, & De Haes, 2003).

We focused on work hours and caseload as predictors of burnout for several reasons. First, these predictors represent widely studied structural aspects of employment (Barnett & Perrew, 2006; van der Hulst, 2003). Second, physicians tend to work long hours (Barnett & Perrew, 2006), are generally unhappy with the number of hours they work (e.g. Gareis & Barnett, 2002), and their long work hours were found to be related to their mental health (Tyssen & Vaglum, 2002; Tyssen, Vaglum, Gronvold, & Ekeberg, 2000). Third, a meta-analytic study (Sparks, Cooper, Fried, & Shirom, 1997) found small but significant correlations between work hours and indicators of physical and psychological strains. However, the mechanisms through which work hours elicit these strains are largely unknown

(Sparks et al., 1997). Fourth, while caseload was found to be an important predictor of burnout in nurses (e.g. Jenkins & Elliott, 2004), and among physicians caseload predicted their perceived workload and job satisfaction (cf. Wetterneck, Linzer, McMurray, Douglas, Schwartz, Bigby, Gerrity, Pathman, Karlson, & Rhodes, 2002), as well their quality of care (e.g. Lindenauer, Behal, Murray, Nsa, & Bratzler, 2006), it has not been systematically examined as a predictor of physicians' burnout. Additionally, to the best of our knowledge, no previous study has examined the extent to which perceived workload mediates the effects of work hours and caseload on physicians' burnout.

Conceptual Framework

Burnout is viewed as a psychological strain representing a process of depleting personal coping resources (e.g. Melamed et al., 2006; Halbesleben, 2006). The theoretical framework guiding our study was based on the Conservation of Resources (COR) theory (Hobfoll, 1988, 1989) because it provides a comprehensive approach to explaining burnout (cf. Hobfoll & Shirom, 2000). COR has often been used in past research to explain burnout (e.g. Innstrand, Langballe, Espnes, Falkum, & Aasland, 2008; Neveu, 2007; Wright & Cropanzano, 1998). COR posits that burnout is most likely to occur in situations where there is an actual resource loss, perceived threat of resource loss, or when one fails to obtain resources to offset those lost (Hobfoll, 1988, 1989). Perceived workload (referred to as workload) was found in a recent meta-analytic study (Gilboa, Shirom, Fried, & Cooper, 2008) to be negatively related to several job performance dimensions, and therefore we regard it as representing a threat to one's resources. Hours of work and caseload represent actual loss of resources for physicians who habitually work long hours and have a high caseload (cf. Kushnir et al., 2004).

Workload represents a job demand (cf. Gilboa et al., 2008), consistently found to be a major predictor of burnout (Lee & Ashforth, 1996; Schaufeli & Enzmann, 1998). High workload was found to be widespread among physicians in healthcare systems (Visser et al., 2003) and to predict their level of burnout (e.g. Peiro, Gonzalez-Roma, Tordera, & Manas, 2001; Ramirez, Graham, Richards, Cull, & Gregory, 1996). In addition to workload as a job-related demand, in our theoretical model we included job autonomy, representing a job-related resource. The rationale is based on COR; a basic principle of COR is that to offset resource loss, people must invest resources (Hobfoll, 1989). Job autonomy enables employees to cope more effectively with job-related demands because it enables them to use their available coping resources and skills more flexibly (Fried & Ferris, 1987), including among physicians (van der Ploeg, Dorresteijn, & Kleber,

2003). Higher levels of job autonomy were found to be negatively associated with physicians' burnout (Peiro et al., 2001; van der Ploeg et al., 2003). Therefore, we used it in our theoretical framework to represent perceived job-related resources.

Lazarus's Stress Appraisal model (Lazarus & Folkman, 1984) argues that appraisals of job demands, such as workload, stem from environmental conditions and situations, such as work hours and caseload. Environmental conditions that elicit stress appraisals or perceived job demands are often referred to as *stressors* (Spector, 1998). There is a conceptual distinction between environmental conditions and their appraisals as job demands; the same condition, for example high caseload, could be perceived as representing workload by some individuals, but not by others. From the COR perspective, *time* is the most tangible finite resource; an hour allocated to the work domain represents an hour that is not available to other life domains, thereby reducing people's ability to meet family demands. Several studies found that long work hours are associated with work–family conflict and reduced life satisfaction (cf. Frone, 2000).

COR theory argues that in a work context, high levels of job demands could lead to higher levels of burnout over time because the rate at which these demands use up employee resources is typically greater than the rate by which resources are replenished (Freedy & Hobfoll, 1994). We argue that this is more likely to occur for physicians who have long work hours and experience considerable workload (cf. Peiro et al., 2001). COR theory maintains that actual loss of resources, such as time and energy at work, could be objectively studied (Hobfoll, 1988). For example, as regards physicians who treat patients, researchers could measure the number of patients per day to represent the physician's caseload. Resources could also be studied phenomenologically, by asking people about their perceived resources (e.g. job autonomy) and about the threat of resource losses (e.g. workload). Consistent with Lazarus's Stress Appraisal model (cf. Lazarus & Folkman, 1984), COR theory views perceived resources and threats of resource loss as reality based, generally products of real occurrences (Hobfoll, 1989, 1988). COR theory does not specify the nature of the relationships among environmental conditions or stressors and appraised job demands as they affect employees' psychological strain. However, one of COR's corollaries is that the more proximal a resource is to the self, the higher its saliency and importance to the person (Hobfoll, 1988). Based on this reasoning, our general hypothesis was that workload and autonomy would mediate the effects of caseload and work hours on physicians' burnout. This meditational hypothesis has not been examined in any past study.

Conceptualising Burnout. Based on COR (Hobfoll, 1989, 2002), we conceptualised *burnout* as a multidimensional construct whose three facets were

physical fatigue (feeling of tiredness and low energy), emotional exhaustion (lacking the energy to display empathy to others), and cognitive weariness (one's feelings of reduced mental agility). There were several theoretical reasons for focusing on these three facets. First, physical, emotional, and cognitive energy are individually possessed, and are expected to be closely interrelated (Hobfoll & Shirom, 2000). COR theory postulates that personal resources affect one another and exist as a resource pool—lacking one is often associated with lacking another. Further, COR theory argues that these resources represent a set of resources internal to the self that facilitates the development and use of other resources (Hobfoll, 2002; Hobfoll & Shirom, 2000). For the above reasons, our basic assumption was that any change in this set of resources reflects a change in the underlying latent construct of burnout. We refer to the underlying latent construct of burnout as *global burnout*. Conceptually, we expected all items in our burnout measure to be influenced by global burnout which represents a nonspecific latent factor. Additionally, we expected each of the three sets of items, representing physical fatigue, cognitive weariness, and emotional exhaustion, to represent a domain-specific factor. Each of those domain-specific latent factors represents the unique variance of the set of items associated with it not shared with all other items (cf. McDonald, 1999). We refer to the domain-specific latent factors as physical fatigue, cognitive weariness, and emotional exhaustion. Other conceptualisations of burnout have been suggested (cf. Halbesleben, 2006). The most frequently used alternative conceptualisation of burnout, gauged by the Maslach Burnout Inventory (MBI; Maslach, Jackson, & Leiter, 1996), views it as a syndrome consisting of emotional exhaustion, depersonalisation, and reduced perceptions of personal accomplishment. The MBI was found (Shirom & Melamed, 2006) to be comparable in terms of construct validity to the conceptualisation of burnout used in this study.

Conceptualising Autonomy and Workload. *Job autonomy* has typically been defined to reflect the extent to which a job allows discretion, freedom, and independence to schedule work, or allows employees to make decisions and select methods to execute their tasks (cf. Morgeson, Delaney-Klinger, & Hemingway, 2005). For physicians, having job autonomy means the capability to exercise self-control over their work-related decisions and activities, including relations with their clients (Engel, 1970). As noted, workload represents a type of threat to resource loss (Hobfoll, 2002), which concerns time-related demands perceived by employees to characterise their jobs, such as the perception of having too many things to do or not having enough time to do the things one has to do (van Emmerik & Jawahar, 2006; Williams, Rondeau, Xiao, & Francescutti, 2007). Below, we present each of our major hypotheses, graphically depicted in Figure 1, representing the study's theoretical model.

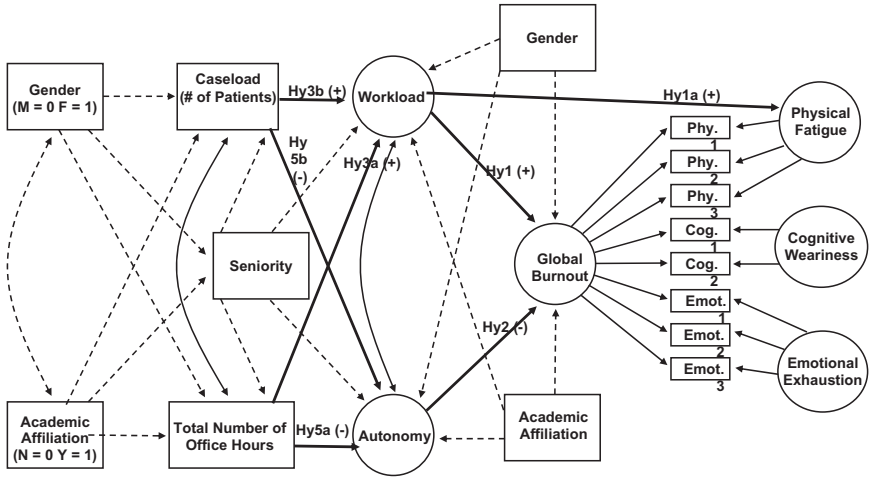

FIGURE 1. The study's theoretical model—the Bifactor Model.

Note: Solid arrows represent hypothesised relationships, whereas broken lines represent the effects of the control variables. Hy = hypothesis. Hypothesis 4, the mediational hypothesis, is not represented in the model. The plus (+) or minus (–) signs (in parentheses) following each hypothesis indicate the direction of the hypothesised effect.

Workload and Burnout. Both COR and job demands–resources theories (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001b) could be used to explain the theoretical rationale of our expectation of finding a positive link between workload and burnout. The theory of job demands–resources (Demerouti et al., 2001b) refers to *job demands* as those physical, psychological, and organisational aspects of the job that require sustained physical, emotional, and cognitive effort. Job demands are closely related to psychological and physiological strains, including burnout (Schaufeli & Bakker, 2004). As noted above, workload was found to be a major predictor of burnout in a meta-analytic study (Lee & Ashforth, 1996), a qualitative review of the burnout literature (Schaufeli & Enzmann, 1998), a qualitative review of physicians' burnout (e.g. Prins, Gazendam-Donofrio, Tubben, van der Heijden, de Wiel, & Hoekstra-Weebers, 2007), and specific studies of the predictors of burnout among specialists or consultants (Linzer, Visser, Oort, Smets, McMurray, & de Haes, 2001; Ramirez et al., 1996). Following the above theoretical reasoning and empirical evidence, workload was predicted to be positively linked with global burnout (Hypothesis 1).

As a corollary, we hypothesised (Hypothesis 1a) that workload, above and beyond its prediction of global burnout, would also predict the unique

variance associated with physical fatigue, a facet of global burnout. Theoretically, this hypothesis was based on Lazarus' cognitive-motivational-relational approach to affective states, which posits that each discrete affective state is characterised by a unique set of antecedent and consequent variables (Lazarus, 2001). Specifically, Moore (2000, p. 336) argued that in contrast to emotional exhaustion and mental exhaustion (represented in our study by "emotional exhaustion" and "cognitive weariness", respectively), physical exhaustion (represented in our study by "physical fatigue") is likely to have a different set of causes and consequences. Empirically, this hypothesis was based on past research (Schaufeli & Enzmann, 1998, p. 47), which found that physicians' overall burnout primarily reflected their physical fatigue. For example, Demerouti and her colleagues (Demerouti, Bakker, de Jonge, Janssen, & Schaufeli, 2001a) found that workload was primarily associated with the physical fatigue component of burnout and was only minimally associated with other assumed components. Methodologically, this hypothesis (1a) was based on the view that a construct is multidimensional when it refers to several distinct but related dimensions that are viewed as a single theoretical construct (Law, Wong, & Mobley, 1998). Global burnout represents the common variance shared by all three facets, but the variance specific to a given facet is not considered as part of global burnout (Law & Wong, 1999). Consequently, after controlling for global burnout, the specific variance of a burnout facet may be associated with a specific set of antecedent variables and may lead to different consequences, relative to the other facets (cf. Shirom et al., 2006).

We compared this prediction, as formulated by Hypothesis 1a, with an alternative theoretical view, which posits that affective states could be represented by a limited set of core affects (Russell, 2003). Therefore, the alternative model expected the more parsimonious model, not including the expected effect of workload on physical fatigue, to better fit the data.

Autonomy and Burnout. A major proposition of the Job Demands–Resources model (Demerouti et al., 2001b) is that burnout develops when certain job demands are high and certain job resources are limited. Several studies reported that lower levels of job autonomy were negatively associated with all dimensions of burnout (cf. Bakker, Demerouti, & Euwema, 2005). Following the above theoretical arguments and the empirical evidence already noted (cf. van der Ploeg et al., 2003), we expected that higher levels of autonomy would predict lower levels of global burnout as representing the common variance of its three facets (Hypothesis 2).

Work Hours, Caseload, and Workload. *Work hours* is typically defined as reflecting employees' reports of hours worked per week, while *caseload*

reflects the number of people served or worked for (Spector, Dwyer, & Jex, 1988). Among physicians, the number of hours worked was consistently found to be a positive predictor of workload (Groenewegen & Hutten, 1991). For example, Linzer and colleagues (Linzer et al., 2001) investigated the antecedents of stress using a nationally representative sample of US physicians and found that the number of work hours was closely associated with perceived stress, after controlling for age, gender, medical specialty, and practice setting. Following this evidence, our third hypothesis was that both number of work hours (Hypothesis 3a) and caseload (Hypothesis 3b) would positively predict workload.

Workload as a Mediator. As explained above, based on COR theory we expected that workload would mediate the relationships between caseload, work hours, and burnout. Past studies which included both work hours and workload examined only the extent to which each predicted burnout independently of the other. For example, in a longitudinal study of US residents (Hillhouse, Adler, & Walters, 2000) only baseline workload but not work hours predicted posttest burnout. As another example, a recent study investigating the effects of work hours and workload on physicians' well-being found that only workload predicted the criterion (Wallace & Lemaire, 2007). Several additional studies did not find a significant effect of work hours on physicians' burnout (Dunwoodie & Auret, 2007; Halbesleben & Rathert, 2008; Panagopoulou, Montgomery, & Benos, 2006). The above pattern of findings suggests that workload fully mediates the effects of work hours—and perhaps also of caseload—on physicians' global burnout and its facet of physical fatigue (after controlling for global burnout, as above in Hypothesis 1a). Following the above theoretical rationale and available evidence, we hypothesised that work hours and caseload would affect global burnout and physical fatigue only indirectly, with workload mediating their effects on the criteria (Hypothesis 4).

Caseload, Work Hours, and Autonomy. Physicians' work hours were found in several studies to decrease their perceived autonomy (e.g. Stern, Katz-Navon, & Naveh, 2008). Following this accumulated evidence, we expected work hours to be a negative predictor of autonomy (Hypothesis 5a). We also expected caseload to be negatively associated with autonomy because physicians' sense of independence in their work environment would be directly undermined by multiple and sustained exposure to patients, rather than by the number of work hours (Hypothesis 5b). A review of this area (Sparks et al., 1997) and more recent research (e.g. McManus, Keeling, & Paice, 2004) provided support for the above expectations.

METHOD

Sample

The sampling frame consisted of all the country's specialists working in six areas of medical specialisation—six areas which represent specialty medicine provided in community clinics. The medical specialisations chosen were ophthalmology, dermatology, otolaryngology and gynecology—mostly providing care in community clinics—and general surgery and cardiology—mostly providing care in acute-care hospitals' outpatient clinics. We constructed the sampling frame based on the service manuals of the four health plans or sick funds, similar to health maintenance organisations in the US, and the list of specialists compiled by the Israeli Ministry of Health for the year 2002. A 50 per cent random probability sample was drawn from each of the six specialties, after excluding from the sampling frame those who either lived abroad or were 65 years of age or older at the time of the study.

About 80 per cent of the specialists in the study were men. The proportion of women was particularly small among general surgeons (5%) and cardiologists (13%), and relatively large among dermatologists (44%) and ophthalmologists (30%). All respondents were MDs; 54 per cent had completed medical school in Israel. Of the remainder, 17 per cent had completed medical school in the former Soviet Union. Concerning their educational attainment, 59 per cent were certified specialists in their area of specialisation, 30 per cent reported having an additional sub-specialisation in their area of specialisation, and the remainder had—in addition to their MD degree and certified specialist status—either a Master's degree in medicine or a PhD. Thirty-one per cent of the respondents held an academic appointment. Median age and seniority were 52 and 12 (SD = 7.2, 7.7), respectively.

Procedure

The study's questionnaire was mailed to 1,410 specialists, of whom 890—representing a response rate of 63 per cent—completed it. The questionnaire was accompanied by a letter, which explained the importance of the study and included a guarantee of confidentiality, as well as the endorsement of the Ministry of Health and the Israel Medical Association. The non-respondents, namely those who either refused or failed to respond, did so despite two mailings and a follow-up telephone reminder. We systematically compared those who responded (N = 890) with the non-respondents (N = 304) regarding differences in medical specialty; no significant difference was found. Using logistic regression, we also systematically compared the extent to which any socio-demographic variables significantly predicted those who had replied early (to our first mailing), as opposed to those who had replied late, and found a slight tendency for younger physicians and physicians who had been trained

in the former Soviet Union to be late respondents. A recent meta-analysis (Schalm & Kelloway, 2001) concluded that non-response is not likely to result in substantial bias in the results of a survey in this area of research.

Measures

Measures were formed following a confirmatory factor analysis (CFA) of the questionnaire items related to each of the multi-item variables under study. Following the confirmation of the expected measurement model in the respective CFA, we calculated the reliability of each resulting measure by Cronbach's internal consistency reliability index, alpha (α). We calculated each respondent's score as the average of his or her responses to the items included in the respective measure.

Burnout was gauged by the Shirom-Melamed Burnout Measure (SMBM).[1] A series of studies conducted over the past 10 years, on a diverse range of occupational groups, has generally confirmed the expected relationships between the SMBM and certain physiological variables, thus lending support to its predictive validity (cf. Melamed et al., 2006). Responses to the 12 items in the measure were gauged using a 7-point scale ranging from 1 (almost never) to 7 (almost always). Confirmatory factor analysis[2] confirmed the theoretically expected SMBM three-factor structure and led to our constructing three subscales, each representing one of the factors, and also a total burnout scale representing all three factors (α = .93). The three subscales, with sample items for each, were as follows: the physical fatigue factor (six items)—the frequency of feeling tired, physically drained, and physically exhausted (α = .93); the cognitive weariness factor (three items)—the frequency of having difficulty in concentrating, and slow thinking processes (α = .91); and the emotional exhaustion factor (three items)—the frequency of feeling emotionally fatigued and emotionally burned out (α = .89).

Workload was gauged based on the overload scale used in the French et al. study (French, Caplan, & Harrison, 1982), with additional physician-specific items adopted from a study which had investigated overload among physicians (Sutherland & Cooper, 1992). Respondents rated their workload using a 5-point scale that ranged from 1 (not at all) to 5 (to a very great extent). The nine-item measure (α = .92) included items gauging quantitative overload (worked too many hours, worked too hard, had too many patients) and qualitative overload (found it difficult to divide his or her available time between work and family). We used the mean of these nine items for correlational analyses.

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[1] The SMBM, its norms, and instructions concerning its use are in the public domain and are downloadable from the following site: http://www.tau.ac.il/~ashirom/

[2] Detailed results of this analysis are available from the authors upon request.

Autonomy was assessed by a measure constructed to reflect physicians' professional autonomy and perceived control over key aspects of caring for their patients (Schulz, Greenley, & Peterson, 1983), a measure used in several previous studies (cf. Schulz, Greenley, & Brown, 1995). The 10-item measure asked respondents to assess on a 5-point scale the extent to which they had control over professional issues including prescribing medication, adopting new modes of care, updating themselves, number and types of patients they cared for, and deciding on their order of priorities in providing care to patients. The measure had an alpha coefficient of .82.

Work hours was assessed by the self-reported total number of weekly work hours, and *caseload* by the total number of patients to whom he or she provides care during a typical workday. Caseloads in the sick funds' clinics, and also in acute-care outpatient clinics, do not fluctuate on a daily basis. Self-reports on hours of work were found to have high correlations with supervisory reports (Spector, 1992; Spector et al., 1988), while self-reports on caseload were found to have high correlations with employers' records (Spector, 1992) and also with supervisors' account (Fox, Dwyer, & Ganster, 1993). *Seniority* was assessed by the total number of years a physician has been working in his or her field of specialty. *Academic affiliation* was a dichotomy with the value 1 representing having a clinical appointment in one of the country's medical schools, while the value 0 was assigned to those responding that they did not hold such an appointment.

Control Variables. A recent review of the literature (Schaufeli & Enzmann, 1998, p. 76) indicated that gender and burnout were probably associated but that the pattern of their relations was inconclusive, with some studies reporting higher emotional exhaustion among women and other studies finding the obverse to be true. Therefore, we used *gender* as a control variable in our analyses. *Age* was consistently found to be related to burnout (Schaufeli & Enzmann, 1998) and therefore was controlled for. *Seniority* was found in several past studies to be associated with different facets of burnout (Brewer & Shapard, 2004). For example, a recent study (Shanafelt et al., 2002) found relatively high levels of burnout among specialists early in their career. Seniority was also expected to negatively predict workload because senior physicians are more experienced and consequently cope better; hence, they may report lower levels of overload relative to their junior colleagues. A positive impact of seniority on autonomy was suggested by several previous studies (cf. Perrone, Zaheer, & McEvily, 2003). We also added *academic affiliation*—indicating that the specialist has a clinical academic appointment in one of the country's medical schools—as yet another control variable, because having such an appointment is likely to add to the specialists' other duties the additional duty of teaching medical students and residents in hospitals.

Data Analysis

Our main analyses involved the testing of the model representing our hypotheses by using structural equation modeling (SEM) with EQS software (Bentler, 2002). Following widely accepted recommendations for SEM analysis (McDonald & Ho, 2002), we report three goodness-of-fit indices: the Normed Fit Index (NFI), the Non-Normed Fit Index (NNFI, also known as TLI), and the Comparative Fit Index (CFI). We also report the misfit index known as Root Mean-Square Error of Approximation (RMSEA). Hu and Bentler (1999) suggested that fit indices close to or above .95 combined with RMSEA below .06 could be considered indicative of a good approximate fit.

For our SEM analyses, the global burnout measure was initially modeled as a second-order factor with each of the three components as first-order factors. The emotional exhaustion factor was indicated by three items, the cognitive weariness factor by three items, and the physical fatigue factor by three parcels, to which we randomly allocated the six items representing this facet of burnout (cf. Rogers & Schmitt, 2004). In our analysis, we first tested the measurement model for the second-order factor model of burnout and found that it fit the data very well with χ^2 (17, 890) = 34.67, NFI, NNFI, CFI all = .99, and RMSEA = .034, relative to each of the two-factor and the one-factor solutions, which resulted in unacceptable values for the same fit indexes.[2] Workload was represented by two indicators, representing the subscales of quantitative and qualitative workload. The two subscales were closely correlated (r = .72) and in a CFA conducted on the nine items they were found to fit significantly better a one-factor model relative to two- and three-factor solutions.[2] Nonetheless, we compared our structural model, as displayed in Figure 2, with an alternative model in which workload was represented by two correlated latent factors, quantitative and qualitative workload, respectively. This model turned out to fit the data significantly worse, relative to the structural model displayed in Figure 2, with χ^2 (89, 890) = 736.4, NFI, NNFI, CFI = .93, .89, .94, and RMSEA = .09, with a 90 per cent confidence interval (CI) ranging from .08 to .10. Based on the RMSEA CIs, this alternative model was assessed as inadmissible (Hu & Bentler, 1999). For our SEM analyses, the 10 items representing autonomy were randomly divided into two subscales that served as indicators of the autonomy latent factor (cf. Rogers & Schmitt, 2004).

We estimated the measurement model of all latent variables, and found that the measurement model fit the data very well, with χ^2 (48, 890) = 198.1, NFI, NNFI, CFI all = .97, and RMSEA = .06 (CI = .05–.07). We next tested two structural models: the theoretical model embodying all our hypotheses (Figure 1) and the alternative model in which the arrow implied by Hypothesis 1a—from perceived overload to the physical fatigue facet of total burnout—was omitted. To test the overall fit of the data to our theoretical

model (Figure 1), we used a bifactor model (displayed in Figures 1 and 2). Bifactor and second-order factor models are two alternative approaches used to represent general constructs, such as global burnout—comprising several highly related domains. Second-order factor models are more familiar because they have been widely applied in burnout research (e.g. Shirom et al., 2006); however, in recent years bifactor models have increasingly been implemented in different areas of applied psychology (Chen, West, & Sousa, 2006; Farias, Mungas, Reed, Cahn-Weiner, Jagust, Baynes, & Decarli, 2008; Osman, Barrios, Gutierrez, Williams, & Bailey, 2008; Reise, Morizot, & Hays, 2007). As has been mathematically demonstrated (Chen et al., 2006), the bifactor model has several major advantages over the standard second-order factor; in the context of our research, the SEM model allows us to directly test Hypothesis 1a without imposing on the standard second-order model certain cumbersome constraints (Chen et al., 2006; McDonald, 1999). Specifically, the bifactor model allowed us to test the general effects of workload on global burnout, and the unique effects of workload on physical fatigue—a domain-specific factor representing the unique variance of the items it predicted not explained by the nonspecific general factor of global burnout. A standard second-order model was shown to be a special case of the more general bifactor model corresponding to it (Chen et al., 2006). Because any second-order model is nested within its corresponding bifactor model, we used the χ^2 difference test to test our expectation that the bifactor model would fit our data significantly better, relative to the second-order factors.[2] The bifactor model was found to fit the data significantly better based on this test; for the bifactor model, $\chi^2 = (91, N = 890) = 348.4$, while for the second-order model, $\chi^2 = (95, N = 890) = 358.4$, significantly different at the $p < .05$ level. The second-order model yielded the same results for all the tests of our hypotheses. Therefore, we present only the results for the bifactor model.

To test our hypotheses that concerned mediation effects, we followed the four conditions which must be met for establishing that mediation exists (MacKinnon, 2008). First, there must be a substantial relation between an independent variable and the mediating variable. Second, there must be a relation between the mediator variable and the dependent variable when accounting for the independent variable. Third, the independent variable must precede and be a cause of the mediator, and the mediator must precede and be a cause of the dependent variable.

RESULTS

Descriptive Results

Table 1 provides the product moment correlations among the study variables, as well as their means and standard deviations. The more hours a

TABLE 1
Product Moment Correlations, Means, and Standard Deviations among the Study Factors (1–6) and Variables (8–10)

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
(1) Burnout, general	1.00									
(2) Physical fatigue	.88	1.00								
(3) Cognitive weariness	.83	.67	1.00							
(4) Emotional exhaustion	.81	.51	.53	1.00						
(5) Workload, subjective	.57	.61	.47	.32	1.00					
(6) Autonomy	−.21	−.19	−.16	−.19	−.10	1.00				
(7) Work hours, total	.10	.14	.05	.03	.33	.01	1.00			
(8) Caseload	−.03	−.02	−.02	−.04	.03	−.07	.02	1.00		
(9) Seniority	−.05	−.04	−.07	−.02	−.08	−.14	−.07	−.14	1.00	
(10) Academic affil. (0 = no)	−.01	−.02	.03	.01	−.17	−.20	−.14	.17	−.11	1.00
(11) Gender (0 = male)	−.08	−.06	−.06	−.12	−.13	−.13	−.17	.06	−.07	.15
Mean	2.78	3.38	2.15	2.23	3.02	3.57	44.2	28.8	12.5	.71
SD	1.07	1.33	1.10	1.13	0.93	0.66	13.2	15.8	7.7	.45

Note: $N = 890$. A correlation coefficient lower than .06 is not significant at the $p < .05$ level.

physician worked per week (at all of his or her jobs), the more likely he or she was to experience job overload. In addition, the more years of seniority a physician had, the smaller the chance that he or she would experience overload.

Testing the Measurement and the Structural Models

We first tested the structural model for all the latent factors presented in Figure 1. Our theoretical model, with the standardised beta coefficients along the paths, is presented in Figure 2. In Figure 2, global burnout accounts for the commonality of all the burnout items. Additionally, three domain-specific factors—physical fatigue, emotional exhaustion, and cognitive weariness—are depicted at the right-hand side of Figure 2. Each of the domain-specific factors accounts for the unique variance in the burnout items it predicts, not accounted for by global burnout. The results demonstrated a good approximate fit to our data, with χ^2 (91, N = 890) = 348.4; Normed, Non-normed, and Comparative Fit Indexes were all .99, and RMSEA = .06 (90% confidence interval for RMSEA ranged from .05 to .06). Next, we tested the alternative model, because it was nested within the theoretical model (Figure 1), and therefore represented a simplified version of it. The alternative model did not include the path of influence from overload to the burnout component of physical fatigue (as proposed in Hypothesis 1a). The results demonstrated that the alternative model had an inferior fit to the data, relative to the theoretical model presented in Figure 1, with χ^2 (92, N = 890) = 399.5, and with Normed, Non-normed and Comparative Fit Indexes of .95, .94, and .96, respectively, RMSEA = .06 (90% confidence interval for RMSEA ranged between .05 and .07). The highly significant difference in χ^2 between our theoretical model and the alternative model (51, for the loss of one degree of freedom) provided strong support for our theoretical model, as well as for Hypothesis 1a. We also found that relative to the simplified model in which the arrow from perceived overload to physical fatigue was omitted, the theoretical model led to a substantive increase in the percent of explained variance of the criterion from 34 per cent to 41 per cent (Figure 2).

On an explorative basis, we tested, in two separate SEM analyses, the possibility that workload, over and above its path of influence leading to global burnout, would predict either cognitive weariness or emotional exhaustion. The SEM program used, EQS, did not propose these additional paths in the information it provided on Lagrange Multipliers. In both explorative SEM analyses, the model failed to converge, suggesting lack of fit with the data.

As proposed in Hypotheses 1 and 1a, in the theoretical model (see Figure 1) perceived overload had a significantly strong positive impact on global burnout, β = .58 (p < .01), and on physical fatigue, β = .49 (p < .01).

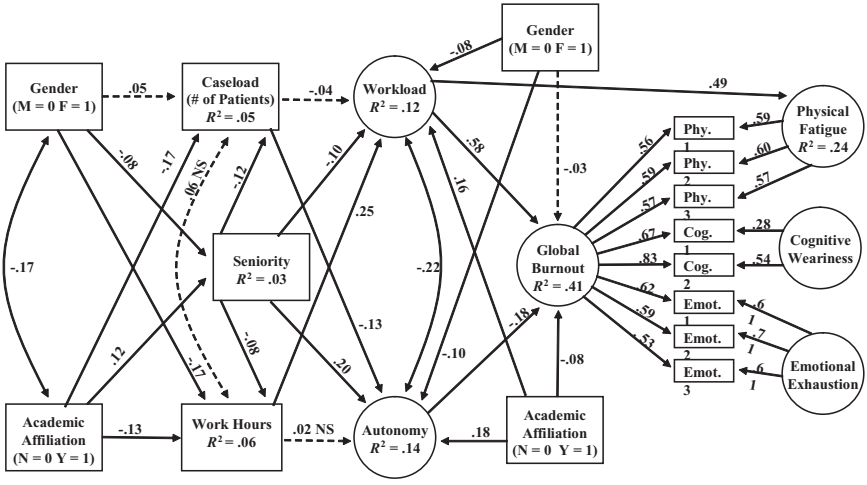

FIGURE 2. Standardised coefficients representing the test of the theoretical model.

Autonomy was a negative predictor of the criterion ($\beta = -.18$), thus supporting Hypothesis 2. Hypothesis 3a was supported in that the number of work hours was found to be a significant positive predictor of workload ($\beta = .25$). However, in contrast to Hypothesis 3b, caseload was not a significant predictor of workload. Work hours and caseload were not significantly correlated ($r = .06$, *ns*) as found in other studies (e.g. Bainbridge, Cregan, & Kulik, 2006). Hypothesis 5a was not supported as work hours did not significantly predict autonomy. As proposed in Hypothesis 5b, caseload was negatively linked with autonomy ($\beta = -.13$).

Figure 2 also provides support for our choice of control variables in that seniority was positively associated with autonomy ($\beta = .20$) and, as expected, was a negative predictor of workload ($\beta = -.10$). Additionally, academic affiliation was a negative predictor of caseload and work hours ($\beta = -.17$, $\beta = -.13$, respectively) and was also found to be a negative predictor of global burnout ($\beta = -.08$) and a positive predictor of autonomy ($\beta = .18$). Gender (men = 0, women = 1), used as a control variable, was found to be a significant negative predictor of work hours ($\beta = -.17$), autonomy ($\beta = -.10$), and workload ($\beta = -.08$).

In conclusion, the major hypotheses of the study regarding the prediction of global burnout by workload and autonomy, as well as the hypothesised linkage of work hours with workload, were supported by the statistically significant path coefficients within a model that provided a good fit to the data.

Testing the Mediation Hypothesis—Hypothesis 4. We proceeded to test whether work hours had significant indirect effects on global burnout and on physical fatigue through its effects on workload. We also tested, on an explorative basis, whether caseload had significant indirect effects on global burnout through its effects on autonomy. In order to test the significance of the hypothesised indirect effects, we used the Sobel test because it performed best in a Monte Carlo study and was found to converge with the Goodman test for sample sizes over 50 (MacKinnon, 2008, pp. 97–100), and also because using it, given our sample size, yielded power over .8 to our mediation tests (MacKinnon, 2008, p. 100). We found that both indirect effects via the mediation of workload, from work hours to global burnout and from work hours to physical fatigue, were statistically significant (Sobel's $Z = 6.21$ and 5.31, respectively, both significant at the $p < .001$ level). We also tested whether caseload had an indirect effect on global burnout via the mediation of autonomy; indeed, this indirect effect was found to be significant (Sobel's $Z = 2.32$, $p < .02$). Therefore, we concluded that caseload exerted an indirect effect on global burnout; however, this indirect effect was transmitted via the mediation of autonomy rather than workload.

DISCUSSION

Stress and burnout, as experienced by specialists in their work environment, have been shown to have an impact on both their mental and physical health (Deary, Blenkin, Agius, Endler, Zealley, & Wood, 1996; Deckard, Meterko, & Field, 1994), as well as on their clinical performance and quality of care (Spurgeon & Harrington, 1989). As indicated in the introductory section, caseload was not considered as a predictor of physicians' burnout, and past research did not test the possibility that the effects of work hours on physicians' burnout are mediated by workload. The current research contributes to our understanding of these relationships by investigating them in a representative sample of Israeli specialists. With some exceptions discussed below, our conceptual model received considerable support. It had a very good fit to the data and explained 41 per cent of the variance of global burnout, thus favorably comparing with other studies that predicted burnout (cf. Halbesleben & Buckley, 2004; Schaufeli & Enzmann, 1998). As expected, we found that workload mediated the linkage between work hours, global burnout, and physical fatigue (as a facet of global burnout). Based on our findings, we suggest that future research seeking to explain physicians' burnout by objective environmental conditions, such as work hours and caseload, should take into account the crucial linchpin of how individuals cognitively appraise these conditions—as potential threats or opportunities (cf. Lazarus & Folkman, 1984, pp. 284–285).

Our major findings—that workload mediated the linkage between work hours, global burnout, and physical fatigue—have both theoretical and practical importance. From a theoretical perspective, as we argued above, COR theory proposes that environmental and contextual factors or stressors may influence individuals' appraised stresses or job-related demands. In addition, in agreement with Lazarus's Stress Appraisal theory (e.g. Lazarus & Folkman, 1984), COR theory further proposes that stress appraisals may be manifested in stress outcomes, including physical and emotional strains and burnout (Hobfoll, 1988, 1989). However, these linkages were not formulated in COR theory as a causal chain. Following our proposed theoretical model and findings, and analogous models developed to explain the links between components of the stress process (Ensel & Lin, 2000; Pillow, Zautra, & Sandler, 1996), we suggest that individuals' appraisals of their job-related demands and resources act as an important route of transmission between environmental conditions and contextual factors, such as work hours and caseload, and negative effects such as burnout. The proposed causal chain, from work hours to perceived job-related demands and then to burnout, could explain why many past studies, referred to above, failed to find a direct effect of work hours on physicians' burnout.

We would like to argue that our major findings shed new light on the inconclusive evidence that work hour limitations applied to physicians influenced their level of burnout. Based on different designs and samples, three studies evaluated the effects of reduced work hours on residents' level of burnout in the USA: one report failed to find a significant effect (Gelfand, Podnos, Carmichael, Saltzman, Wilson, & Williams, 2004); another reported finding a significant decrease in the prevalence of burnout—while comparing two different samples of first-year residents before and after the reduction in work hours (Martini, Arfken, & Balon, 2006)—while yet another report found mixed results, depending on the specific dimension of burnout considered (Gopal, Glasheen, Miyoshi, & Prochazka, 2005). These studies were conducted only on residents, but their synthesis led to the conclusion that the effects of work hours on physicians' burnout probably depend on mediator and moderator variables still to be investigated in future research, as recently argued by Prins et al. (2007). As our findings indicate, workload may play a crucial role in transmitting the effects of reduced work hours on burnout. It is possible, as suggested in a recent editorial (Volpp, 2008), that the reform of residents' work hours in the USA was accompanied by unanticipated changes that actually *increased* their perceived workload, thereby nullifying the possible effects of the reduced work hours on ameliorating residents' levels of workload. These accompanying changes probably increased residents' level of workload. For example, it is possible that the prevailing shorter residents' work shifts that followed their reduced work hours disrupted their ability to continuously monitor their patients, thus intensifying

work demands at the beginning of each new shift. It is also possible that hospitals in the USA reacted to the reduced residents' work hours by admitting more severe clinical cases that required more intensive care and posed new demands to attending residents. Our major findings suggest that the work hour reforms—designed, among other purposes, to ameliorate physicians' burnout—need to take into account the mechanisms through which reduced work hours influence physicians' burnout or, more generally, their well-being.

Our first hypothesis was concerned with the relative fit of two alternative theoretical models with the data. We found that the theoretical model presented in Figure 1 fit the data better than the alternative theoretical model. Overall, our findings provide support for the theoretical argument that global burnout coexists with its specific facets within the nomological network that connects them to possible predictors and outcomes. This is analogous to the coexistence of global role stress with the specific facets of role conflict and role ambiguity (McGee, Ferguson, & Seers, 1989), and to the existence of global health-related quality of life with three highly related domain-specific factors (vitality, cognition, and disease worry; cf. Chen et al., 2006). Our research suggests that in future burnout research both the second-order global burnout and the specific variance of each of its facets should be considered and modeled.

For future researchers using SEM, our findings imply a change in the strategy of constructing second-order factors models. If our findings are corroborated by additional research, the implication is that researchers constructing structural models that include burnout should consider modeling both the first-order latent factors and the second-order factor underlying these first-order factors using the bifactor model, since each may make a unique contribution to explaining outcome variables of interest and could be differentially related to antecedent variables.

Workload did not mediate the linkage between caseload and burnout; more specifically, caseload was not found to be a significant predictor of workload. What could possibly account for our failure to support this part of Hypothesis 4? This may be due to the inadequacy of the measure used, which confounds caseload with the type, intensity, and duration of client contacts. These dimensions of caseload probably vary within and between the medical specialties included in our sample. In addition, we would like to suggest that the quality of the interaction with patients, for example, whether or not it is laden with conflict or tension, is a particularly relevant dimension of a physician–patient interaction. Therefore, we suggest that future examinations of the effects of caseload on burnout should include improved operationalisation of this objective indicator of workload, including quantitative measures, such as duration of average contact and qualitative measures like the intensity and nature of the contact (Jackson, Schwab, & Schuler, 1986).

As noted, caseload (number of patients) did affect burnout, but only indirectly, through the full mediation of autonomy.

A frequent concern voiced in medical journals is that reforms designed to reduce duty hours of physicians could adversely affect their professional autonomy (e.g. Van Eaton, Horvath, & Pellegrini, 2005). While our study was not designed to assess the effects of such a reform, our failure to find support for Hypothesis 5a may alleviate this concern. It is important to recall that we found that work hours did not have a significant effect on autonomy. Rather, caseload exerted a direct negative impact on the respondents' autonomy. Future research may explore the possibility that this occurred because a higher caseload reduces physicians' rest periods or because it introduced a "shift work" mentality into their work environment, as suggested by a recent editorial published in a leading medical journal (Meltzer & Arora, 2007).

Limitations

Although we found that the data fit our model very well, this fact merely provides support for—rather than confirmation of—our model and hypotheses. Other models, not considered here, could be equally compatible with the data. We recommend that future research in this area replicate our model and test additional alternative models on new samples. As in any other cross-sectional study, the direction of causality is an open question. Generally, longitudinal designs adhere to the positivist view of causation in that the cause precedes the effect over time. However, temporal precedence is a necessary, but insufficient, condition for causation (MacKinnon, 2008, pp. 347–349). Given the limitation of our cross-sectional design, we clearly did not meet the causal precedence required for demonstrating mediation (MacKinnon, 2008) in that burnout, our model's criterion, could be a cause of workload and autonomy rather than the reverse and it could also be that they are reciprocally related over time. We recommend that future research examine these plausible alternative paths of influence using a longitudinal design.

Gathering self-reports on stress, burnout, and self-rated performance in the same questionnaire could lead to artifacts such as priming and consistency effects associated with the bias of common method variance. Common method variance is expected to inflate the correlations between self-reported measures in our questionnaire (Doty & Glick, 1998). From Table 1 and Figure 2, it is obvious that there are non-significant and zero-level correlations among the percept-percept variables included in our study; this fact militates against the existence of a pervasive common method bias (Williams & Brown, 1994). As suggested by both meta-analytic and qualitative reviews of the area, common method bias may indeed exist, but not at a level that would typically invalidate substantive conclusions (Doty & Glick, 1998). These literature reviews on common

method variance have led one author to refer to it as an "urban legend" (Spector, 2006). Specifically relating to our measure of global burnout and its three facets, modeling both the first- and second-order factors of burnout is advantageous in that our facet-specific findings are probably less prone to confound substance with method effect. Self-reported work hours in our study may be inaccurate, but self-reported and observed work hours among physicians were found in one study (Laine, Goldman, Soukup, & Hayes, 1993) to be highly correlated (r = .98).

Implications

Our findings carry several implications for future research and policy-making on specialists' work lives. It is important to recall that according to our findings, seniority was negatively related to caseload, number of work hours, and workload, and positively associated with autonomy. Having an academic affiliation was found to be a negative predictor of global burnout and workload, and a positive predictor of autonomy. Additionally, having an academic affiliation predicted lower hours of work and caseload. Therefore, based on our set of results, we would like to recommend that future researchers consider the addition of these variables to their research design, possibly adding additional aspects of physicians' work experience (Tesluk & Jacobs, 1998).

It has been established that the effect of work hours on affective and behavioral outcomes—such as burnout and job performance—operate through multiple and sustained paths of influence, including increases in physiological arousal, sleep disturbances, and changes in health-related behaviors (Sparks et al., 1997). Efforts to reduce physicians' workload have traditionally focused on work hours, since they reflect exposure to stress that can be easily ameliorated by lowering the level of exposure. As our findings suggest, work hours have a direct and relatively strong impact on workload; therefore, the focus on reducing them seems justified. However, based on our findings, we would like to suggest that workload, long known to be the most potent predictor of burnout (Schaufeli & Enzmann, 1998), should be considered as a focal variable in future interventions designed to reduce burnout levels among physicians.

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