Burnout is a long-term stress reaction seen primarily in the human service professions. It is a "psychological syndrome of emotional exhaustion, depersonalization and reduced personal accomplishment" (1). Over the past 20 years, many aspects of medical practice have changed: autonomy is declining, the status of physicians has diminished, and work pressures are increasing. Burnout is an unintended and adverse result of such changes. Burnout has been described among physicians in several countries and practice settings; in the Netherlands, physician disability insurance premiums have recently risen 20% to 30% owing to an increasing incidence of burnout and stress-related complaints (2).

Paraphrasing Maslach, Wilters (3) describes burned out physicians as being angry, irritable, and impatient; "there is also an increase in absenteeism and job turnover. Decreasing productivity and practice revenue are by-products of physician turnover." Thus burnout can be associated with a deterioration in the physician-patient relationship and a decrease in both the quantity and quality of care. In a recent survey of health maintenance organization (HMO) physicians (4), burned out physicians were less satisfied, more likely to want to reduce their time seeing patients, more likely to order tests or procedures, and more interested in early retirement than other physicians. To better understand the interplay of the predictors of physician burnout and to develop strategies for prevention, we compared data from two large physician surveys, one in the United States (the Physician Worklife Study) and another in the Netherlands (the Dutch Study of Motivation among Medical Consultants). These data were used to construct and test a predictive model of physician burnout.

**THE DUTCH-U.S. PHYSICIAN BURNOUT STUDY**

**Samples**

Methods of the U.S. (5) and the Dutch (6) physician surveys are described elsewhere. In brief, the U.S. Physician Worklife Study (PWS) aimed to determine factors in work life associated with job satisfaction, stress, burnout, and intention to leave the practice. For the study, 5,700 physicians were surveyed after random selection from the American Medical Association masterfile, with stratification based on specialty, ethnicity, and regional penetration of managed care. There were 2,356 respondents. After accounting for ineligibility, exclusions, and incorrect addresses, the adjusted response rate was 52%. "Academic physicians" in PWS were community-based physicians with academic affiliations. The goals of the Dutch study were to determine factors related to motivation, stress, satisfaction, and burnout. For this study, 2,400 medical specialists were randomly surveyed, and 1,435 usable responses were received (adjusted response rate, 63%). A nonrespondent questionnaire revealed equivalent satisfaction in nonresponders and slightly less stress (effect size <0.1) (6). In the Dutch study, academic physicians included full-time, hospital-based academicians.

**Selection of Subjects for Comparison**

The U.S. survey studied family physicians, general internists, general pediatricians, internal medicine subspecialists, and pediatric subspecialists. The Dutch survey sampled all medical specialists except family physicians. We therefore included all U.S. respondents except family physicians (n = 1,749 after handling missing data). To determine the suitability of including all Dutch respondents, we divided the Dutch sample into two groups: those clearly comparable with the U.S. sample (internists and pediatricians) and the remainder (e.g., psychiatrists, anesthesiologists, surgeons). When comparing correlation coefficients among all research variables for these two Dutch subsamples using Bonferroni’s adjustment (alpha = 0.05/66), no differences were significant. For predictor and outcome variables, the only significant difference in means or percentages was in practice type, as virtually all Dutch specialists in solo practice were psychiatrists. Therefore, all Dutch respondents were retained in the current analysis (n = 1,349 after handling missing data). Missing values were handled through imputation (7).

**Choice of Variables for the Study and Conceptual Framework**

Investigators made lists of variables from each questionnaire that were associated with stress, satisfaction, or burnout in previous analyses (6,8). Our selection of potential predictor variables was influenced by the demand-control (9) and demand-control-support models of oc-
cupational stress (10). These well-validated models from social sciences literature state that job stress is caused by work demands and can be diminished by work control (9) and social support (10). In these early studies of Swedish workers, high demands and low work control were associated with cardiac symptoms (9) and cardiovascular disease prevalence (10).

The investigative team discussed variable lists in an iterative manner to develop a final list (see Appendix). In the U.S. study, burnout was assessed with a single item adapted from the tedium index (11) with 5 increasing degrees of burnout. The question was approximately as follows: “Using your own definition of ‘burnout,’ circle one: 1. I have no symptoms of burnout. 2. I don’t always have as much energy as I once did, but I don’t feel burned out. 3. I am definitely burning out and have one or more symptoms of burnout, such as physical and emotional exhaustion. 4. The symptoms of burnout that I am experiencing won’t go away. 5. I feel completely burned out and wonder if I can go on.” A score of 3 or higher represented burnout (4). In the Dutch survey, burnout was assessed with the Maslach Burnout Inventory (MBI). To maximize comparability of burnout measurement in the two surveys, we focused on the central scale of the MBI, emotional exhaustion (1). Dutch physicians assessed the frequency of the following 8 items: “1. I feel emotionally drained by my work. 2. I feel used up at the end of the day. 3. I feel fatigued when I get up in the morning. 4. Working with people all day is a strain. 5. I feel burned out by my work. 6. I feel frustrated by my job. 7. I’m working too hard at my job. 8. I’m at the end of my rope.” The burnout score for each Dutch physician was a composite of the frequency with which each item occurred. The prevalence of burnout in Dutch physicians ranged from those who endorsed item 5 (I feel burned out by my work) once a week or more to those who felt burned out a few times a month or more.

Analyses
Because of differences in the definitions of variables, we could not compare means or variances between countries; rather, we analyzed within-country relationships between variables through structural equation modeling. We then developed a burnout model for both countries and compared relationships between variables cross-nationally. Structural equation modeling allows testing models of relations between predictors and outcomes and determining the presence of mediating variables. LISREL (Linear Structural RELations) was used to fit a model to the correlation matrices of all research variables (12). Model parameters include regression coefficients expressing strength of relations between predictors, mediators, and outcomes. The “maximum likelihood” method yields estimates of model parameters with confidence intervals that enable us to evaluate significant differences between countries. Maximum likelihood estimation also yields measures of fit, including the root mean square error of approximation (RMSEA) where values <0.05 indicate close fit (13).

Table 1. Subjects from the U.S. Physician Worklife Study and the Dutch Motivation in Medical Consultants Study Included in Burnout Model

<table>
<thead>
<tr>
<th>Specialty</th>
<th>United States (n = 1,824)</th>
<th>Netherlands (n = 1,435)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practice type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solo</td>
<td>17%</td>
<td>8%</td>
</tr>
<tr>
<td>Group</td>
<td>60%</td>
<td>42%</td>
</tr>
<tr>
<td>Academic</td>
<td>15%</td>
<td>24%</td>
</tr>
<tr>
<td>Other</td>
<td>8%</td>
<td>26%*</td>
</tr>
<tr>
<td>Specialty</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal Medicine†</td>
<td>49%</td>
<td>26%</td>
</tr>
<tr>
<td>Pediatrics</td>
<td>51%</td>
<td>7%</td>
</tr>
<tr>
<td>Other‡</td>
<td>0%</td>
<td>67%</td>
</tr>
<tr>
<td>Work hours per week (SD)</td>
<td>54.6 (18.4)</td>
<td>53.5 (13.6)</td>
</tr>
<tr>
<td>Burnout§</td>
<td>22%</td>
<td>11%–20%</td>
</tr>
</tbody>
</table>

* Dutch “other” practice types include salaried nonacademic physicians.
† Internal Medicine included general internists, subspecialty internists, and, in the Dutch sample, neurologists.
‡ All medical specialists aside from family physicians (huisarts) were sampled in the Dutch study. Most frequently represented specialties were psychiatry (14%), anesthesiology (7%), surgery (7%), radiology (6%), obstetrics and gynecology (5%), and ophthalmology (5%).
§ Burnout definitions provided in text.

**THE BURNOUT MODEL**

**Physician Samples and Burnout Prevalence**
Dutch and U.S. respondents were similar in age, presence of children, and work hours (Table 1). There were more U.S. female physicians, in part due to the number of U.S. pediatricians. The Dutch sample included more academic physicians as well as more technical and procedural physician specialties. Burnout prevalence was approximately 22% in the United States. In the Dutch sample, 11% of respondents felt burned out by their work once a week or more; an additional 9% felt burned out a few times per month.

**Developing and Testing the Burnout Model**
The burnout model in the figure distinguishes between background, mediating, and outcome variables. Background variables include sex, age, presence of children under 18, practice type, and work hours. Background variables do not directly affect burnout but rather have an impact on mediating variables. These mediators affect
Figure. Model to predict physician burnout. Background variables have direct effects on mediating variables that have direct effects on stress and satisfaction (intermediate outcomes). Stress and satisfaction have direct effects on burnout. All other effects are indirect, except for the direct effect of work-home interference on burnout. Proportions of variance of burnout explained by the model: U.S. 50%, Netherlands 51%.

intermediate outcomes of stress and satisfaction, which in turn lead to or prevent burnout. An initial hypothesis that mediating variables would have only indirect effects on burnout produced a model with unsatisfactory fit. Inspection of the LISREL modification indexes showed that model fit would improve by adding a direct effect of work-home interference on burnout. The final model (Figure) fitted the correlation matrices closely for both samples with U.S. RMSEA = 0.035 (95% confidence interval [CI]: 0.024 to 0.047) and Dutch RMSEA = 0.037 (95% CI: 0.023 to 0.050). In this model, background variables affect stress and satisfaction through the mediating variables of work control, work-home interference, and home support. Stress, satisfaction, and work-home interference have direct effects on burnout. The proportion of variance of burnout explained is high: 50% for the U.S. sample and 51% for the Dutch.

Table 2. Direct Effects of Background Variables on Mediating Variables in Burnout Model for U.S. and Dutch Physicians

<table>
<thead>
<tr>
<th>Background Variables</th>
<th>Mediating Variables</th>
<th>Outcome Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Work control</td>
<td>Stress</td>
</tr>
<tr>
<td>Age</td>
<td>Work-home interference</td>
<td>Satisfaction</td>
</tr>
<tr>
<td>Children</td>
<td>Home support</td>
<td>Burnout</td>
</tr>
<tr>
<td>Solo practice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic practice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work hours</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Direct Effects of Mediating Variables on Stress and Satisfaction

<table>
<thead>
<tr>
<th></th>
<th>Stress</th>
<th>Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work control</td>
<td>U.S. Neth</td>
<td>U.S. Neth</td>
</tr>
<tr>
<td>Work home interference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home support</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Percent variance explained 0.25 = 0.24 0.22 > 0.11

For meaning of signs (*, >, <, =), see footnote Table 2.

U.S. = United States; Neth = Netherlands.

Cross-National Comparisons

Regression coefficients in Tables 2, 3, and 4 represent effects of background variables on mediating variables, and effects of mediators on outcomes. For example (Table 2, row 2), older physicians in the United States felt they had more work control than younger physicians (beta = 0.19, which is significantly greater than 0); in the Netherlands, this age differential was less impressive (beta = 0.09, which is different from 0 but significantly less than the U.S. beta). Some key findings include the adverse impact of academic practice on work control and work-home interference in the United States, the strong association between work hours and work-home interference in both countries (remembering that work-home interference has a direct impact on burnout), the substantial benefits of physician work control on minimizing stress and increasing satisfaction in both countries, and the remarkable benefit of home support on stress reduction in the United States.

Tables 2, 3, and 4 demonstrate many similarities between countries. In fact, for both countries, work control was correlated with job stress and satisfaction, whereas work-home interference was associated with work hours,
The pioneering work of Ramirez and colleagues (15) with British medical consultants showed a high prevalence (27%) of psychiatric morbidity related to work overload, feeling poorly managed or resourced, and dealing with patients’ suffering. In a study of Scottish consultants (16), academic responsibilities were “protective” whereas clinical workload predicted emotional exhaustion. Among British general practitioners (17), four stressors predicted a lack of mental well-being: patient expectations, work-home interference, interruptions, and administration. Our study confirms many of these findings in more diverse physician samples. Our results also highlight the core theme of work control (not emphasized in these prior studies) and show the critical and direct effects of work-home interference on burnout. Finally, while protective effects of academic practice on burnout were found in the Scottish study (16), our data show that U.S. academically affiliated physicians were not protected against burnout.

Stress and satisfaction contribute to the high percent of burnout variance explained by our model. Signs of stress and burnout in physicians may include irritability, fatigue, an inability to leave work (working longer and longer hours), absenteeism, lower job satisfaction, or a decreased sense of personal accomplishment. Additional analyses from the U.S. and Dutch surveys (6,18,19) have focused on stress predictors and intentions to leave a job. Some of the predictors not used in the current study owing to lack of comparability between survey instruments included training, values, practice size, emphasis on productivity, time pressure during office visits, societal pressure, colleague support, feeling poorly resourced, intellectual stimulation, and job security. These variables should be considered in future studies to improve further the prediction of burnout.

The strengths of the model presented here include its derivation and confirmation in a cross-national investigation of large numbers of physicians in multiple specialties and practice settings, and the model’s ability to explain a high proportion of the variance in burnout in both countries. Weaknesses include the different questionnaires, differences in physician specialties, and a relatively low response rate in the U.S. sample. However, the U.S. response rate is close to the mean for national physician surveys (20), and a “wave analysis” of 140 items from the questionnaire showed meaningful correlations ($r > 0.1$) between early and late responders on only 4 items, suggesting a minimal impact of late response (or nonresponse) (8). Finally, it is possible that burnout in U.S. physicians varies by region and varies between the numerous practice types found in U.S. medicine. This study did not address these issues in detail.

What can an organization do about physician burnout? The model suggests that first, work control needs to be explicitly addressed: do physicians feel they have a say in how their work days are organized? Can they modulate the pace of their work, or minimize hassles, interruptions, and paperwork? Second, the physician organization should commit to understanding and addressing work-home interference. Cross-coverage, child care, part-time practice, and flexible work hours (21) all may mitigate role conflicts and build physician loyalty to the organization. Freeborn and colleagues (4,11) describe valuable preventive measures, including increasing physician participation in decision making, monitoring workload, promoting teamwork, increasing work fulfillment through goal setting and feedback, and orienting new physicians so they establish reasonable job expectations. Future research is needed to assess the impact of such measures on burnout and job turnover.

**DISCUSSION**

From this exploratory comparison of data from more than 3,000 physicians, we have derived a burnout model with a close fit to the data in two countries. The model’s background variables exert their effects on burnout through the mediating variables of work control, work-home interference, and home support. These mediators result in job stress and satisfaction, which, in conjunction with work-home interference, relate directly to physician burnout. To our knowledge, this model is the first to be applied across cultures. The strong performance of the model in both countries suggests that even if the importance of individual variables differs by country, the overall approach to preventing physician burnout may remain the same.

Table 4. Direct Effects of Stress, Satisfaction, and Work-Home Interference on Burnout

<table>
<thead>
<tr>
<th>Variable</th>
<th>U.S.</th>
<th>Neth</th>
<th>Percent variance explained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work home interference</td>
<td>0.23*</td>
<td>&lt; 0.33*</td>
<td>0.50</td>
</tr>
<tr>
<td>Stress</td>
<td>0.31*</td>
<td>= 0.35*</td>
<td></td>
</tr>
<tr>
<td>Satisfaction</td>
<td>-0.34*</td>
<td>&gt; -0.28*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For meaning of signs (*, >, <, =), see footnote Table 2.

U.S. = United States; Neth = Netherlands.

For children, stress, (dis)satisfaction, and burnout. Thus, the basic predictors of burnout are concordant across these two industrialized nations. Finally, some sex differences emerged with differences between countries. Male U.S. physicians described significantly more work control than female U.S. physicians, a sex difference not seen in the Netherlands. These sex differences are explored in greater detail in a separate report (14).
It is of concern that few physician practices have instituted burnout assessment or prevention programs. Burnout is prevalent and, given the emphasis on cost containment, may continue to rise. We recommend periodically surveying physicians and organizations for stress, satisfaction, and burnout, as well as for key mediators of work control and work-home interference and background variables such as work hours. A focus on these remediable factors may improve worklife, diminish turnover, and improve the quality of care.

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REFERENCES

APPENDIX

Additional Details about Predictor Variables from the U.S. and Netherlands Surveys

1. Work control: U.S.: “How much control do you have over each of the following: details of office schedule; work hours; work interruptions; patient load or panel size; and workplace issues (e.g., facilities, supplies).” Netherlands: “How much influence do you have over the following aspects of your work?: Planning the day; carrying out your work; available resources; and amount of work?”

2. Work-home interference: U.S.: “Please assess how well each statement describes your own practice situation: work rarely encroaches on personal time; work schedule leaves enough time for family; call is not excessive; the interruption of personal life by work is a problem.” Netherlands: “Please indicate how often you have to deal with each (of the following) situations: disruption of home life through spending long hours at work; having too much work; disruption of home life by paperwork; disruption of home life by call; not having time to relax.” Higher scores showed more work-home interference for both countries.

3. Home support: U.S.: A single item that asks for agreement with the statement “my spouse (or significant other) supports my career.” Netherlands: “The following questions concern the degree of support you experience from your partner (at home): 1. Can you talk about work troubles with your partner? 2. If work demands are high, can you count on your partner? and 3. Does your partner appreciate your work?”

4. Stress: U.S.: Averaged responses to a 4-item “stress scale” (22). “In the last month, how often have you felt: you were unable to control important things in your life; confident in your ability to handle personal problems; things were going your way; difficulties were piling up so high you could not overcome them?” Netherlands: “Overall, how stressful do you find your work?”

5. Satisfaction: U.S.: Five global satisfaction items: “I find my work personally rewarding; overall, I am pleased with my work; I am satisfied in my current practice; my current work is a major source of frustration; my work has not met my expectations.” Netherlands: “Overall, how satisfying do you find your work?”