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Are occupational stress levels predictive of ambulatory blood pressure in British GPs? An exploratory study

Daryl B O'Connor, Rory C O'Connor[a], Barbara L White and Peter E Bundred[b]

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Background. Occupational stress has been implicated as an independent risk factor in the aetiology of coronary heart disease and increased hypertensive risk in a number of occupations. Despite the large number of studies into GP stress, none have employed an objective physiological stress correlate.

Objectives. We conducted an exploratory study to investigate whether self-reported occupational stress levels as measured by the General Practitioner Stress Index (GPSI) were predictive of ambulatory blood pressure (ABP) using a Spacelabs 90207 in a sample of British GPs.

Method. Twenty-seven GPs (17 males, 10 females) participated in the study. Each GP wore an ABP monitor on a normal workday and non-workday. All GPs completed the GPSI before returning the ABP monitors. Demographic data were also collected.

Results. Stress associated with 'interpersonal and organizational change' emerged from the stepwise multiple regression analysis as the only significant predictor of ABP, explaining 21% of the variance in workday systolic blood pressure, 26% during the workday evening and 19% during the non-workday. For diastolic blood pressure, the same variable explained 29% of the variability during the workday and 17% during the non-workday. No significant gender differences were found on any of the ABP measures.

Conclusions. For the first time in GP stress research, our findings established that higher levels of self-reported occupational stress are predictive of greater ABP in British GPs. More detailed psychophysiological research and stress management interventions are required to isolate the effects of occupational stress in British GPs.

Keywords. Ambulatory blood pressure, GPs, occupational stress, organizational change.

Introduction

During the last 10 years, general practice has seen unprecedented change and has experienced a substantial increase in job demands and patient expectations.[1] In this time, GPs have reported high levels of occupational stress and have been found to exhibit significantly greater levels of job dissatisfaction and depressive symptoms than other white collar workers.[1–3] However, to date, GP stress research has not investigated whether these high levels of self-reported occupational stress are predictive of any adverse physiological parameters (such as blood pressure or heart rate). Previous studies have shown that job strain is associated with coronary heart disease and hypertension risk in a number of occupations.[4] Evidence suggests that job strain may be an independent risk factor in the aetiology of cardiovascular disease.[4] Cardiovascular and neuroendocrine stress responsivity have been implicated as possible mechanisms underlying the associations with coronary heart disease and hypertensive risk.[4,5]

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Department of Psychology, Eleanor Rathbone Building, University of Liverpool, Liverpool L69 3BX, [a]Department of Psychology, University of Strathclyde, Graham Hills Building, 40 George Street, Glasgow G1 1QE and [b]Department of Primary Care, Whelen Building, University of Liverpool, Liverpool L69 3BX, UK. Correspondence to Dr Daryl B O'Connor, School of Psychology, University of Leeds, Leeds LS2 9JT, UK.

This study sought, for the first time, to investigate whether the stressors inherent within the ever changing NHS were related to ambulatory blood pressure (ABP) levels in British GPs. It was hypothesized that occupational stress levels would predict significantly more of the variance in ABP during a normal workday and workday evening than during a non-workday and non-workday evening given that the source of stress is exposure to the psychosocial work environment.

Methods

Participants

A total of 124 full-time GPs were randomly sent a letter outlining the nature of the project and a consent form to be signed and returned to the investigators in a reply paid envelope if they were willing to participate. Forty-one consent forms were returned. Fourteen of the 41 GPs were excluded from the study, nine of whom did not pass the medical screening process (e.g. taking medication) and five who were excluded from analysis because of either incomplete data or technological problems. The sample size is similar to that reported elsewhere.[6]

Procedure

GPs were fitted with a Spacelabs 90207 ambulatory blood pressure monitor (ABPM) on the non-preferred arm. They were instructed to put the ABPM on between 8 a.m. and 10 a.m. during their normal workday/non-workday and wear it until 11 p.m. the same evening, and to re-fit the unit on the morning of their subsequent workday/non-workday (between 8 a.m. and 10 a.m.). The monitor was set to take readings at 30-minute intervals during both the workday and the non-workday. Readings which occurred during the workday until 7 p.m. were classified as workday, and those recorded after 7 p.m. until 11 p.m. as workday evening. This was repeated for the non-workday. Blood pressure readings were edited according to the physiological limits established by the British Hypertension Society.[7]

GPs were given a questionnaire to complete before returning the ABPM with the diary. Occupational stress was assessed using the 41-item General Practitioner Stress Index (GPSI), which consists of five subdimensions measured on a 6-point Likert scale (higher score = higher stress). The subdimensions measured stress related to: (i) interpersonal and organizational change; (ii) practice demands; (iii) on-call; (iv) facilities management; and (v) interruptions. Demographic information was also collected.

Statistics

Descriptive statistics were calculated for each of the variables. Stepwise multiple regression was employed to analyse the relationship between the dependent variables (systolic and diastolic workday and non-workday BP levels) and independent variables (age, number of GPs in practice, body mass index and occupational stress subdimensions). The internal reliability of the subscales with this sample was evaluated using Cronbach's alpha co-efficient. All data were analysed using SPSS for Windows.

Results

Descriptive statistics

Seventeen (63%) GPs were male, and 10 (37%) female. GP ages ranged from 30 to 64 years (mean = 43.45 years, SD = 9.36 years). A significant gender difference was only found for mean body mass index [males = 24.94 (SD = 3.02), females = 19.94 (SD = 1.25); $t = 4.95$, $P < 0.01$]. Descriptive statistics for all ABP measures are shown in Table 1. Internal reliability for the GPSI subscales with the present sample ranged from $\alpha = 0.75$ to 0.89. All were within acceptable boundaries.

Stepwise multiple regression analysis

One variable, stress associated with interpersonal and organizational change, emerged from the regression analysis accounting for significant amounts of variability in the BP measures (see Table 2).

Discussion

For the first time in GP stress research, our study has established that higher levels of self-reported occupational stress are predictive of greater ABP during both a workday and a non-workday in British GPs, whilst controlling for other known risk factors. These findings are novel in that, to our knowledge, this relationship has never been demonstrated previously within this population and previous studies have failed to employ objective physiological correlates of occupational stress. We found support for our hypothesis that self-reported occupational stress would explain more of the variance

TABLE 1 *Descriptive statistics: means and standard deviations scores for all ABP measures for all GPs (*n = *27)*

Variable	Mean	SD	Variable	Mean	SD
SBPWD	125.83	13.21	DBPWD	82.63	10.90
SBPWE	122.95	12.79	DBPWE	82.02	12.08
SBPNWD	118.18	9.96	DBPNWD	75.90	7.49
SBPNWE	117.98	9.44	DBPWE	74.34	7.42

SBPWD, workday SBP; SBPWE, workday evening SBP; SBPNWD, non-workday SBP; SBPNWE, non-workday evening SBP; DBPWD, workday DBP; DBPWE, workday evening DBP; DBPNWD, non-workday DBP; DBPNWE, non-workday evening DBP.

TABLE 2 *Stepwise multiple regression analysis: predicting systolic BP (SBP) and diastolic BP (DBP) in British GPs (*n = *27)*

Variable	Predictors	*T*	β	R^2	*P*
SBPWD	1. I/O change Total $R^2 = 0.21$	2.57	0.46	0.21	<0.05
SBPWE	1. I/O change Total $R^2 = 0.26$	2.99	0.51	0.26	<0.01
SBPNWD	1. I/O change Total $R^2 = 0.19$	2.43	0.44	0.19	<0.05
SBPNWE[a]	NS	NS	NS	NS	NS
DBPWD	1. I/O change Total $R^2 = 0.29$	3.19	0.54	0.29	<0.01
DBPWE[a]	NS	NS	NS	NS	NS
DBPNWD	1. I/O change Total $R^2 = 0.17$	2.28	0.41	0.17	<0.05
DBPNWE[a]	NS	NS	NS	NS	NS

[a] No variables entered or were removed from the regression equation.
SBPWD, workday SBP; SBPWE, workday evening SBP; SBPNWD, non-workday SBP; SBPNWE, non-workday evening SBP; DBPWD, workday DBP; DBPWE, workday evening DBP; DBPNWD, non-workday DBP; DBPNWE, non-workday evening DBP.

in workday and workday evening BP than non-workday and non-workday evening BP. This is consistent with the view that occupational stress resulting from exposure to the psychosocial work environment can lead to elevations in both systolic and diastolic blood pressure.[5,8] Further to this, if there is protracted elevation of the cardiovascular system (when the stressor is not present), this may have a prolonged effect on circulation, and may increase the risk of long-term damage.[9] Clearly, this is an area of concern that requires intervention.

Unlike Sutherland and Cooper's previous work,[3] we did not find stress associated with demands of the job and patient expectations emerging as a theme from the regression analysis with the most predictive value. Instead, stress associated with interpersonal and organizational change (items include, for example, coping with constant changes, increased medical services, dealing with difficult patients, postgraduate education commitments, etc.) was found to be the only significant predictor of ABP levels during both workday and non-workdays. This is not altogether surprising considering the recent history of change in the NHS, and suggests that the experience of organizational change by GPs may be associated with adverse physiological stress responsivity. In fact, Rout and Rout reported that GPs felt aggrieved with the 1990 contractual changes, in particular with the way and the pace with which the changes were implemented.[2]

A recent study reported the implementation of a stress management intervention in female GPs,[6] the result of which led to a significant reduction in psychological distress and emotional exhaustion using a programme which encouraged active worker participation and was based around learner-centred group seminars. It is not known at this time whether similar intervention strategies would have an ameliorative effect on physiological correlates of occupational stress. Hence, future work should implement and evaluate alternative stress management programmes, using longitudinal, randomized control paradigms based upon evidence-led approaches.[10]

Finally, as this exploratory study used a small sample, these results require replication in a larger sample, and more detailed psycho-physiological research is necessary to isolate the effects of occupational stress in British GPs.

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