Job characteristics, well-being and risky behaviour amongst pharmacists

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Abstract

Healthcare practitioners' fitness to practise has often been linked to their personal and demographic characteristics. It is possible that situational factors, such as the work environment and physical or psychological well-being, also have an influence on an individual's fitness to practise. However, it is unclear how these factors might be linked to behaviours that risk compromising fitness to practise. The aim of this study was to examine the association between job characteristics, well-being and behaviour reflecting risky practice amongst a sample of registered pharmacists in a region of the United Kingdom. Data were obtained from a cross-sectional self-report survey of 517 pharmacists. These data were subjected to principal component analysis and path analysis, with job characteristics (demand, autonomy and feedback) and well-being (distress and perceived competence) as the predictors and behaviour as the outcome variable. Two aspects of behaviour were found: overloading (taking on more work than one can comfortably manage) and risk taking (working at or beyond boundaries of safe practice). Separate path models including either job characteristics or well-being as independent variables provided a good fit to the dataset. Of the job characteristics, demand had the strongest association with behaviour, while the association between well-being and risky behaviour differed according to the aspect of behaviour being assessed. The findings suggest that, in general terms, situational factors should be considered alongside personal factors when assessing, judging or remediating fitness to practise. They also suggest the presence of different facets to the relationship between job characteristics, well-being and risky behaviour amongst pharmacists.

Background

One challenge for care quality and safety is ensuring that healthcare professionals remain fit to practise (Wachter, 2012). While this can be achieved in part by detecting and remediating performance problems as they emerge (Weenink, Westert, Schoonhoven, Wollersheim, & Kool, 2014), another aspect is the control of factors that could compromise fitness to practise in the first place (Harrison, 2008; Jacobs, Hassell, Seston, Potter, & Schafheutle, 2013).

A number of studies have explored risk factors for fitness to practise by identifying the characteristics of healthcare professionals who have been referred either to a fitness to practise hearing or to an assessment and rehabilitation service; such referrals typically happen because of suspected professional misconduct (e.g. dishonesty) or health impairment (e.g. addiction) (Phipps, Noyce, Walshe, Parker, & Ashcroft, 2011a). The characteristics typically highlighted by these studies include clinical specialty or sector, age, amount of experience, working without other healthcare professionals, gender, ethnicity, whether or not the practitioner was trained overseas, socio-economic class, and whether or not the practitioner has previously been disciplined (e.g. National Patient Safety Agency, 2009; Chamberlain, 2011; Bismark, Spittal, Gurrin, Ward, & Studdert, 2013). The relationship between some of these characteristics and practitioner risk differs between studies, while other characteristics have a more consistent pattern – most notably, male, ethnic minority and overseas-trained practitioners being at higher risk (as noted by Phipps et al. (2011a,b) amongst others, however, such findings may reflect process variables such as working relationships rather than an inherent feature of particular demographic groups). Other studies have suggested a role for individual differences such as personality (Firth-Cozens, Cording, & Ginsburg, 2003) and cognitive ability (Perry & Crean, 2005; Korinek, Thompson, McRae, & Korinek, 2009) in practitioner risk; for example, doctors referred to a performance assessment service were found to have impaired intellectual and neuropsychological performance.

While these studies have focused on the role of enduring personal characteristics, it is likely that situational factors are also associated with practitioner risk (Nahrgang, Morgeson & Hofmann, 2011;

Panagopoulou, Montgomery, & Tsiga, 2015). Firth-Cozens (2006) proposed a system model that places doctors' performance in the context of organisational stressors and individuals' psychological and physical well-being; these are proposed to affect patient care, both in their own right and in combination with personal characteristics. This view is supported by data from British doctors (Firth-Cozens & Greenhalgh, 1997; Cohen, Rhydderch, Marfell, & Cooper, 2009) and examination of malpractice cases amongst doctors in the United States (Stripe et al., 2006) and the Netherlands (van den Goor et al, 2015).

As in other health professions there is evidence to suggest that in general terms, demographic factors, individual differences, personal well-being and the work environment can affect both the performance of pharmacists and their likelihood of engaging in specific behaviours that compromise their fitness to practice (Johnson, O'Connor, Jacobs, Hassell, & Ashcroft, 2014; Phipps, Noyce, Walshe, Parker, & Ashcroft, 2011b; Willis, Elvey, & Hassell, 2011; Schafheutle, Seston, & Hassell, 2011; Merlo, Cummings, & Cottler, 2003). Other studies have explored the nature of the stressors that affect pharmacists' well-being; these commonly include excessive work demand, poor work-life balance, and lack of reward or recognition (Lea, Corlett, & Rodgers, 2012; Jacobs, Hassell, Ashcroft, Johnson, & O'Connor, 2014; McCann, Adair, & Hughes, 2009; McCann, Hughes, Adair, & Cardwell, 2009; Gaither, Kahaleh, Doucette, Mott, Pederson, & Schommer, 2008). While it is apparent from these studies that personal and situational factors could affect pharmacists' well-being and performance, there remain questions regarding how these factors relate to each other and to the behaviours that could compromise fitness to practise (e.g. Schafheutle et al., 2011). The current study aims to address this question by examining the association between psychosocial factors (job characteristics and well-being) and engagement in risky behaviour (that is, behaviour that could lead to the emergence of a fitness to practise concern) amongst pharmacists.

Method

Study design

The study used a cross-sectional survey design. The sampling frame consisted of all pharmacists registered to practise in Northern Ireland as of December 2010 (N = 1978).

Study measures

The following measures were used as part of the survey instrument:

- *Perceived work characteristics in health care* (Haynes, Wall, Bolden, Stride & Rick, 1999). The six-item measure of perceived work demand and the six-item measure of perceived autonomy (control) over one's work.
- *Work Design Questionnaire* (Morgeson & Humphrey, 2006). The three-item measure of task-related feedback available from other members of staff.
- *General Health Questionnaire* (Goldberg & Williams, 1988). The 12-item version of this questionnaire, with Likert scoring, in order to measure distress;
- *Well-being at work* (Warr, 1990). The six-item measure of perceived work competence.
- *Measure of pharmacist risk behaviours.* A 15-item measure, based on interview data from a previous study (Phipps, Noyce, Walshe, Parker, & Ashcroft, 2010). This asks respondents to rate the frequency with which they engage in a set of risk-increasing or risk-reducing behaviours (see Appendix A for details).

The measures were selected by the authors on the basis of their content validity with respect to job characteristics and well-being. In order to establish their face validity, a convenience sample of ten pharmacists working at the authors' institution and ten pharmacists who were part of the study's sampling frame reviewed the measures' content.

Procedure

Every participant within the sampling frame was mailed a paper copy of the instrument, and invited to complete it anonymously and return it directly to the lead author using a reply-paid envelope. Completed questionnaires were received from 543 respondents. Respondents who reported that they were not working at the time of completing the survey were removed from the sample. Demographic details of the final sample (N = 517, equating to a response rate of 26%) are shown in Table 1. A comparison with demographic data for the entire sampling frame around the time of data collection (see McCann, Hughes, et al., 2009) suggests that the distributions of employment sector and year of registration were broadly consistent with that of the study population, although there was some overrepresentation of hospital pharmacists (23.6% versus 13.5%) compared to community pharmacists (63.2% versus 74.2%) and underrepresentation of longer qualified pharmacists (5.1% qualified 1979 or earlier, versus 14.1%). Approval for the study was granted by the University of Manchester Senate Ethics Committee [Ref 10307, Dec 2010]

INSERT TABLE 1 HERE

Data analysis

The distribution of responses and pattern of missing responses were initially examined using version 22 of SPSS. Because all measures were administered within a single instrument, the Lavaan package in version 3.1.2 of R (Rosseel, 2012) was then used to screen for common method variance (CMV) between the measures, following the procedure described by Podsakoff, MacKenzie, Lee, and Podsakoff (2003). This identified thirteen items in the risky behaviour measure, three of the items in the demand measure, and one of the items in the autonomy measure, as being contaminated by CMV. As the effect of CMV appears to be confined mainly to two measures (risky behaviour and demand), all items were retained for the purposes of the analysis.

In order to determine whether the risky behaviour items form a unidimensional or a multidimensional measure, a principal component analysis was carried out using the Psych package in R (Revelle, 2015). Components were extracted from the correlation matrix, and rotated using the promax

procedure. The number of components to extract was decided on by examining the scree plot and the eigenvalue and squared multiple correlation of each component. During successive runs of the analysis any items that had a loading of more than .32 on more than one component, or that had no loading of at least .32 on any component, were removed (Tabachnick & Fidell, 2001).

In order to identify the effect of the independent variables (job characteristics and well-being) on the dependent variable (risky behaviour), three path models were specified. In Model A, job characteristics were proposed to have a direct association with risky behaviour. In Model B, well-being was proposed to have a direct association with risky behaviour. Model C combines Models A and B, with the additional proposal that well-being has an indirect effect on risky behaviour, mediated by well-being. During the analysis, each model was fit to covariance matrices and the maximum likelihood procedure was used to estimate model parameters. Each of the job characteristics and well-being measures was centred around its sample mean score prior to analysis, and cases with missing data were removed using listwise deletion. Model fit was assessed using the Tucker-Lewis index (TLI), comparative fit index (CFI) and root mean square error of approximation (RMSEA). The path analyses were conducted in R using Lavaan.

Results

Data screening

Of the data points in the dataset, 0.5% were missing. Little's test indicated that these values were missing completely at random [$\chi^2(1126) = 1174.07$, $p = 0.16$], although year of registration and patient-facing versus non patient-facing were more affected than other variables (5.2% missing from each). There were 21 multivariate outliers on the study measures. Analysis of variance identified cases with missing data as reporting more years of experience and higher ratings for competence. Outlier cases reported having high work demand with respect to the level of autonomy and feedback available to them, and a high frequency of risky behaviour, but a low level of distress. For each analysis the outlier cases were retained, and missing data deleted on a listwise basis, but the findings of these analyses were cross-checked with those obtained from two alternative datasets: one with outliers removed; the other with missing data substituted using the expectation maximization method.

Principal component analysis of risk behaviour items

The scree plot and eigenvalues suggested that three components could be extracted, and the squared multiple correlation of each component was higher than 0.9. However this solution was not adopted because only two items, with a correlation of 0.3 between them, loaded on the third component. Instead, a solution consisting of two components was adopted. The components accounted for 46% of the variance in the item responses. Bartlett's test of sphericity and the Kaiser-Meyer-Olkin measure of sampling adequacy were within acceptable limits for the analysis [Bartlett $\chi^2(66) = 1473.37$, $p < 0.001$; Kaiser-Meyer-Olkin = 0.82]. The components are shown in Table 2.

INSERT TABLE 2 HERE

From the items loading on each component, the components were identified as follows: component 1 reflects overloading (that is, taking on a high volume of work relative to that which the respondent can deal with); and component 2 reflects risk-taking (working at or beyond the limits of safe practice). Therefore, the single measure of risky behaviour was replaced with two measures, each representing

one of these components. The descriptive statistics for the job characteristics, well-being and risky behaviour measures are shown in Table 3 and their distributions in Figure 1.

INSERT TABLE 3 HERE

INSERT FIGURE 1 HERE

Test of modified path diagram

As a result of the principal component analysis, the path model was revised to that shown in Figure 2. Here, job characteristics and well-being are directly related to the two sets of risky behaviours (Models A and B respectively), and well-being accounts for the association between job characteristics and the risky behaviours (Model C). In order to construct Model C, paths for the job characteristics were added to Model B; these were added in an iterative manner, with paths added one-by-one until the best fitting version of Model C had been constructed. In all three models, covariance paths between items on the risky behaviour questionnaire were added as suggested by the modification indices.

INSERT FIGURE 2 HERE

The path weights for each model are shown in Table 4. In interpreting each path weight, he critical p value for statistical significance was assumed to be 0.05 divided by the number of parameters in the respective model, in order to achieve a familywise error rate of 5% across each model. When the job characteristics measures are used as independent variables (Model A), only demand has a significant association with either behavioural measure. The fit indices for this model indicate a statistically significant chi-square test [$\chi^2(78) = 174.97$, $p < 0.01$], but the other fit indices were within acceptable limits [CFI = 0.95; TLI = 0.93; RMSEA = 0.05]. When the well-being measures are used as independent variables (Model B), distress has a significant association with overloading only, while competence has a significant association with risk taking only. Again, this model has a statistically

significant chi-square test [$\chi^2(68) = 157.78$, $p < 0.01$], but the other fit indices were within acceptable limits [CFI = 0.95; TLI = 0.93; RMSEA = 0.05].

When both sets of measures are used together (Model C), demand has a direct association with overloading and risk taking, and with distress and competence. In addition to this, competence has a direct association with risk taking, while distress has a direct association with overloading. Autonomy has a direct association with competence only, and feedback has a direct association with distress only. Model C fits the data less well [$\chi^2(102) = 271.69$, $p < 0.01$; CFI = 0.92; TLI = 0.90; RMSEA = 0.06]. A comparison of the Akaike's information criterion (AIC) values reported in Table 4 indicates that the difference in fit between Model C and each of the other models is statistically significant [for Model A, $\chi^2(8) = 3546.02$; $p < 0.001$; for Model B, $\chi^2(13) = 3108.51$; $p < 0.001$]. In addition, Model A has a significantly better fit than Model B [$\chi^2(5) = 437.51$; $p < 0.001$]. Therefore, Models A and B are preferable to Model C, with Model A being the best fitting model of the three.

When these analyses were repeated with the outliers removed, the same associations were observed, except for the path between feedback and distress becoming non-significant. However, when missing data were substituted rather than listwise deleted, competence no longer had a significant association with either behaviour measure.

Discussion

The findings indicate a general association between job characteristics, well-being and risky behaviour amongst pharmacists. Specifically, there appear to be at least two aspects to pharmacists' risky behaviour, each of which is predicted by particular elements of job characteristics and well-being. Work demand is the job characteristic that is most consistently related with behaviour, in combination with either competence or distress according to the aspect of behaviour being assessed. In addition, each aspect of well-being is itself related to particular job characteristics. However, while job characteristics and well-being have associations with risky behaviour in their own right, and job characteristics have an association with well-being, there is only modest support for a model in which well-being mediates the association between job characteristics and well-being.

The findings highlight the potential role of situational factors in accounting for healthcare practitioners' performance or conduct. As such, they are consistent with those studies that have suggested a link between organisational stressors, individual well-being, and performance problems (Cohen et al., 2009; Montgomery, Todorova, Baban, & Panagopoulou, 2013). They are also broadly consistent with the model proposed by Firth-Cozens (2006). With regard to the latter, though, the findings suggest that simply casting well-being as a mediator between the work environment and performance may not be the best way to account for the associations between these variables. Firth-Cozens' model proposes that individual differences such as personality and coping style also act as mediators, and so also need to be included in a mediation analysis.

The formation of different components from the risky behaviour items indicates that risky behaviour – at least, in the context of pharmacy practice – is best understood as comprising different categories, closely related but differentially affected by psychosocial factors. For example, overworking could be conceived of as a product of perceived distress, risk taking a product of perceived competence, and both a product of perceived work demand. That the association between competence and risky behaviour was absent when the most experienced and competent respondents were retained in the sample suggests this association is confined to the relatively less confident respondents. Interestingly,

those respondents who had a low level of distress despite experiencing heavy work demand and frequently engaging in risk behaviour appeared to introduce a link between feedback and distress. Why this might be is a matter for conjecture; one suggestion is that feedback about job performance helps respondents to manage any negative feelings associated with their work.

In methodological terms, the current study examines variation in risk factors across a population of healthcare professionals. Also, the outcome is defined in terms of behaviour that may lead to performance or conduct problems, rather than whether or not such problems have actually been identified. Therefore, the study complements previous studies that have concentrated on a subset of the population that has been identified to have performance or conduct problems. There are, though, some limitations with the methodology used here. Because the measure of risky behaviour is bespoke, neither it nor the components that were derived from it in the current study have been validated outside of this study sample. Furthermore, while the findings are consistent with previous studies, the extent to which they generalise to other locations or professional groups is not clear; more so given the relatively low response rate from this sampling frame. Finally, the study relies on cross-sectional self-reported data. As described in the method section, any contamination of the findings due to common method variance is limited; nevertheless a cause-and-effect relationship between the study variables can only be inferred on the basis of these findings. It is quite possible that bi-directional or reciprocal relationships exist between the variables over time; for example, distress both influencing and being influenced by engagement in risk-taking behaviour (Ford et al., 2014).

The findings support the argument that fitness-to-practise risk is not a matter only of personal or employment characteristics, but also of a given practitioners' work setting and personal well-being (Cox, King, Hutchison, & McAvoy, 2006; Jacobs, Hassell, Seston, et al., 2013; van den Goor et al., 2015). These factors should be taken into account when screening members of a professional group for risk, and also when deciding how to remediate any problems that do arise. A remedial or preventative intervention should consider ways of improving the overall fit between the practitioner and his or her work environment (for example by changing one or the other, or both) as opposed to

focusing only on the practitioner (Harrison, 2008). In order to aid decision-making about the most suitable sanction, both personal and situational factors should be incorporated into the classification or formulation of a disciplinary case (Elkin, Spittal, Elkin, & Studdert, 2012). A more general point to be drawn from the findings is the multifaceted nature of the link between psychosocial factors and behaviour; for one thing, positive and negative aspects of well-being could be differentially affected by job characteristics, or have differential effects on behaviour (Warr, 1990).

Further studies should be carried out to establish whether the findings can be generalised to other healthcare professions or locations (for example, primary care medicine: Calnan, Wainright, Forsythe, Wall, & Almond, 2001). Such studies should, where possible, also assess the role of individual differences and attitudinal factors that could affect risky behaviour (e.g. Phipps, Beatty, & Parker, 2015) and lifestyle factors that could affect well-being. They should also use a longitudinal design in order to further explore the cause-and-effect relationships suggested here.

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Competing interests

No potential conflict of interest is reported by the authors.

References

Bismark, M.M., Spittal, M.J., Gurrin, L.C., Ward, M., & Studdert, D.M. (2013). Identification of doctors at risk of recurrent complaints: a national study of healthcare complaints in Australia. *BMJ Quality and Safety, 22*, 532-540.

Calnan, M., Wainwright, D., Forsythe, M., Wall, B., & Almond, S. (2001). Mental health and stress in the workplace: the case of general practice in the UK. *Social Science and Medicine, 52*(4), 499-507.

Chamberlain, J.M. (2011). The hearing of fitness to practice cases by the General Medical Council: future trends and current research agendas. *Health, Risk and Society, 13*, 561-575.

Cohen, D., Rhydderch, M., Marfell, N., & Cooper, I. (2009). Identifying biographical and biopsychosocial risk factors amongst underperforming doctors. Report RES-153-25-0092. Economic and Social Research Council, Swindon. Retrieved from https://www.esrc.ac.uk/my-esrc/grants/RES-153-25-0092/outputs/Download/61650084-5d7b-4d21-b3c0-22daf95750a0, 18th June 2015.

Cox, J., King, J., Hutchinson, A., & McAvoy, P. (2006). *Understanding Doctors' Performance*. Abingdon: Radcliffe Publishing.

Elkin, J., Spittal, M.K., Elkin, D., & Studdert, D.M. (2012). Removal of doctors from practice for professional misconduct in Australia and New Zealand. *BMJ Quality and Safety, 21*, 1027-1033.

Firth-Cozens, J. (2006). A perspective on stress and depression. In J. Cox, J. King, A. Hutchinson, & P. McAvoy (Eds.), *Understanding Doctors' Performance* (pp. 22-37). Abingdon: Radcliffe Publishing.

Firth-Cozens, J., Cording, H., & Ginsburg, R. (2003). Can we select health professionals who provide safer care? *Quality and Safety in Health Care, 12(Suppl. 1)*, i16-i20.

Firth-Cozens, J., & Greenhalgh, J. (1997). Doctors' perceptions of the links between stress and lowered clinical care. *Social Science and Medicine, 44*(7), 1017-1022.

Ford, M.T., Matthews, R.A., Wooldrige, J.D., Mishra, V., Kakar, U.M., & Strahan, S.R. (2014). How do occupational stressor-strain effects vary with time? A review and meta-analysis of the relevance of time lags in longitudinal studies. *Work and Stress,28*(1), 9-30.

Gaither, C.A., Kahaleh, A.A., Doucette, W.R., Mott, D.A., Pederson, C.A., & Schommer, J.C. (2008). A modified model of pharmacists' job stress: the role of organizational, extra-role, and individual factors on work-related outcomes. *Research in Social and Administrative Pharmacy, 4*, 231-243.

Goldberg, D., & Williams, P. (1988). *A User's Guide to the General Health Questionnaire*. London: GL Assessment Ltd.

Harrison, J. (2008). Doctors' health and fitness to practise: assessment models. *Occupational Medicine, 58*, 318-322.

Haynes, C.E., Wall, T.D., Bolden, R.I., Stride, C., & Rick, J.E. (1999). Measures of perceived work characteristics for health services research: test of a measurement model and normative data. *British Journal of Health Psychology, 4*, 257-275.

Jacobs, S., Hassell, K., Ashcroft, D., Johnson, S., & O'Connor, E. (2014). Workplace stress in community pharmacies in England: associations with individual, organizational and job characteristics. *Journal of Health Services Research and Policy, 19*(1), 27-33.

Jacobs, S., Hassell, K., Seston, E., Potter, H., & Schafheutle, E. (2013). Identifying and managing performance concerns in community pharmacists in the UK. *Journal of Health Service Research and Policy, 18*, 144-150.

Johnson, S.J., O'Connor, E.M., Jacobs, S., Hassell, K., & Ashcroft, D.M. (2014). The relationships among work stress, strain and self-reported errors in UK community pharmacy. *Research in Social and Administrative Pharmacy, 10*(6), 885-895.

Korinek, L.L., Thompson, L.L., McRae, C., & Korinek, E. (2009). Do physicians referred for competency evaluations have underlying cognitive problems? *Academic Medicine, 84*(8), 1015-1021.

Lea, V.M., Corlett, S.A., & Rodgers, R.M. (2012). Workload and its impact on community pharmacists' job satisfaction and stress: a review of the literature. *International Journal of Pharmacy Practice, 20*, 259-271.

McCann, L., Adair, C.G., & Hughes, C.M. (2009). An exploration of work-related stress in Northern Ireland community pharmacy: a qualitative study. *International Journal of Pharmacy Practice, 17*, 261-267.

McCann, L., Hughes, C.M., Adair, C.G., & Cardwell, C. (2009). Assessing job satisfaction and stress among pharmacists in Northern Ireland. *Pharmacy World and Science, 31,* 188-194.

Merlo, L.J., Cummings, S.M., & Cottler, L.B. (2003). Recovering substance-impaired pharmacists' views regarding occupational risks for addiction. *Journal of the American Pharmacists' Association, 52*(4), 480-491.

Montgomery, A., Todorova, I., Baban, A., & Panagopoulou, E. (2013). Improving quality and safety in the hospital: the link between organizational culture, burnout, and quality of care. *British Journal of Health Psychology, 18*, 656-662.

Morgeson, F.P., & Humphrey, S.E. (2006). The work design questionnaire: developing and validating a comprehensive measure for assessing job design and the nature of work. *Journal of Applied Psychology, 91,* 1321-1339.

Nahrgang, J.D., Morgeson, F.P., & Hofmann, D.A. (2011). Safety at work: a meta-analytic investigation of the link between job demands, job resources, burnout, engagement, and safety outcomes. *Journal of Applied Psychology, 96*(1), 71-94.

National Patient Safety Agency (2009). NCAS Casework: the first eight years. London: National Patient Safety Agency. Downloaded from http://www.ncas.nhs.uk/EasySiteWeb/GatewayLink.aspx?alId=62232, 22nd December 2015.

Panagopoulou, E., Montgomery, A.J., & Tsiga, E. (2015). Bringing the well-being and patient safety research agenda together: why healthy HPs equal healthy patients. *Frontiers in Psychology, 6*(211).

Perry, W., & Crean, R.D. (2005). A retrospective review of neuropsychological test performance of physicians referred for medical infractions. *Archives of Clinical Neuropsychology, 20,* 161-170.

Phipps, D.L., Beatty, P.C.W., & Parker, D. (2015). Standard deviation? The role of perceived behavioural control in procedural violations. *Safety Science, 72,* 66-74

Phipps, D.L., Noyce, P.R., Walshe, K., Parker, D., & Ashcroft, D.M. (2010). Risk assessment in pharmacy practice. Report to the Royal Pharmaceutical Society of Great Britain. Retrieved from http://www.pharmacyregulation.org/sites/default/files/Work%20stream%201%20-%20Final%20Report.pdf, 18th June 2015.

Phipps, D.L., Noyce, P.R., Walshe, K., Parker, D., & Ashcroft, D.M. (2011a). Risk-based regulation of healthcare professionals: what are the implications for pharmacists? *Health, Risk and Society, 13*, 277-292.

Phipps, D.L., Noyce, P.R., Walshe, K., Parker, D., & Ashcroft, D.M. (2011b). Pharmacists subjected to disciplinary action: characteristics and risk factors. *International Journal of Pharmacy Practice, 19*, 367-373

Podsakoff, P.M., MacKenzie, S.B., Lee, J.-Y., & Podsakoff, N. (2003). Common method biases in behavioural research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(5), 879-903.

Revelle, W. (2015). Psych: procedures for personality and psychology research. Evanston IL: Northwestern University. Retrieved from http://personality-project.org/r/psych/psych-manual.pdf, 18th June 2015.

Rosseel, Y. (2012). Lavaan: an R package for structural equation modelling. *Journal of Statistical Software, 48*, 1-36.

Schafheutle, E.I., Seston, E.M., & Hassell, K. (2011). Factors influencing pharmacist performance: a review of the peer-reviewed literature. *Health Policy, 102*, 178-192.

Stripe, S.C., Best, L.G., Cole-Harding, S., Fifield, B., & Talebdoost, F. (2006). Aviation model risk factors applied to medical malpractice cases. *Journal of the American Board of Family Medicine, 19*, 627-632.

Tabachnick, B.G., & Fidell, L.S. (2001). *Using Multivariate Statistics (4th Ed.)*. Boston: Allyn & Bacon.

van den Goor, M.M.P.G., Wagner, C.C., Lombarts, K.M.J.M.H. (2015). Poor physician performance in the Netherlands: characteristics, causes, and prevalence. *Journal of Patient Safety.* doi: 10.1097/PTS.0000000000000222

Wachter, R.M. (2012). Disciplining doctors for misconduct: character matters, but so does competence. *BMJ Quality and Safety, 21*, 976-978.

Warr, P. (1990). The measurement of well-being and other aspects of mental health. *Journal of Occupational Psychology*, 63, 193-210.

Weenink, J., Westert, G., Schoonhoven, L.,Wollersheim, H., & Kool, R.B. (2014). Am I my brother's keeper? A survey of 10 healthcare professions in the Netherlands about experiences with impaired and incompetent colleagues. *BMJ Quality and Safety, 24*, 56-64.

Willis, S., Elvey, R., & Hassell, K. (2011). What is the evidence that workload is affecting hospital pharmacists' performance and patient safety? Report to the Centre for Workforce Intelligence. Downloaded from http://www.cfwi.org.uk/publications/what-is-the-evidence-that-workload-is-affecting-hospital-pharmacists2019-performance-and-patient-safety, 21st December 2015.

Tables

Table 1. Demographic characteristics of the sample

		N	Percentage
Year of registration	1950 – 1959	2	0.4
	1960 – 1969	3	0.6
	1970 – 1979	21	4.1
	1980 – 1989	105	20.3
	1990 – 1999	143	27.7
	> 2000	216	41.8
	No answer	27	5.2
Sector of employment	Community	327	63.2
	Hospital	122	23.6
	Primary care	25	4.8
	Pharmaceutical industry	7	1.4
	Academia	17	3.3
	Other	15	2.9
	No answer	4	0.8

Table 2. Components formed by the risk behaviour items

	Component	
Item	1	2
Worked for longer hours than you should have	0.76	-0.16
Worked alone on a task when you should have had support from someone else	0.63	0.11
Ignored concerns about your own health	0.80	-0.06
Continued to work while feeling unfit for work	0.78	-0.02
Taken on more work than you feel capable of	0.76	-0.03
Worked somewhere that you felt was unsafe	0.42	0.21
Allowed a safety incident to go unreported	-0.12	0.76
Deviated from standard operating procedures or organisational policies	-0.10	0.74
Knowingly worked outside your boundaries of expertise	-0.01	0.67
Been "caught out" by something going wrong that you should have anticipated	0.15	0.57
Failed to report someone who you suspected of committing an offence*	-0.04	0.55
Taken no action when someone voiced concern about your performance*	0.10	0.41
Eigenvalue	3.83	1.52
Squared multiple correlation	0.96	0.96
Proportion of variance accounted for	0.25	0.20

Note: the correlation between the components is 0.45, $p < 0.01$. * indicates the items that formed a third component during initial runs of the analysis.

Table 3. Sample descriptives and correlations for the study measures

	Correlations										
Measure	1	2	3	4	5	6	7	Scale	Mean	SD	Alpha
1. Demand		-0.23**	-0.21**	-0.33**	0.45**	0.64**	0.37**	1 – 5	3.01	1.00	0.90
2. Autonomy			-0.23**	0.31**	-0.23**	-0.23**	-0.19**	1 – 5	3.49	0.92	0.87
3. Feedback				0.19**	-0.26**	-0.13**	-0.11*	1 – 5	2.70	0.89	0.86
4. Competence					-0.46**	-0.27**	-0.31**	1 – 5	3.52	0.57	0.72
5. Distress						0.49**	0.29**	0 – 36	12.06	5.62	0.90
6. Overloading							0.42**	6 – 30	16.09	4.70	0.79
7. Risk taking								6 – 30	10.85	2.71	0.68

Key: * two-tailed $p < 0.05$; ** two-tailed $p < 0.01$

Table 4. Path weights and AIC values for the path models

Path	Value	SE	Z	p	Model AIC
Model A: Job characteristics measures only					*17445.39 (42)*
Demand > Overloading	0.60	0.05	12.87	<0.001	
Autonomy > Overloading	-0.07	0.04	-1.94	0.052	
Feedback > Overloading	0.03	0.04	0.78	0.437	
Demand > Risk taking	0.18	0.03	6.38	<0.001	
Autonomy > Risk taking	-0.06	0.03	-2.25	0.025	
Feedback > Risk taking	-0.01	0.03	-0.34	0.731	
Model B: Well-being measures only					*17882.90 (37)*
Distress > Overloading	0.06	0.01	7.96	<0.001	
Competence > Overloading	-0.11	0.06	-1.92	0.055	
Distress >Risk taking	0.02	0.01	3.38	0.001	
Competence > Risk taking	-0.22	0.05	-4.62	<0.001	
Model C: Job characteristics and well-being measures combined					*20991.41 (50)*
Demand > Overloading	0.47	0.04	10.71	<0.001	
Distress > Overloading	0.03	0.01	5.68	<0.001	
Demand > Risk taking	0.15	0.03	5.70	<0.001	
Competence > Risk taking	-0.21	0.04	-4.89	<0.001	
Demand > Distress	2.17	0.23	9.41	<0.001	
Autonomy > Distress	-0.75	0.25	-2.94	0.003	
Feedback > Distress	-0.99	0.26	-3.81	<0.001	
Demand > Competence	-0.14	0.02	-5.89	<0.001	
Autonomy > Competence	0.15	0.03	5.54	<0.001	
Feedback > Competence	0.07	0.03	2.34	0.018	

Note: SE: standard error. AIC: Akaike's Information Criterion value, with number of parameters in brackets. Covariances, item-factor loadings and error terms have been omitted for brevity.

Figures

Figure 1. Boxplot of the study measures

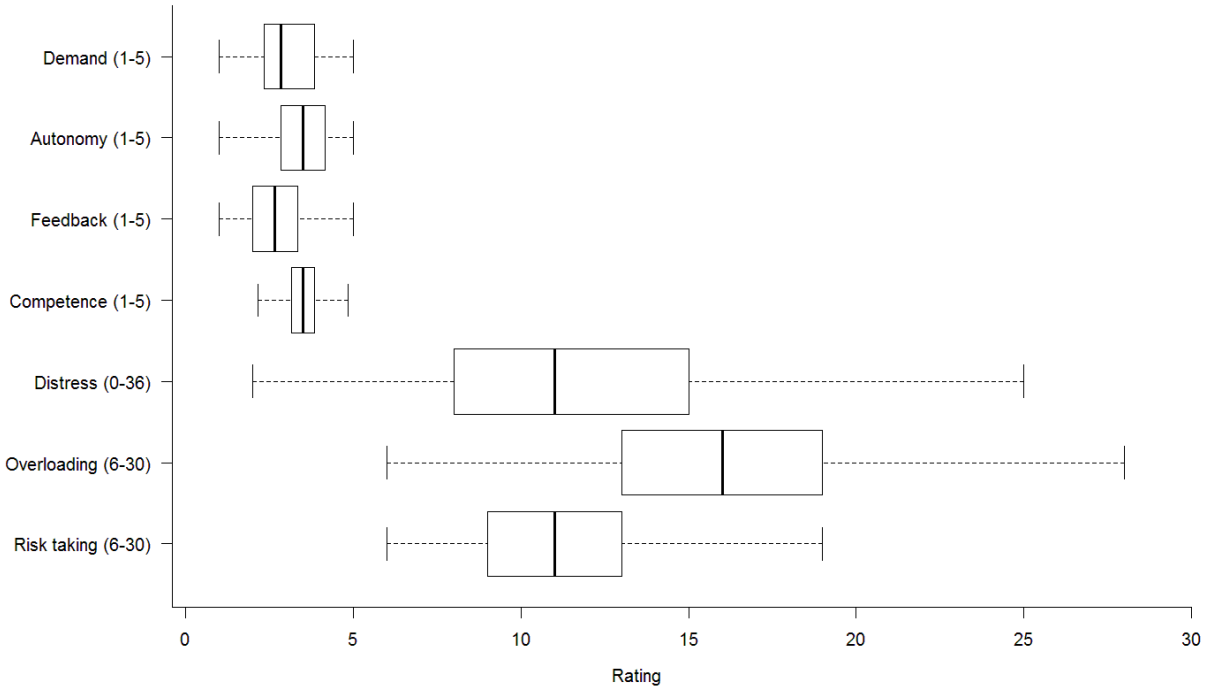
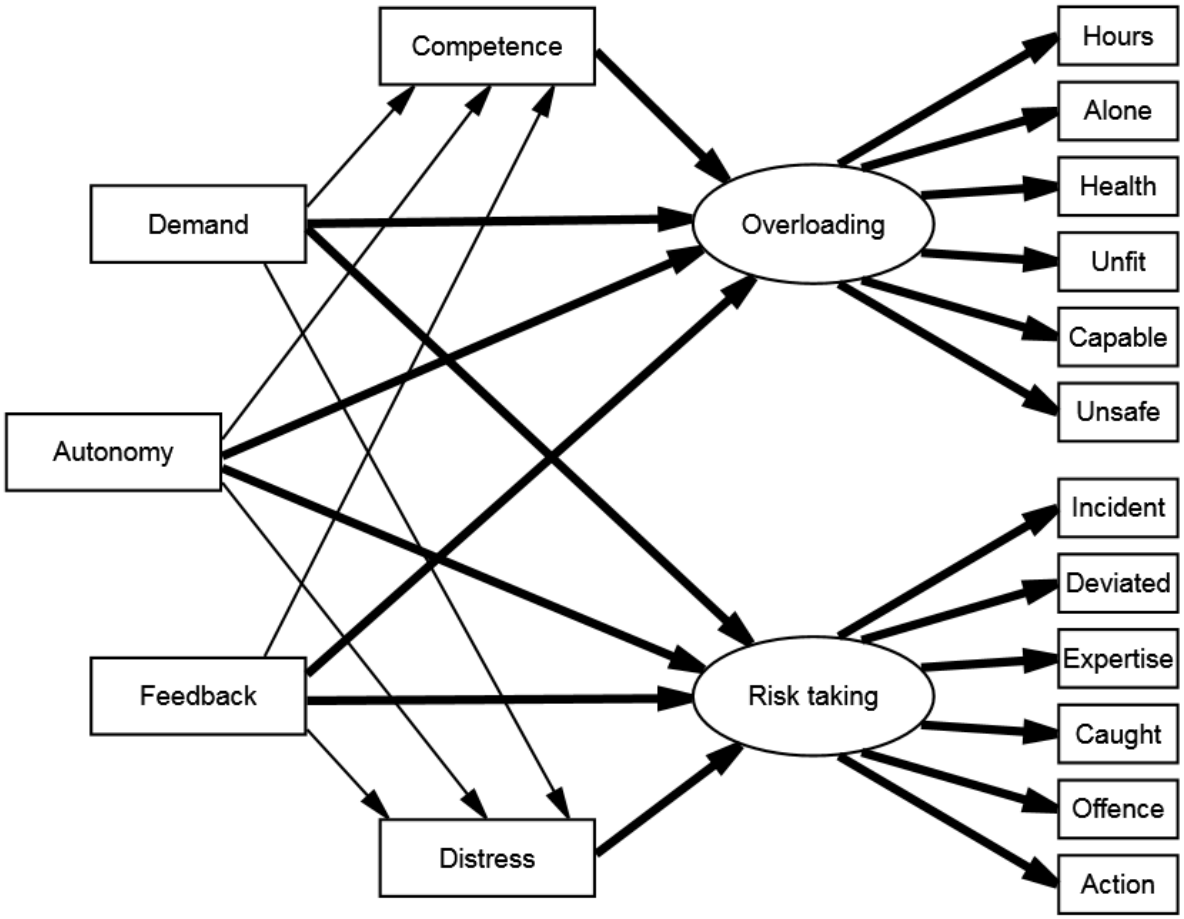


Figure 2. The path model tested in the study. Thick lines indicate the paths tested in Models A and B. Thin lines indicate the additional paths tested in Model C.



Appendix A: Questionnaire to assess risky practice

On scale of 1 (Never) to 5 (Frequently), how often have you done the following over the past six months?

1. Checked that your knowledge is up to date
2. Allowed a safety incident to go unreported
3. Deviated from standard operating procedures or organisational policies
4. Knowingly worked outside your boundaries of expertise
5. Worked for longer hours than you should have
6. Ensured that your workplace is well organised
7. Worked alone on a task when you should have had support from someone else
8. Been "caught out" by something going wrong that you should have anticipated
9. Ignored concerns about your own health
10. Continued to work while feeling unfit for work
11. Failed to report someone who you suspected of committing an offence
12. Taken no action when someone voiced concern about your performance
13. Taken on more work than you felt capable of
14. Worked somewhere that you felt was unsafe
15. Spoken to somebody in a manner that he or she thought was inappropriate