

DOCTOR WORKPLACE ATTRITION: AN EXAMINATION OF PATHWAYS FROM WORK DEMANDS TO ORGANISATIONAL COMMITMENT

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ABSTRACT

Health workforce shortages worldwide are approaching crisis point, further burdening systems already struggling to meet demand. Doctor attrition has been identified as a major contributor to this problem and therefore, the current study examined links between workload demands and stressors, and doctors' commitment. Based on prior research and key psychological theories, pathways were hypothesised that were initiated by workload demands and stressors, proceeding through work-life conflict and psychological distress, intrinsic motivation factors, through to commitment. A sample of 208 medical doctors completed self-report measures of these constructs. Among workload hassles and demands, quantitative demands, representing the extent that workload exceeds available resources (e.g., time) emerged as the strongest predictor. Meaningfulness of work was the strongest direct predictor of commitment, followed by work-life conflict, job satisfaction and burnout. This study highlights the importance of workplaces providing an environment that nurtures doctors' intrinsic motivation and manages doctor workloads to ensure work-life balance is maintained.

KEYWORDS

turnover; attrition; job satisfaction; doctor burnout; doctor stress

INTRODUCTION

Health workforce shortages currently present a critical problem in Australia and internationally, placing tremendous pressure on already overburdened healthcare systems. (1, 2) These shortages are escalating, with a global shortfall of 12.9 million workers predicted in coming decades. (2) This places additional burden on a system

already struggling to cope with demand. (3) Overburdened healthcare systems drive increased strain on individual practitioners, poorer quality of work and health outcomes, and can lead to workforce attrition, thus further compounding the problem. (4, 5)

Concerns regarding health workforce, work performance, and attrition have long been recognised. For example,

almost a quarter of a century ago, Williams, Michie, and Pattani (6) highlight an array of issues relating to doctor workloads, job pressures, work-life balance, and the enormous economic burden of understaffing and staff absence; themes that have been repeatedly echoed up to the current day. However, these challenges remain poorly understood, in part due to our limited understanding of the factors that contribute to the attrition of medical practitioners. The current study is both novel and ambitious in its scope and draws on several lines of evidence and theoretical propositions to articulate a model that explains workplace attrition among doctors. The model stipulates pathways initiated by workload demands and stressors, proceeding through work-life conflict and psychological distress, intrinsic motivation factors, and terminates at workplace commitment (hereon, commitment). The complexity of this model requires introducing multiple bodies of evidence and theoretical positions. Figure 1 is a useful reference point to navigate the following material.

For the current investigation, the outcome variable 'commitment' is adopted as an inverse proxy operationalisation of workplace attrition as it is expected to be easier for doctors to contemplate and report on their level of commitment rather than intentions to quit. Therefore, variation in workplace commitment is a useful means of measuring attrition, as these two constructs are conceptually strongly, though inversely correlated. The definition and operationalisation of workplace commitment used in the current study is derived from its conceptualisation within the Copenhagen Psychosocial Questionnaire subscale 'Commitment to the workplace'. This is defined as "...the degree to which one experiences being committed to ones' workplace." (p. 497). (7) Unfortunately, the scale developers do not elaborate on the conceptual bases of this construct though, of the three generally acknowledged types of organisation commitment (8), it appears closest to affective commitment or wanting to remain due to an emotional attachment rather than a perceived need to stay (i.e., continuance commitment) or a sense of obligation (i.e., normative commitment).

Despite the broader context of the study being health workforce shortages, this study focuses on the more immediate context of a doctors' current workplace commitment. Attrition to the current workplace is considered a useful reference frame within which to test important hypotheses that have implications for broader contexts.

ATTRITION AS A FUNCTION OF DOCTOR MOTIVATION

Motivation has an important role to play in driving doctor attrition and workplace commitment. Self-determination theory (SDT) is an influential framework that has been successfully applied to understanding motivation across a range of contexts including work motivation. (9) Medical work can be rich in both extrinsic and intrinsic motivators, however extrinsic motivators appear less important for doctors. Medical students rate intrinsic factors (internal rewards and fulfilment) as more influential in their career choice with person-oriented factors, such as the opportunity to work and care for people, considered more important than extrinsic factors such as money and prestige. (10, 11) This emphasis on intrinsic motivation appears to remain an important driving force throughout a doctor's career. For example, the majority of senior doctors (i.e., those successfully retained in the workforce) report being intrinsically motivated, identifying with medicine as a calling, which is associated with the sense of meaningfulness of their work, workplace commitment, and job satisfaction. (12, 13) This emphasis on the importance of intrinsic motivation is consistent with evidence that extrinsic motivators, such as financial incentives are insufficient for producing job satisfaction and enhancing workplace commitment. (13, 14) The importance of intrinsic motivation is further underscored by evidence that doctors who fail to derive a sense of satisfaction from their job are two to three times more likely to leave. (15) A more recent study involving nurses showed that intrinsic motivation also significantly predicted their work engagement. (16)

High workplace demands and stressors can interfere with the ability of doctors' work to support their intrinsic motivation. This is most readily observed in a reduction of doctors' sense of meaningfulness in their work and the degree of satisfaction with their work. Therefore, lower job satisfaction (H1a) and meaningfulness of work (H1b) are expected to predict decreased commitment. Recognising the importance of a sense of meaningfulness of work for sustaining job satisfaction, it is also hypothesised that lower meaningfulness of work will predict lower job satisfaction (H2).

BURNOUT AMONG DOCTORS

Burnout is defined as a specific form of stress associated with prolonged exposure to occupational stressors, which results in a condition characterised by emotional exhaustion, depersonalisation, and reduced feelings of accomplishment. (17) Key indicators and outcomes of burnout involve exhaustion accompanied by personal

distress, decreased motivation, feelings of reduced effectiveness, dysfunctional behaviours and attitudes toward work, and job withdrawal. (18, 19) Burnout is prevalent among doctors at an alarming rate, which is almost twice that of the general working population. (20) In fact, more than half of Australian and US doctors experience symptoms of burnout (20, 21) with the prevalence among junior doctors as high as 75%. (22) Concerningly, many doctors do not access support to deal with stress and burnout citing time constraints, availability of services, and stigma among the greatest barriers. (23, 24) This is especially unfortunate given psychosocial support has been found to be helpful in many circumstances. (25, 26)

The results of burnout can be both wide-ranging and damaging. The personal consequences of burnout among doctors include psychological disorder, ill-health, disrupted relationships, and suicidal ideation. (27-29) The consequences of doctor burnout for patients include increased medical errors and suboptimal patient care. (30, 31) At the organisational level, burnout diminishes intrinsic motivation and appears to be the single greatest predictor of job dissatisfaction. (32, 33) Burnout can also lead to a decrease in the meaningfulness of work and reduced personal and professional satisfaction. (20, 28) Burnout has also been associated with low physician productivity (resulting in reduced working hours), absenteeism, low organisational commitment, greater intention to leave the practice or profession, early retirement, and turnover. (34-37)

This evidence supports the notion that burnout decreases intrinsic motivational factors necessary to sustain commitment. Therefore, higher reported burnout is hypothesised to predict decreased job satisfaction (H3a) and meaningfulness of work (H3b). It is also hypothesised that higher burnout will directly predict lower commitment (H4).

CAUSES OF BURNOUT

A number of factors have been associated with burnout. Occupational stress has been strongly associated with burnout among medical professionals. (38, 39) Work-life conflict combined with ongoing work stress represents a chronic strain that often results in burnout. (40, 41) Studies of varying professional populations show individuals experiencing work-life conflict are more likely to suffer stress and burnout. (42, 43) This is also the case with doctors, for whom work-life conflict is a strong predictor of burnout and

stress. (21, 44) Doctors also face unique factors contributing to burnout such as moral distress arising from their "... inability to act in accord with their individual and professional ethical values" (p. 409). (45) Finally, maladaptive coping strategies such as behavioural disengagement has also been linked to increased burnout among doctors. (46) For the current study, an increase in stress (H5a) and work-life conflict (H5b) is predicted to predict increased burnout.

STRESS AND WORK-LIFE CONFLICT

The transactional theory of stress and coping (47) stipulates that stress results from interactions between an individual and their environment. These interactions trigger a two-stage appraisal process that determines whether, and to what degree, stress is experienced. Primary appraisals involve assessing the stressor (stimuli or situation) to determine its 'threat' level, whereas secondary appraisals involve evaluating available resources to cope with the threat. (48) Accordingly, work-related stressors represent demands placed on the individual that are appraised as potentially threatening and straining available resources. The often-excessive work demands faced by doctors, such as high-pressure environments, high-stakes decision-making, heavy workloads, and long hours, place them at elevated risk of experiencing high levels of stress. (20, 28, 49) Consequently, work demands have been shown to be an important contributor to the alarmingly high rates of stress observed among Australian doctors. (21, 23, 50) Doctors in both Australia and the UK have indicated that work demands were their greatest source of stress. (49, 51)

One means by which work-related demands contributes to stress is by generating work-life conflict, which is particularly likely in cases of work overload. (52) Work-life conflict occurs when work demands interfere with private life and has been a noteworthy problem for doctors with almost two thirds of doctors reporting dissatisfaction with their work-life balance, which is almost twice that of the general population. (20, 28) In fact, work-life conflict is the second most frequently reported cause of stress for doctors. (49, 51) A nationwide study found that 44.3% of doctors had experienced a work-life conflict associated with work demands within the past three weeks. (44)

A fulfilling private life can be an important protective factor against stress and burnout for professionals. (53) That is, it can support a positive secondary appraisal of sufficient resources leading to lower total stress. However, when work demands begin to interfere with doctors' private life, it

represents a loss of this resource and may produce a compound effect on stress. An increase in job demands combined with the resultant work-life conflict is associated with an increase in both stress and burnout. (43)

Therefore, increased work-life conflict is expected to predict greater reported stress (H6). Further, greater workload demands (e.g., increased work hours, shift-work, additional shifts, on-call work, working late, as well as perceived quantitative, cognitive, and emotional demands) is expected to predict greater stress (H7a), and work-life conflict (H7b).

WORK-RELATED DEMANDS AMONG DOCTORS

Medical work involves many stressors including excessive workloads, workplace inefficiencies, unhealthy occupational cultures, a lack of work-life balance, abuse from patients, fear of making errors, and a lack of control and autonomy. (21, 30, 50, 54, 55) The determination of factors to incorporate in the current study was made considering evidence showing stressors relating to excessive workload demands are the most commonly reported cause of strain for doctors, with the volume of work, shift work, and on-call work being particularly problematic. (21, 23, 49, 51)

Previous research has established links between heavy workloads with burnout, work-life conflict, and stress. (21, 23, 28, 39, 56, 57) These issues also have influences on reduced job satisfaction and turnover intention. (53, 58) Excessive work hours have been associated with increased stress, burnout, and work-life conflicts, and decreased job satisfaction and quality of life. (59, 60) On-call work, shift work, and night work when combined with high job demands has also been associated with stress, burnout, turnover intention, and early retirement. (58, 61, 62)

Consistent with the transactional model of stress, a combination of both objective and subjective (perceived) demands are liable to be appraised as stressful and straining available resources. Specifically, the perception of excessive demands is likely to contribute to stress even for doctors not working long hours, overtime, or extra shifts.

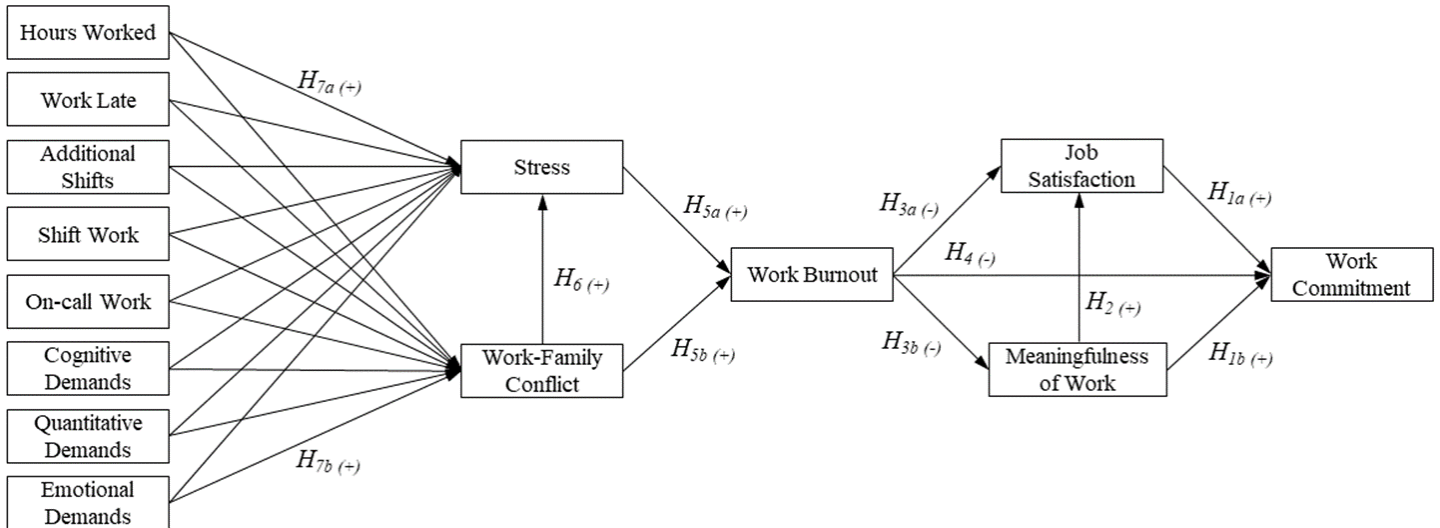
Therefore, the current study incorporated self-perceived quantitative, cognitive, and emotional demands. Quantitative demands represent the perception of the amount of work to be done relative to the resources (e.g., time) available to do it. Doctors commonly report a belief that their workload exceeds the available time and resources resulting in elevated stress. (49, 51, 63) Cognitive demands represent the cognitive effort required to carry out tasks. This is high among doctors whose work is often intellectually demanding, highly technical, and requires high-stakes decision-making. (5, 20) Emotional demands represent the amount of emotional effort required to complete the work. Emotional demands of medical work can be challenging due to the nature of their 'helping role'. (63) Doctors are also required to regulate their own emotional state in a context that is often highly emotionally charged. (64) Emotional and quantitative demands have previously been found to strongly predict burnout in doctors indirectly via increased work-life conflict. (65)

The current study assesses five objective demands (hours worked, shift work, working additional shifts, on-call work, and working late) and three subjective demands (cognitive, emotional, and quantitative). It is hypothesised that increased objective and subjective demands will predict an increase in stress (H7a) and work-life conflict (H7b). No hypotheses are specified about the relative influence of these eight demands. Rather the current analysis examines the role of each as an independent predictor of stress and work-life conflict.

THE CURRENT STUDY

The aim of the current study was to examine pathways that link workload demands and stressors to doctors' work commitment. The hypotheses stated above represent pathways (shown by arrows in Figure 1) initiated by workload demands and stressors, proceeding through work-life conflict, emotional difficulties (stress and burnout), and reduction in intrinsic motivators (meaningfulness and satisfaction of work) through to commitment to the workplace (as a proxy operationalisation for attrition). This current study aims to test the plausibility of this causal chain and the parameters within it.

FIGURE 1. HYPOTHESISED MODEL PREDICTING WORKPLACE COMMITMENT WITH DIRECT EFFECTS REPRESENTED BY ARROWS AND INDIRECT EFFECTS IMPLIED BY VARIABLES LINKED BY MORE THAN ONE ARROW.



METHOD

PARTICIPANTS

Participants were 208 Australian registered medical doctors, 80.9% women and 19.1% men, aged between 24 and 82 years ($M = 37.96$, $SD = 9.61$). Most were married or in de facto relationships (77%) and had children (60.8%). The average number of years worked as a doctor was 12.56 ($SD = 9.70$). Most participants were in full-time employment working 30 hours or more per week (72.7%).

MEASURES

COPSOQ-II. Seven variables were measured using subscales of the Copenhagen Psychosocial Questionnaire, second version (COPSOQ-II). (66) The subscales used were Quantitative Demands, Cognitive Demands, Emotional Demands, Meaning of Work, Commitment to the Workplace, Job Satisfaction, and Work-family Conflict (items on this scale reference conflict between work and private life rather than family, so we refer to as Work-life conflict for clarity). Each scale contains three to four questions such as 'Do your friends or family tell you that you work too much?' (work-life conflict subscale), and 'Do you feel that the work you do is important?' (meaning of work subscale). Participants rate each item on a 5-point Likert-type scale from 1 to 5 with value labels varying by question (e.g., from "Always" to "Never/hardly ever" or from "To a very large extent" to "To a very small extent"). Subscales utilised in the current study have demonstrated acceptable reliability ($\alpha = .74$ to $.87$, and $.71$ to $.85$ in the

current sample) and supporting convergent and discriminant validity.

Burnout. Work-related burnout (hereon, burnout) was measured using the 7-item Burnout subscale from the Copenhagen Burnout Inventory (CBI). (67) Participants respond to items (e.g., 'Do you feel worn out at the end of the working day?') on a 5-point Likert-type scale (1 = "always or to a very high degree" to 5 = "never/almost never or to a very low degree"). The CBI has demonstrated excellent reliability ($\alpha = .85$ to $.87$, and $.85$ in the current sample) as well as corroborating convergent and discriminant validity. (67)

Stress. Stress was measured using the stress sub-scale of the Depression and Anxiety Stress Scales, 21-item version (DASS-21). (68) This subscale contains seven items describing negative emotional states such as "I found it hard to wind down". Participants rate how much each applied to them over the past week on a 4-point Likert-type (0 = "not at all" to 3 = "very much, or most of the time"). The stress sub-scale has demonstrated excellent reliability ($\alpha = .90$ to $.91$, and $.85$ in the current sample) and good convergent and discriminant validity. (68-70)

PROCEDURE

Convenience sampling was used to recruit participants through advertisements on social media (i.e., Facebook forums and groups); advertisements placed in medical journals and newsletters; and snowball sampling (i.e., at the

completion of the survey, participants were asked to share a study invitation with relevant friends and colleagues). Participation was anonymous, and responses were confidential. No incentives were offered for participating in the study. The study was approved by the host institution's ethics review committee and the study was carried out in compliance with APA ethical standards for the treatment of human samples.

DATA SCREENING AND ANALYSIS

Analyses were conducted using Mplus (Version 8) (71) and SPSS Statistics (Version 25). To accommodate non-normality among several variables, the robust maximum likelihood estimation approach will be used since it can accommodate non-normality. (71) This estimation method is also able to accommodate the count and ordinal indicators used in the model. For bivariate correlation analyses, bias-corrected bootstrapped confidence intervals (BCa CIs) will be calculated.

Regarding sample size requirements, the model contained 14 variables, 208 observations, and 37 free parameters to be estimated. Therefore, $N:q = 5.62$ exceeding the recommended observation (N) to parameter (q) ratio of five. (72) Furthermore, the 14.86 cases per variable also exceeds the recommendation of 10 cases per variable. (73) Eight percent of total values were missing completely at random, Little's $\chi^2(df = 32) = 37.28, p = .239$. Therefore, the full information maximum likelihood (FIML) estimation method will be used to estimate model parameters in order to retain the full sample. (74)

Model fit will be assessed using chi-square tests along with indices of incremental fit (CFI), and 'badness-of-fit' (RMSEA and SRMR). RMSEA and SRMR values $<.08$ ($\leq .05$ for excellent fit), and CFI and TLI values $>.90$ ($\geq .95$ for excellent

fit) will be interpreted as confirming the fit of the model. (75, 76)

RESULTS

Preliminary correlation analyses were first conducted to determine the relationships among variables and the plausibility of the modelled pathways (see Table 1, square bracketed values below represent the BCa CIs). Strong positive relationships were found between the dependent variable commitment and both meaningfulness of work [.57, .75] and job satisfaction [.52, .69] with a strong negative relationship found between commitment and burnout [-.64, -.42]. A moderate positive relationship was found between meaningfulness of work and job satisfaction [.32, .58] with moderate negative relationships found between burnout and job satisfaction [-.59, -.34] and burnout and meaningfulness of work [-.52, -.24]. Strong positive relationships were also found between stress and burnout [.50, .67]; work-life conflict and burnout [.57, .73]; and work-life conflict and stress [.47, .66].

All work-related demands, both objective and subjective, were found to have a positive relationship with work-life conflict. Quantitative demands [.33, .58] and working late [.17, .44] exhibited a moderate relationship, while hours worked [.09, .37], shift work [.07, .32], being on-call [.01, .27], working extra shifts [.01, .29], cognitive demands [.13, .39] and emotional demands [.06, .34] exhibited small associations. In contrast, only three of the work-related demands were related to stress such that quantitative demands [.25, .49] exhibited a moderate relationship, whereas working late [.09, .36] and emotional demands [.10, .39] exhibited a small relationship. Interestingly, a moderate inverse relationship emerged between number of hours worked and emotional demands [-.31, -.03].

TABLE 1: CORRELATIONS AMONG ALL STUDY VARIABLES (N=208)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Hours	-												
2. Shift work	.15*	-											
3. On-call work	.22*	.19**	-										
4. Extra shift	.31***	.30***	.35***	-									
5. Work late	.28***	.09	.05	.30***	-								
6. Q Demands	.11	-.03	.15*	.27***	.51***	-							
7. C Demands	.06	.16*	.25***	.26***	.21**	.21**	-						

8. E Demands	-.18**	-.02	-.10	.08	.18**	.17*	.38***	-					
9. Conflict	.24**	.20**	.14*	.16*	.31***	.46***	.26***	.20**	-				
10. Burnout	.03	.14*	.05	.11	.29***	.41***	.31***	.39***	.66***	-			
11. Stress	-.08	.12	.09	.08	.23***	.38***	.13	.25***	.57***	.59***	-		
12. Meaning	.00	-.05	.05	.06	.01	-.07	.11	.10	-.19**	-.39***	-.22	-	
13. Satisfaction	-.06	-.13	-.19**	-.18*	-.18**	-.32***	-.16*	.03	-.35***	-.47***	-.28***	.45***	-
14. Commitment	-.07	-.06	-.01	-.01	-.03	-.24***	-.03	-.02	-.28***	-.53***	-.34***	.67***	.61***

Note: Hours = number of hours worked in an average week; Burnout = work-related burnout; Q Demands = quantitative demands; C Demands = cognitive demands; E Demands = emotional demands; Meaning = work meaningfulness; Commitment = work commitment
*p < .05, **p < .01, ***p < .001.

OVERALL MODEL FIT

Overall, the model fit to the data was marginal to acceptable, $\chi^2(38) = 94.70$, $p < .001$, RMSEA = .085, CFI = .90, SRMR = .050. Adequate model fit was achieved according to CFI and SRMR but not χ^2 or RMSEA.

The proportion of variance in the endogenous variables explained by the model is summarised in Table 2. The model accounted for between 15% (meaningfulness of work) and 60% (commitment) of variance in the outcomes modelled. These represent large effect sizes for all outcomes except meaningfulness of work, for which the effect size was medium.

Model modification indices suggest improvements in fit

would be achieved by freeing pathways regressing burnout onto emotional demands ($\beta = 0.23$), meaningfulness of work onto cognitive demands ($\beta = 0.24$), and meaningfulness of work onto emotional demands ($\beta = 0.26$). These modifications yielded a good fitting model according to all indicators, $\chi^2(35) = 52.21$, $p = .020$, RMSEA = .051, CFI = .97, SRMR = .038.

HYPOTHESIS TESTING

The specific hypotheses were modelled and tested by estimating standardised and unstandardized regression coefficients (see Table 3 and 4). Parameter estimates for the significant pathways are included in Figure 2, with non-significant pathways represented in grey.

TABLE 2: MULTIPLE COEFFICIENT OF DETERMINATION FOR MODELLED ENDOGENOUS VARIABLES

Variable	R ²
Stress	.42
Work-family conflict	.32
Work-related burnout	.50
Job satisfaction	.31
Meaningfulness of work	.15
Work commitment	.60

TABLE 3: UNSTANDARDISED ESTIMATES OF THE MODELLED DIRECT AND INDIRECT EFFECTS

Predictor	Direct Effects				Indirect Effects						
	Conflict	Stress	Burnout	Meaning	Satisfact	Commit	Stress	Burnout	Meaning	Satisfact	Commit
IVs											
Hours worked	0.0	-0.13**	-	-	-	-	0.06**	0.09	<-0.01	<-0.01	<-0.01
	1**										
Shift work	0.1	0.30	-	-	-	-	0.55**	2.03**	-0.03**	-0.02**	-0.05**
	0**										

On-call work	0.0 3	0.58	-	-	-	-	0.13	0.92	-0.01	-0.01	-0.02
Additional shifts	- 0.1 3	-0.07	-	-	-	-	-0.71	-2.38	0.03	0.03	0.06
Work late	0.0 1	0.36	-	-	-	-	0.03	0.39	-0.01	-0.01	-0.01
Quant demands	0.3 7***	1.18	-	-	-	-	1.99***	7.48**	-0.09***	-0.09***	-0.18***
Cognitive demands	0.1 1	-1.29	-	-	-	-	0.57	0.77	-0.01	-0.01	-0.02
Emotional demands	0.1 4*	1.36	-	-	-	-	0.77**	3.66**	-0.05*	-0.04*	-0.09**
Mediators											
Hours worked	-	5.37***	12.99***	-	-	-	-	4.51***	-0.22***	-0.20***	-0.42***
Stress	-	-	0.84***	-	-	-	-	-	-0.01***	<-0.01**	-0.02***
Burnout	-	-	-	-0.01***	-0.01***	-0.01***	-	-	-	-0.01***	-0.01***
Meaning	-	-	-	-	0.25***	0.63***	-	-	-	-	0.14**
Satisfaction	-	-	-	-	-	0.56***	-	-	-	-	-

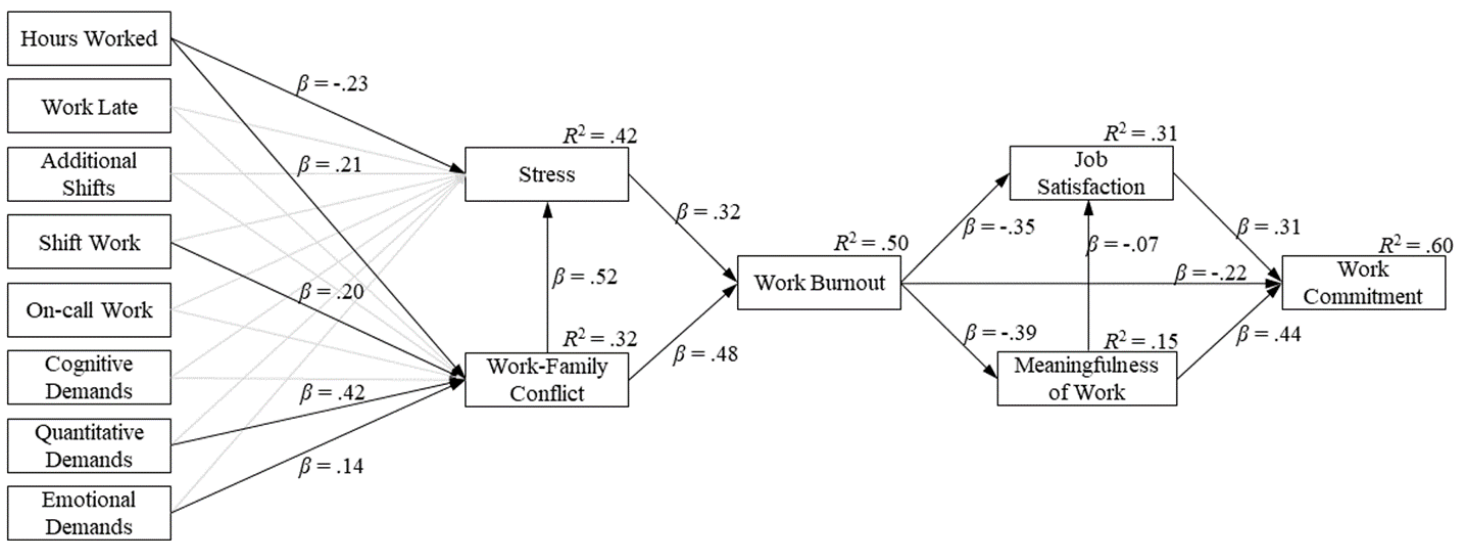
Note: IVs = Independent variables; Quant demands = Quantitative demands; Burnout = Work-related burnout; Meaning = Work meaningfulness; Satisfact = Satisfaction; Commit = Work commitment
*p < .05, **p < .01, ***p < .001.

TABLE 4: STANDARDISED ESTIMATES OF THE MODELLED DIRECT AND INDIRECT EFFECTS

Predictor	Direct Effects			Indirect Effects							
	Conflict	Stress	Burnout	Meaning	Satisfact	Commit	Stress	Burnout	Meaning	Satisfact	Commit
IVs											
Hours worked	.21**	-.23***	-	-	-	-	.11**	.06	-.02	-.03	-.03
Shift work	.20**	.06	-	-	-	-	.10**	.14**	-.06**	-.07**	-.08**
On-call work	.13	.08	-	-	-	-	.02	.05	-.02	-.02	-.03
Additional shifts	-.13	-.01	-	-	-	-	-.07	-.08	.03	.04	.05
Work late	.01	.06	-	-	-	-	.01	.02	-.01	-.01	-.01
Quant demands	.42***	.13	-	-	-	-	.22***	.32***	-.12***	-.15***	-.17***
Cognitive demands	.10	-.11	-	-	-	-	.05	.03	-.01	-.01	-.01
Emotional demands	.14*	.13	-	-	-	-	.07**	.13**	-.05*	-.06*	-.07**
Mediators											
Hours worked	-	.52***	.48***	-	-	-	-	.17***	-.25***	-.30***	-.35***
Stress	-	-	.32***	-	-	-	-	-	-.12***	-.15**	-.17***
Burnout	-	-	-	-.39***	-.35***	-.22***	-	-	-	-.12***	-.32***
Meaning	-	-	-	-	.07***	.44***	-	-	-	-	.10**
Satisfaction	-	-	-	-	-	.31***	-	-	-	-	-

Note: IVs = Independent variables; Quant demands = Quantitative demands; Burnout = Work-related burnout; Meaning = Work meaningfulness; Satisfact = Satisfaction; Commit = Work commitment
*p < .05, **p < .01, ***p < .001.

FIGURE 2. HYPOTHESISED MODEL CONTAINING SIGNIFICANT PARTIAL STANDARDISED REGRESSION COEFFICIENTS AND MULTIPLE COEFFICIENTS OF DETERMINATION. SIGNIFICANT PATHWAYS ARE REPRESENTED BY BLACK LINES, NON-SIGNIFICANT PATHWAYS ARE GREYED OUT.



Meaningfulness of work was a direct, moderate positive predictor of commitment, as well as an indirect, weak positive predictor via job satisfaction. It was also a direct, weak positive predictor of job satisfaction, while job satisfaction was a direct, moderate positive predictor of commitment. Burnout was a direct, moderate negative predictor of meaningfulness of work, job satisfaction, and commitment. In addition to being a direct predictor of commitment, burnout was an indirect, moderate negative predictor of commitment via meaningfulness of work and job satisfaction. Likewise, in addition to being a direct predictor of job satisfaction, burnout was also an indirect, weak negative predictor of job satisfaction via meaningfulness of work. Work-life conflict was a direct, strong positive predictor of stress and moderate positive predictor of burnout. It was also an indirect, moderate negative predictor of commitment, job satisfaction and meaningfulness of work via burnout; and an indirect, weak positive predictor of burnout via stress. Stress was a direct, moderate positive predictor of burnout and an indirect, weak negative predictor of commitment, job satisfaction and meaningfulness of work via burnout.

Not all work-related demands were unique predictors of stress and work-life conflict. Quantitative demands was a direct, moderate positive predictor of work-life conflict while also being an indirect, moderate positive predictor of stress and burnout and an indirect, weak negative predictor of meaningfulness of work, satisfaction, and commitment. Hours worked was a direct, moderate positive predictor of work-life conflict and a direct,

moderate negative predictor of stress while being an indirect, weak positive predictor of stress. Shift work was a direct, moderate positive predictor of work-life conflict, while emotional demands was a direct, weak positive predictor of work-life conflict with both shift work and emotional demands being indirect, weak positive predictors of stress and burnout and indirect, weak negative predictors of meaningfulness of work, job satisfaction, and commitment. The indirect predictive effects observed for all work-related demands result from small to moderate relationships with work-life conflict.

DISCUSSION

The aim of the current study was to examine links between work-related demands and stressors and doctors' workplace commitment (serving as a proxy for attrition). An examination of doctor attrition is urgently needed given that health workforce shortages are rapidly approaching crisis point and are further burdening a system already struggling to meet demand. The current study tested a set of theoretical and empirically derived hypotheses regarding the causes and processes involved in workplace attrition. The results of the hypotheses testing are summarised in Table 5. A structural path model representing these hypotheses (Figure 2) showed marginal fit to the data. Overall, the modelled relationships were successful in explaining large proportions of variance in all outcome variables except meaningfulness of work (for which a moderate amount of variance was explained).

TABLE 5: SUMMARY OF THE RESULTS OF HYPOTHESES TESTING

	Hypothesis	Supported
H ₁	Lower ratings of job satisfaction (H _{1a}) and meaningfulness of work (H _{1b}) will predict decreased ratings of work commitment	Yes
H ₂	Lower ratings of meaningfulness of work will predict lower ratings of job satisfaction (H ₂)	Yes
H ₃	Higher work-related burnout scores will predict decreased job satisfaction (H _{3a}) and meaningfulness of work ratings (H _{3b})	Yes
H ₄	Higher work-related burnout scores will directly predict lower ratings on work commitment (H ₄)	Yes
H ₅	Increase in ratings of stress (H _{5a}) and work-family conflict (H _{5b}) will predict increased work-related burnout	Yes
H ₆	Higher ratings of work-family conflict will predict greater reported stress (H ₆)	Yes
H ₇	Higher scores on work-related demands will predict greater reported stress (H _{7a}); and increased ratings of work-family conflict (H _{7b})	Partially

It was hypothesised that lower job satisfaction (H1a) and meaningfulness of work (H1b), and higher burnout (H4), would predict decreased commitment. The results corroborated these hypotheses, with job satisfaction and meaningfulness of work positively predicting, and burnout negatively predicting commitment, all with moderate effect sizes. Meaningfulness of work was the strongest independent predictor of commitment, being almost twice as strong as burnout (and 41.9% greater than job satisfaction). These results suggest that doctors who are intrinsically motivated by deriving meaningfulness and satisfaction from their work are much more likely to be committed to their workplace, and that doctors suffering from burnout are likely to have lower commitment. Stress and work-life conflict were indirectly associated with commitment, which suggest that mitigating burnout, by targeting stress and work-life conflict may be an effective approach to increasing commitment, likely resulting from an increase in the meaningfulness of work. These findings are consistent with several premises of SDT, according to which, doctors engaging in their work by choice due to it being meaningful to them, will derive a greater degree of satisfaction from it and be more committed. (77, 78) These findings are also consistent with those of Tak, Curlin, and Yoon (13) who found that intrinsically motivated doctors were more likely to be satisfied with their job, derive meaning from their work and have a higher level of commitment; while burnout served to erode these positive outcomes.

Lower meaningfulness of work was hypothesised to predict lower job satisfaction (H2). The results corroborated this

hypothesis with meaningfulness of work being a positive, albeit weak predictor of job satisfaction (though this is a partial coefficient representing the association independent of variance shared with work burnout). Therefore, independently of work burnout, doctors who do not find their work to be meaningful are also less likely to be satisfied with their job. This finding is also consistent with SDT, as well as with previous findings by Berdud et al. (12) who demonstrated that a lack of intrinsic motivation is associated with reduced meaningfulness of work and job satisfaction.

Increase stress (H5a) and work-life conflict (H5b) were hypothesised to predict increased burnout, which in turn, would predict decreased job satisfaction (H3a) and meaningfulness of work (H3b). The results also corroborated these hypotheses, with stress and work-life conflict emerging as moderate positive predictors of burnout, while burnout was a moderate negative predictor of both job satisfaction and meaningfulness of work. Work-life conflict was the greatest independent predictor of burnout, being 50% stronger than stress. Work-life conflict (medium effect) and stress (weak effect) also emerged as indirect negative predictors of meaningfulness of work and job satisfaction. Therefore, predictably, doctors reporting greater stress and work-life conflict are more likely to report burnout and doctors reporting greater burnout are likely to be less satisfied and find less meaning in their work. This is consistent with prevailing conceptualisations of burnout, which indicate that ongoing occupational stress results in burnout, which constitutes a lack of personal accomplishment, depersonalisation and emotional

exhaustion. (17) This finding is consistent with those of Dyrbye et al. (79) who reported that work-life conflict was strongly associated with burnout and stress. These findings are also consistent with those of Shanafelt et al. (20) who also found that burnout was linked to a decrease in satisfaction and meaningfulness of work.

It was hypothesised that greater work-life conflict would predict greater stress (H6). The results corroborated this hypothesis and showed that work-life conflict was a strong unique positive predictor of stress. The current results also show that work-life conflict is potentially a greater source of stress for doctors (i.e., a stronger correlate) than work demands and stressors. This finding is consistent with the premises of the transactional theory of stress, according to which, work-life conflict may represent the elimination of one important coping resource; namely, time outside of work in which they can recharge with family and recreational activities. A greater level of perceived stress is expected when work-demands interfere with access to this coping resource.

It was hypothesised that greater work-related demands would predict higher stress (H7a) and increased work-life conflict (H7b). The results partially corroborated these hypotheses since not all work-related demands predicted higher stress and work-life conflict. Only hours worked uniquely predicted stress after controlling for all other predictors and also controlling for the influence of work-life conflict. Hours worked emerged as a moderate negative predictor of stress, which is in the direction contrary to what was expected. However, this relationship makes some sense when interpreted in conjunction with the indirect positive relationship between hours worked and stress. Consequently, working hours appears to play a dual role as both stress-reliever and stress-producer. The indirect positive relationship is transmitted through work-life conflict and therefore, while working more hours may be an active and productive way to reduce work stress, to the extent that it creates work-life conflict, increased work hours is associated with higher stress.

Hours worked, shift work, quantitative demands, and emotional demands (all moderate except for the weak association of emotional demands) were all positive predictors of work-life conflict as well as being indirect positive predictors of stress through work-life conflict (weak effects except for the moderate indirect association of quantitative demands). Quantitative demands was the strongest direct predictor, being twice as strong as hours

worked or shift work. Shift work, quantitative, and emotional demands were indirect negative predictors (small effects) of meaningfulness of work, satisfaction, and commitment, with shift work (small effect) and quantitative demands (moderate effect) also being indirect positive predictors of burnout. All work-related demands, both objective and subjective, were bivariately associated with increased work-life conflict (small to moderate correlations).

In addition to quantitative demands being the strongest direct predictor of work-life conflict, it was the strongest bivariate correlate of both work-life conflict and stress. Quantitative demands (the perception that the quantity of work exceeds the resources available to do it) has the greatest ability to predict work-life conflict and stress (more than twice as strong at predicting stress as indicators of objective demands such as hours worked and shift work). This finding is consistent with the transactional theory of stress, according to which stress is a product of doctors' appraising work-related demands as exceeding available resources (such as time and energy). For several demands, the relationship with stress was mediated through work-life conflict, rather than direct, suggesting that work-related demands may create stress primarily as a function of degrading work-life balance. This finding is consistent with previous results from Dyrbye et al. (79) who found high work demands increased the risk of work-life conflict.

IMPLICATIONS

This study's primary aim was to explain workplace commitment in order to identify potential drivers and mechanisms of attrition among doctors. The strongest unique predictor of commitment was meaningfulness of work, followed by the indirect effect of work-life conflict. Therefore, doctors' work-life balance and sense of meaningfulness from their work should be prioritised and maximised in order to minimise workplace attrition. The results suggest that meaningfulness of work has less to do with the stressors measured and more to do with burnout and work-life conflict. Therefore, focusing on burnout and factors known to increase a sense of meaningfulness in work should be the primary targets of attrition-reducing initiatives. For example, according to the SDT, strategies that enhance doctors' sense of autonomy, competence, and social connectedness are likely to increase their sense of meaningfulness and satisfaction with work.

Indirectly, work-life conflict was the second strongest predictor of attrition. Work-life conflict also predicted both

stress and burnout, which are highly prevalent and concerning among doctors since they adversely affect both mental health and work performance. (20, 21) Therefore, enhancing work-life balance should also be a primary target to improve doctor wellbeing, performance, and commitment. While the workplace of a doctor can be inflexibly stressful and demanding, endeavouring to contain the stressors and burden inside the workplace and prevent these from spilling over into home-life is an essential challenge.

Health workforce planners and government decision-makers should be aware that doctor work commitment is a problem that is largely explained (60% of variance) by work demands, work-life conflict, burnout, and the meaningfulness and satisfaction of work. Therefore, adequate funding and resources should be allocated to minimise heavy workloads, which in turn, may go some way toward improving work-life balance, minimising burnout, and supporting doctors' intrinsic motivation.

STRENGTHS, LIMITATIONS, AND FUTURE DIRECTIONS

The current study is strengthened by the fact that it proposes theoretically-deductive pathways constituting a broad framework that links work-demands and stressors to doctor work commitment. While there is a growing body of research focusing on doctor attrition, studies tend to focus on isolated sections of the proposed framework, which is here tested in full.

The most notable limitation is the inability of the cross-sectional data to support inferences about the causal direction of the effects. It remains plausible that the direction of influence runs counter to that depicted in the model, or in some cases, causal influences may be bidirectional or reciprocal.

A further limitation is the fact that all the measures utilised in this study rely on self-report. This may limit the results due to response biases. Another limitation is the use of self-reported commitment as the outcome variable rather than actual attrition behaviour. The current study is concerned primarily with attrition and commitment can serve only as an imperfect proxy of attrition; therefore, it is unclear if the effects found apply equally to attrition behaviour.

Finally, as with any convenience sample, no guarantee can be given regarding the degree of generalisability of the current results and therefore, they require independent corroboration before they can be taken as conclusive.

These limitations suggest several avenues for future research. Longitudinal experimental studies would provide greater confidence in drawing causal conclusions regarding the pathway proposed. However, ethical concerns likely preclude the manipulation of many of the predictors under study. Quasi-experimental studies recruiting samples of doctors experiencing varying levels of demands may be worthwhile since it is the strongest predictor among the work demands. Further studies looking at objective work outcomes, such as actual attrition from the workplace, would also be useful.

In summary, the current study supports the plausibility of the proposed pathways to doctor attrition with a large proportion of variance in work commitment and other important outcomes explained. Meaningfulness of work was the greatest independent predictor of work commitment followed by work-life conflict, job satisfaction, and burnout, while quantitative demands, the perception of too much work and not enough time, emerged as the most important work-related demand to predict stress and work-life conflict, and ultimately work commitment.

ETHICAL APPROVAL:

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

References

1. Health Workforce Australia. Australia's Future Health Workforce – Doctors. Canberra, ACT: Department of Health; 2014.
2. Organization WH. Global health workforce shortage to reach 12.9 million in coming decades. 2013.
3. Rollins A. Patients face potentially lethal delays as hospitals struggle: Australian Medical Association; 2015. 16 p.
4. Applebaum D, Fowler S, Fiedler N, Osinubi O, Robson M. The Impact of Environmental Factors on Nursing Stress, Job Satisfaction, and Turnover Intention. *JONA: The Journal of Nursing Administration*. 2010;40(7/8):323-8.
5. Tziner A, Rabenu E, Radomski R, Belkin A. Work stress and turnover intentions among hospital physicians: The mediating role of burnout and work satisfaction. *Revista de Psicología del Trabajo y de las Organizaciones*. 2015;31(3):207-13.

6. Williams S, Michie S, Pattani S. Improving the health of the NHS workforce: Report of the partnership on the health of the NHS workforce: Nuffield Trust; 1998.
7. Burr H, Berthelsen H, Moncada S, Nübling M, Dupret E, Demiral Y, et al. The Third Version of the Copenhagen Psychosocial Questionnaire. *Safety and Health at Work*. 2019;10(4):482-503.
8. Bouckennooghe D, M. Schwarz G, Minbashian A. Herscovitch and Meyer's Three-Component model of commitment to change: Meta-analytic findings. *European Journal of Work and Organizational Psychology*. 2015;24(4):578-95.
9. Gagné M, Deci EL. Self-determination theory and work motivation. *Journal of Organizational Behavior*. 2005;26(4):331-62.
10. Crossley ML, Mubarik A. A comparative investigation of dental and medical student's motivation towards career choice. *British Dental Journal*. 2002;193(8):471-3.
11. Györfy Z, Birkás E, Sándor I. Career motivation and burnout among medical students in Hungary - could altruism be a protection factor? *BMC Medical Education*. 2016;16(1):182.
12. Berdud M, Cabasés JM, Nieto J. Incentives and intrinsic motivation in healthcare. *Gac Sanit*. 2016;30(6):408-14.
13. Tak HJ, Curlin FA, Yoon JD. Association of Intrinsic Motivating Factors and Markers of Physician Well-Being: A National Physician Survey. *Journal of General Internal Medicine*. 2017;32(7):739-46.
14. Organization WH. The migration of skilled health personnel in the Pacific Region: a summary report. 2004.
15. Landon BE, Reschovsky JD, Pham HH, Blumenthal D. Leaving Medicine: The Consequences of Physician Dissatisfaction. *Medical Care*. 2006;44(3):234-42.
16. Zeng D, Takada N, Hara Y, Sugiyama S, Ito Y, Nihei Y, et al. Impact of Intrinsic and Extrinsic Motivation on Work Engagement: A Cross-Sectional Study of Nurses Working in Long-Term Care Facilities. *International Journal of Environmental Research and Public Health*. 2022;19(3):1284.
17. Maslach C, Jackson SE, Leiter MP. Maslach burnout inventory manual. Mountain View, CA: CPP, Inc; 1996.
18. Maslach C, Leiter MP. Understanding the burnout experience: recent research and its implications for psychiatry. *World Psychiatry*. 2016;15(2):103-11.
19. Schaufeli WB, Buunk BP. Burnout: An overview of 25 years of research and theorizing. *The handbook of work and health psychology*. 2003;2(1):282-424.
20. Shanafelt TD, Hasan O, Dyrbye LN, Sinsky C, Satele D, Sloan J, et al. Changes in Burnout and Satisfaction With Work-Life Balance in Physicians and the General US Working Population Between 2011 and 2014. *Mayo Clinic Proceedings*. 2015;90(12):1600-13.
21. Clough BA, Ireland MJ, Leane S, March S. Stressors and protective factors among regional and metropolitan Australian medical doctors: A mixed methods investigation. *Journal of Clinical Psychology*. 2020;76(7):1362-89.
22. Willcock SM, Daly MG, Tennant CC, Allard BJ. Burnout and psychiatric morbidity in new medical graduates. *Medical Journal of Australia*. 2004;181(7):357-60.
23. Clough BA, March S, Leane S, Ireland MJ. What prevents doctors from seeking help for stress and burnout? A mixed-methods investigation among metropolitan and regional-based Australian doctors. *Journal of Clinical Psychology*. 2019;75(3):418-32.
24. Clough BA, Ireland MJ, March S. Development of the SOSS-D: a scale to measure stigma of occupational stress and burnout in medical doctors. *Journal of Mental Health*. 2019;28(1):26-33.
25. Clough BA, March S, Chan RJ, Casey LM, Phillips R, Ireland MJ. Psychosocial interventions for managing occupational stress and burnout among medical doctors: a systematic review. *Systematic Reviews*. 2017;6(1):144.
26. Ireland MJ, Clough B, Gill K, Langan F, O'Connor A, Spencer L. A randomized controlled trial of mindfulness to reduce stress and burnout among intern medical practitioners. *Medical Teacher*. 2017;39(4):409-14.
27. Shanafelt TD, Balch CM, Dyrbye L, Bechamps G, Russell T, Satele D, et al. Special Report: Suicidal Ideation Among American Surgeons. *Archives of Surgery*. 2011;146(1):54-62.
28. Shanafelt TD, Boone S, Tan L, Dyrbye LN, Sotile W, Satele D, et al. Burnout and Satisfaction With Work-Life Balance Among US Physicians Relative to the General US Population. *Archives of Internal Medicine*. 2012;172(18):1377-85.
29. Wurm W, Vogel K, Holl A, Ebner C, Bayer D, Mörtl S, et al. Depression-burnout overlap in physicians. *PLoS one*. 2016;11(3):e0149913.
30. Shanafelt TD, Balch CM, Bechamps G, Russell T, Dyrbye L, Satele D, et al. Burnout and Medical Errors Among American Surgeons. *Annals of Surgery*. 2010;251(6):995-1000.
31. Shanafelt TD, Bradley KA, Wipf JE, Back AL. Burnout and Self-Reported Patient Care in an Internal Medicine Residency Program. *Annals of Internal Medicine*. 2002;136(5):358-67.

32. Jager AJ, Tutty MA, Kao AC. Association Between Physician Burnout and Identification With Medicine as a Calling. *Mayo Clinic Proceedings*. 2017;92(3):415-22.
33. Shanafelt TD, Balch CM, Bechamps GJ, Russell T, Dyrbye L, Satele D, et al. Burnout and Career Satisfaction Among American Surgeons. *Annals of Surgery*. 2009;250(3):463-71.
34. Dewa CS, Jacobs P, Thanh NX, Loong D. An estimate of the cost of burnout on early retirement and reduction in clinical hours of practicing physicians in Canada. *BMC Health Services Research*. 2014;14(1):254.
35. Dewa CS, Loong D, Bonato S, Thanh NX, Jacobs P. How does burnout affect physician productivity? A systematic literature review. *BMC Health Services Research*. 2014;14(1):325.
36. Shanafelt TD, Mungo M, Schmitgen J, Storz KA, Reeves D, Hayes SN, et al. Longitudinal Study Evaluating the Association Between Physician Burnout and Changes in Professional Work Effort. *Mayo Clinic Proceedings*. 2016;91(4):422-31.
37. Shanafelt TD, Raymond M, Kosty M, Satele D, Horn L, Phippen J, et al. Satisfaction with work-life balance and the career and retirement plans of US oncologists. *J Clin Oncol*. 2014;32(11):1127-35.
38. Escribà-Agüir V, Martín-Baena D, Pérez-Hoyos S. Psychosocial work environment and burnout among emergency medical and nursing staff. *International Archives of Occupational and Environmental Health*. 2006;80(2):127-33.
39. Wu S, Zhu W, Wang Z, Wang M, Lan Y. Relationship between burnout and occupational stress among nurses in China. *Journal of Advanced Nursing*. 2007;59(3):233-9.
40. Ray EB, Miller KI. Social Support, Home/Work Stress, and Burnout: Who can Help? *The Journal of Applied Behavioral Science*. 1994;30(3):357-73.
41. Smith TD, DeJoy DM, Dyal M-A, Huang G. Impact of work pressure, work stress and work-family conflict on firefighter burnout. *Archives of Environmental & Occupational Health*. 2019;74(4):215-22.
42. Colichi RMB, Bocchi SCM, Lima SAM, Popim RC. Interactions between quality of life at work and family: integrative review. *International Archives of Medicine*. 2016;9.
43. Bennett MM, Beehr TA, Ivanitskaya LV. Work-family conflict: differences across generations and life cycles. *Journal of Managerial Psychology*. 2017;32(4):314-32.
44. Dyrbye LN, Sotile W, Boone S, West CP, Tan L, Satele D, et al. A Survey of U.S. Physicians and Their Partners Regarding the Impact of Work-Home Conflict. *Journal of General Internal Medicine*. 2014;29(1):155-61.
45. Dzung E, Wachter RM. Ethics in Conflict: Moral Distress as a Root Cause of Burnout. *Journal of General Internal Medicine*. 2020;35(2):409-11.
46. McCain RS, McKinley N, Dempster M, Campbell WJ, Kirk SJ. A study of the relationship between resilience, burnout and coping strategies in doctors. *Postgraduate Medical Journal*. 2018;94(1107):43-7.
47. Lazarus RS, Folkman S. *Stress, appraisal, and coping*: Springer publishing company; 1984.
48. Lazarus RS, Free Association Books L. *Stress and emotion, a new synthesis*. *Journal of Psychiatric and Mental Health Nursing*. 1999;6(5):410-1.
49. Wu F, Ireland M, Hafekost K, Lawrence D. *National Mental Health Survey of Doctors and Medical Students*. Australia: Beyond Blue; 2013.
50. Elliot L, Tan J, Norris S. *The mental health of doctors: a systematic literature review: Beyond Blue*. Beyondblue; 2010.
51. Hospital Consultants Specialists Association. *Who cares for the carers? the impact of workplace stress on senior hospital doctors*. Hospital Consultants and Specialists Association London; 2015.
52. Bianchi SM, Milkie MA. *Work and Family Research in the First Decade of the 21st Century*. *Journal of Marriage and Family*. 2010;72(3):705-25.
53. Giauque D, Anderfuhren-Biget S, Varone F. Stress and turnover intents in international organizations: social support and work-life balance as resources. *The International Journal of Human Resource Management*. 2019;30(5):879-901.
54. Dyrbye LN, West CP, Richards ML, Ross HJ, Satele D, Shanafelt TD. A randomized, controlled study of an online intervention to promote job satisfaction and well-being among physicians. *Burnout Research*. 2016;3(3):69-75.
55. West CP, Dyrbye LN, Erwin PJ, Shanafelt TD. Interventions to prevent and reduce physician burnout: a systematic review and meta-analysis. *The Lancet*. 2016;388(10057):2272-81.
56. Panagioti M, Panagopoulou E, Bower P, Lewith G, Kontopantelis E, Chew-Graham C, et al. Controlled Interventions to Reduce Burnout in Physicians: A Systematic Review and Meta-analysis. *JAMA Internal Medicine*. 2017;177(2):195-205.
57. Pit SW, Hansen V. Factors influencing early retirement intentions in Australian rural general practitioners. *Occupational Medicine*. 2014;64(4):297-304.

58. Heponiemi T, Pesseau J, Elovainio M. On-call work and physicians' turnover intention: the moderating effect of job strain. *Psychology, Health & Medicine*. 2016;21(1):74-80.
59. Balch CM, Shanafelt TD, Dyrbye L, Sloan JA, Russell TR, Bechamps GJ, et al. Surgeon Distress as Calibrated by Hours Worked and Nights on Call. *Journal of the American College of Surgeons*. 2010;211(5):609-19.
60. Lau MW, Li WE, Llewellyn A, Cyna AM. Prevalence and associations of psychological distress in Australian junior medical officers. *Internal Medicine Journal*. 2017;47(10):1190-6.
61. Heponiemi T, Kouvonen A, Vänskä J, Halila H, Sinervo T, Kivimäki M, et al. Effects of active on-call hours on physicians' turnover intentions and well-being. *Scandinavian Journal of Work, Environment & Health*. 2008;34(5):356-63.
62. Shin J, Kim YJ, Kim JK, Lee DE, Moon S, Choe JY, et al. Probability of Early Retirement Among Emergency Physicians. *J Prev Med Public Health*. 2018;51(3):154-62.
63. Coomber S, Todd C, Park G, Baxter P, Firth-Cozens J, Shore S. Stress in UK intensive care unit doctors. *BJA: British Journal of Anaesthesia*. 2002;89(6):873-81.
64. Kafetsios K, Anagnostopoulos F, Lempesis E, Valindra A. Doctors' Emotion Regulation and Patient Satisfaction: A Social-Functional Perspective. *Health Communication*. 2014;29(2):205-14.
65. Montgomery AJ, Panagopolou E, Benos A. Work-family interference as a mediator between job demands and job burnout among doctors. *Stress and Health*. 2006;22(3):203-12.
66. Pejtersen JH, Kristensen TS, Borg V, Bjorner JB. The second version of the Copenhagen Psychosocial Questionnaire. *Scandinavian Journal of Public Health*. 2010;38(3_suppl):8-24.
67. Kristensen TS, Borritz M, Villadsen E, Christensen KB. The Copenhagen Burnout Inventory: A new tool for the assessment of burnout. *Work & Stress*. 2005;19(3):192-207.
68. Lovibond SH, Lovibond PF. *Manual for the depression anxiety stress scales*: Psychology Foundation of Australia; 1996.
69. Antony MM, Bieling PJ, Cox BJ, Enns MW, Swinson RP. Psychometric properties of the 42-item and 21-item versions of the Depression Anxiety Stress Scales in clinical groups and a community sample. *Psychological assessment*. 1998;10(2):176.
70. Henry JD, Crawford JR. The short-form version of the Depression Anxiety Stress Scales (DASS-21): Construct validity and normative data in a large non-clinical sample. *British Journal of Clinical Psychology*. 2005;44(2):227-39.
71. Muthén LK, Muthén BO. *Mplus: Statistical Analysis with Latent Variables: User's Guide (Version 8)*. Los Angeles, CA: Authors; 2017.
72. Chou C-P, Bentler PM. *Practical Issues in Structural Modeling*. *Sociological Methods & Research*. 1987;16(1):78-117.
73. Nunnally JC. *Psychometric theory*. 1967.
74. Dong Y, Peng C-YJ. *Principled missing data methods for researchers*. SpringerPlus. 2013;2(1):222.
75. Hu Lt, Bentler PM. Evaluating model fit. In: Hoyle RH, editor. *Structural equation modelling: Concepts, issues, and applications*. Thousand Oaks, CA: Sage Publications, Inc.; 1995. p. 76-99.
76. Hu Lt, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*. 1999;6(1):1-55.
77. Deci EL, Ryan RM, Van Lange P, Kruglanski AW, Higgins ET. Self-determination theory. In: P. A. M. Van Lange, A. W. Kruglanski, Higgins ET, editors. *Handbook of theories of social psychology*. 1. Thousand Oaks, CA: Sage; 2012. p. 416-37.
78. Fernet C, Guay F, Senécal C. Adjusting to job demands: The role of work self-determination and job control in predicting burnout. *Journal of Vocational Behavior*. 2004;65(1):39-56.
79. Dyrbye LN, Varkey P, Boone SL, Satele DV, Sloan JA, Shanafelt TD. Physician Satisfaction and Burnout at Different Career Stages. *Mayo Clinic Proceedings*. 2013;88(12):1358-67.