

BMJ Open Relationship between medical students' negative perceptions of colleagues' work-life and burn-out during clerkships: a longitudinal observational cohort study

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To cite: Lin YK, Lin BY-J, Lin C-D, *et al.* Relationship between medical students' negative perceptions of colleagues' work-life and burn-out during clerkships: a longitudinal observational cohort study. *BMJ Open* 2021;**11**:e049672. doi:10.1136/bmjopen-2021-049672

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2021-049672>).

Received 29 January 2021
Accepted 24 September 2021



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ABSTRACT

Objective Because work and educational environments are closely related and can affect each other, this study examined whether medical students' negative perceptions of their colleagues' work-life balance (NWLB) during their clinical rotations would be related to burn-out in clerkships and investigated the effect of students' gender on this relationship.

Design A longitudinal, prospective 2-year cohort study conducted between September 2013 and April 2015.

Setting Medical students from a university school of medicine in Taiwan.

Participants One voluntary cohort of undergraduate medical students in clerkships was invited to participate. Among 190 medical students recruited in September 2013, a total of 124 students provided written informed consent. Participants were free to decide whether to complete each survey; therefore, varying numbers of responses were obtained during the study period. Those who responded to our survey for more than 6 months were included in our analyses. Overall, 2128 responses from 94 medical students were analysed, with each student providing an average of 23 responses for 2 years.

Primary outcome measure Burn-out was measured using the Professional Quality of Life Scale.

Results Our study found that a strong NWLB was related to high burn-out levels among medical students during their clerkships ($p < 0.001$). However, the gender of the student had no effect on this relationship ($p > 0.05$). In addition, our study indicated that medical students living with a companion had decreased burn-out levels than did those living alone during their clerkships.

Conclusions The significance of policies promoting employee work-life balance should be emphasised because of the potential for social contagion effects on medical students. Clerkship trainees might be vulnerable to such negative contagion effects during the transition to their early clinical workplace training and may, therefore, require advanced socialisation and mentoring.

INTRODUCTION

The clinical workplace training of medical students occur in complex environments or situations that help them experience

Strengths and limitations of this study

- This is a longitudinal study of one cohort of medical students we tracked yearly for 2 years in clerkships.
- We used the validated Chinese versions of the Professional Quality of Life Scale to examine medical students' burn-out and the adapted family-work conflict scale to evaluate their negative perceptions of their colleagues' work-life balance (NWLB).
- Individual observational cross-sectional study surveys were conducted to evaluate measures of medical students' NWLB and burn-out at the individual clinical specialty rotations.
- Medical students' subjective self-reported NWLB might not be corroborated with their colleagues' personal descriptions of clinical workplaces.
- Our study included only one university.

opportunities and challenges encountered in learning and medical practices within the multiple social contexts ranging from those involving individual participants to the overall medical system.¹ A social information processing perspective considers the social context of work and how this context might affect individuals' attitudes and actions.² Because individuals are affected by their social environments or groups (such as colleagues, supervisors, friends, families or other consumers) or by their previous actions and experiences, they may exhibit dissimilar needs and feelings regarding the same job that are unrelated to their personal characteristics or rational decision-making models.³ Therefore, people develop positive feelings towards their jobs (eg, exhibit a high satisfaction level) if their social environment conveys positive job-related information.³ Moreover, social contagion theory proposes that people's degree of satisfaction and attitude towards their jobs are affected by social

information they receive from groups or people with whom they communicate or socialise.⁴

The millennial generation places a high value on jobs that provide substantial leisure time.⁵ A worldwide survey revealed that the millennial generation was willing to strive for the maximum workplace productivity and simultaneously seek a work–life balance.⁶ Workers in the fields of science, technology, engineering and mathematics have reported holding certain expectations regarding work–life balance since their high school days.⁵ Studies on medical education conducted worldwide have also reported that medical students' perceptions and expectations regarding work–life balance act as a stressor for the millennial generation⁷ and play a crucial role in their clerkship training,⁸ career choices⁹ and specialty preferences.^{10–16} Furthermore, UK junior doctors¹⁷; Australian younger general practitioners (GPs), particularly female GPs¹⁸; US internal medicine hospitalists and outpatient general internists¹⁹; New Zealander junior doctors²⁰ and Hongkonger surgeons²¹ have all reported achieving an acceptable work–life balance to be a central objective that may override other preferences.

Clinical training is a major role change for medical students and involves intellectually, physically and mentally demanding tasks.^{22–23} Studies have revealed that the increasing prevalence of burn-out among medical students^{24,25} and burn-out was reported to be a predictor of medical students' quality of life.²⁶ Furthermore, burn-out can hamper the professional development of medical students, thus posing a risk to patients and contributing to various personal consequences including suicidal ideation.²⁷ People's well-being is more closely related to a proximate social environment—represented as ratings by coworkers, for example—than to a more distant common social environment.²⁸ People typically prefer communicating with individuals in similar roles because they understand their environments; this is more applicable to fellow employees than to their managers.²⁹ When people share the same work demands and environment, their personal feelings regarding work–family conflict are reinforced by those in their work group.³⁰ A Spanish study examining the burn-out of individual teachers in elementary and junior high schools reported that the degree of institutional-level burn-out (ie, school personnel's perceived overall burn-out) affected individual staff members' feelings of burn-out.³¹ Working and educational environments are closely related and can influence each other,³² however, few studies have explored how clinical training affects trainees in the context of organisational work–life balance atmospheres. Therefore, we proposed—as the first hypothesis in this study—medical students' negative perceptions of their colleagues' work–life balance (NWLB) in their clinical departments or specialty training would be related to their own burn-out in the clinical workplace.

Notably, men and women tend to have different experiences because of sex-specific social and domestic factors, sex stereotypes or stigmas,³³ particularly in professional

roles.³⁴ For example, a study examining German hospital physicians across various specialties showed that female physicians reported significant higher scores of work–family conflicts than male physicians.³⁵ A study examining US neurologists found that female neurologists expressed proportionately more negative comments compared with their male counterparts regarding workload, work–life balance, leadership, deterioration of professionalism and productivity demands eroding their academic mission.³⁶ Female doctors in Norway reported a more significantly increased risk of work–home interface stress after adjustment for partner support and working hours,³⁷ and those in Australia reported poorer self-rated health.³⁸ In addition, similar gender-specific differences were observed among early-career resident paediatricians in the US, with women having a lower likelihood of work–life balance and career satisfaction.³⁹ It was also found that work–life imbalance was particularly severe for female medical trainees who had children in the UK.⁴⁰

Previous studies argued that medical career considerations could be reinforced early in medical education given the norms of a given culture (eg, those in Denmark) regarding female medical students' anticipation towards family responsibilities considering work–life problems.^{41–42} We might postulate that the medical students' sex with the implication of gender roles might play an important role on their NWLB perceptions and their workplace burn-out in their clinical department or specialty training. Therefore, we proposed the second hypothesis: sex difference may have an effect (ie, a moderating role) on the relationship between medical students' NWLB and their own burn-out in their clinical department or specialty training.

METHODS

Study participants and data collection

Our target population comprised medical students from China Medical University who underwent a 2-year clerkship between September 2013 and April 2015 in Taiwan. All trainees followed the same clinical curricula (ie, rotating clinical specialties); however, their rotation schedules sometimes differed. Clinical specialties covered in the first year were internal medicine (ie, cardiology, chest medicine, haematology and oncology, infectious diseases, nephrology, gastroenterology, general medicine, metabolic medicine and endocrinology or rheumatology), psychiatry, neurology, surgery (ie, general, chest, cardiovascular, colon, rectal, paediatric and trauma surgery), obstetrics and gynaecology, paediatrics and radiology. Furthermore, clinical specialties covered in the second year were anaesthesiology, orthopaedics, neurosurgery, plastic surgery, urology, dermatology, rehabilitative medicine, ophthalmology, otolaryngology, family medicine, emergency medicine, nuclear medicine, pathology, laboratory medicine and radiation oncology.⁴³

Among 190 students recruited in a study in September 2013, 124 medical students (participation

rate=approximately 65%) provided written informed consent. Throughout the 2-year clerkship, participants were regularly surveyed after each clinical specialty rotation by using an internet-based questionnaire designed to evaluate their NWLB and burn-out levels. In addition, personal background data related to sex, age, religion, and living alone or not were collected. All participants were provided the freedom to decide whether to complete each survey; therefore, varying number of responses was submitted during the study period. The participation was voluntary and the money gift US\$10 was paid to each response for compensation. Participants who responded to our survey for more than 6 months were included in our analysis. A total of 2128 responses from 94 medical students were analysed, with each student providing an average of 23 responses (SD=7.06) for 2 years.

Patient and public involvement

No patient was involved.

Measurement instrument

NWLB in individual clinical specialty rotations

This study adapted five question items from Netemeyer *et al* by altering the wording for respondents' self-ratings to represent respondents' perceptions regarding their colleagues' NWLB.⁴⁴ In particular, the original words 'I' and 'my' were replaced with 'my colleagues' in the question items (table 1). A 5-point scale was used to evaluate participants' responses (5=strongly agree, 4=agree, 3=neither agree nor disagree, 2=disagree and 1=strongly disagree), with higher scores indicating stronger NWLB in individual clinical specialty rotations. Factor analysis using principal component analysis mode was performed, and a common factor with an eigenvalue of >1 was obtained for all five items. Factor loadings of all five items that were >0.4 were retained. One factor score was calculated using a multiple regression for the subsequent analysis. Table 1 provides detailed information regarding the questions (also see online supplemental file) with associated descriptive statistics and factor loadings. The Cronbach's alpha value of the construct of NWLB was 0.967.

Burn-out in individual clinical specialty rotations

Participants' burn-out was examined using the Professional Quality of Life Scale (ProQOL, V.5),⁴⁵ that was developed for professionals, such as healthcare professionals, to measure the positive and negative aspects of ProQOL.⁴⁶ The ProQOL has gradually been adopted for evaluating medical professionals^{47–49} and its main strength is that it examines the work environment at the organisational and task levels.⁴⁶ Burn-out is a negative affective state associated with the feelings of hopelessness and difficulty in managing work and performing a job effectively. Open access to the Chinese version of 10 questions was provided by the developer for measuring burn-out on a 5-point scale (5=always, 4=often, 3=sometimes, 2=seldom and 1=never).⁴⁶ Five reverse-scored questions listed in table 1 had recoded scores ranging from 1 to 5, 2 to 4, 3 to 3, 4 to 2 and 5 to 1, respectively.⁴⁶ Factor analysis using

Table 1 Descriptive analyses and factor structures of NWLB and burn-out, as perceived by medical students, on individual clinical specialty rotations (n=2128)

Question items	Mean	SD	Factor loadings
NWLB	2.54	0.96	
Work demands interfere with the home and family lives of my colleagues.	2.67	1.05	0.898
The amount of time the job requires makes it difficult for my colleagues to fulfil their familial responsibilities.	2.55	1.04	0.955
Activities that my colleagues want to pursue at home are postponed because of job demands.	2.51	1.01	0.962
Job strain makes it difficult for my colleagues to fulfil their familial duties.	2.47	1.00	0.952
Because of work-related duties, my colleagues must change their plans for family activities.	2.49	1.00	0.934
Burn-out*	2.41	0.54	
I am happy (R)	2.26	0.71	0.726
I feel connected to others (R)	2.20	0.77	0.661
I feel trapped by my job as a physician	2.51	0.97	0.582
I have beliefs that sustain me (R)	2.27	0.80	0.677
I am the physician I always wanted to be (R)	2.22	0.80	0.704
I feel worn out because of my work as a physician	2.81	1.06	0.511
I feel overwhelmed because my case/workload or workload seems endless	2.42	0.98	0.612
I feel 'bogged down' by the system	2.65	1.08	0.509
I am a very caring person (R)	2.39	0.86	0.516

(R) indicates that the responding scores were recoded by 1 to 5, 2 to 4, 3 to 3, 4 to 2 and 5 to 1.

*Open access to the 10 question items from Stamm BH. *The Concise ProQOL Manual*. Pocatello, ID: ProQOL.org. 2010. The term 'helper' in the original question item was replaced by 'physician'. The question item 'I am not as productive at work because I am losing sleep over the traumatic experiences of a person I help' had a factor loading of less than 0.4 and was deleted from the final model.

NWLB, negative perceptions of their colleagues' work-life balance; ProQOL, Professional Quality of Life Scale.

principal component analysis mode was performed, and a common factor with an eigenvalue of >1 was obtained. The question item 'I am not as productive at work because I am losing sleep over the traumatic experiences of a person I help', had a factor loading of <0.4 and thus was excluded from the final model. The remaining nine question items of burn-out were re-examined by performing factor analysis using principal component analysis mode and thus one factor score was calculated by performing multiple regression for the subsequent analysis. Table 1 provides detailed information regarding the questions

**Table 2** Personal background of the studied medical students (N=94)

Variables	Scale	Freq	Percentage	Mean	SD
Age				23.38	2.42
Sex	Male	49	52		
	Female	45	48		
Living status	Alone	31	33		
	Accompanied	63	67		
Religion	No	62	66		
	Yes	32	34		

(also see online supplemental file) with associated descriptive statistics and factor loadings. The Cronbach's alpha value of the construct of burn-out was 0.783.

Personal background

Personal data potentially related to participants' burn-out,^{49 50} sex and age, were collected. In addition, participants' living status (alone or not)^{51 52} and religion⁵³ were identified as potential covariates for participants' burn-out. **Table 2** provides detailed information regarding the questions related to personal background (also see online supplemental file).

Statistical analysis

Descriptive analysis was performed to examine all variables. A generalised estimating equation (GEE) was used to evaluate the repeated measures of medical students' burn-out status for selected predictors. Regression of the dependent variable for selected predictors was performed using a GEE for the following reasons: (1) a repeated measure was used as the dependent variable; (2) some missing values were noted for predictor variables; (3) robust standard estimates were available for consistently and accurately testing statistical significance and (4) the availability of the quasi-likelihood information criterion could reflect the relative quality of the proposed model in terms of how well it fit the data.^{54 55} Therefore, to test the hypotheses, 2128 responses obtained from 94 medical students were analysed using the GEE model. Notably, the GEE model considered participants' burn-out as a dependent variable and NWLB as an independent variable with age, sex, living status and religion as covariates. Moreover, to investigate the moderating effect of sex, the interaction between NWLB and sex was added to the GEE model. Statistical analyses were performed using SPSS V.25.0 software package (IBM). A $p < 0.05$ indicated statistical significance.

RESULTS

We included 94 medical students (49 men (52%) and 45 women (48%); average age=23 years) in this study. Approximately one-third of medical students lived alone during their clerkship, and one-third had a religious status. **Table 2** lists detailed personal background information.

The analysis of 2128 responses obtained for individual clinical specialty rotations indicated that the average NWLB of medical students was 2.54 (SD=0.96), whereas the average perceived burn-out was 2.41 (SD=0.54). **Table 1** presents the detailed descriptive analyses of medical students' perceived NWLB and burn-out based on individual specialty rotations.

In hypotheses testing, the first GEE model revealed that medical students' perceived NWLB was related to increased burn-out ($\beta=0.201$, $p < 0.001$; **table 3**). However, sex did not significantly moderate this relationship ($\beta=-0.159$, $p=0.080$; **table 3**). In addition, medical students who lived with a companion had decreased burn-out levels than did those who lived alone during their clinical training ($\beta=-0.269$, $p=0.032$; **table 3**).

DISCUSSION

On the basis of 2128 responses obtained from 94 medical students during their 2-year clerkships, we examined whether medical students' NWLB during clinical specialty rotations was related to their high burn-out and whether any effects were sex-specific. Our findings indicated that medical students' NWLB was related to high burn-out levels during their clerkships; however, sex did not affect this relationship. In addition, medical students living with a companion had lower burn-out levels than did those living alone during their clinical training.

Previous studies have revealed that senior colleagues' work-life imbalances caused by the job demands of specific departments in the clinical workplace, such as working hours,^{18 56 57} shift patterns,⁵⁸ working time regulations and welfare status,⁵⁶ can negatively affect junior professionals' performance and educational training.⁵⁸ Our study results revealed that medical students' NWLB was related to high burn-out levels during their clerkships. These findings indicate that medical students' NWLB might affect their psychological well-being if their colleagues' workloads are transferred to them or if their learning schedules change. Alternatively, work-life imbalance among colleagues might be viewed as a unique feature of their clinical specialties that may negatively affect the psychological expectation of medical students. Therefore, medical students undergoing clerkships at clinical workplaces should be supported during their medical professional training and the potential effects of

Table 3 GEE model of relationship between medical students' NWLB and burn-out and sex effect on clinical specialty rotations (n=2128)

Variables	Burn-out		
	Estimates	SE	P value
NWLB	0.201	0.050	<0.001***
NWLB × sex	-0.159	0.091	0.080
Covariates			
Age	-0.003	0.036	0.923
Sex (male as default)	0.090	0.147	0.541
Living with accompanied (alone as default)	-0.269	0.126	0.032*
Religion (no religion as default)	0.029	0.137	0.833
Intercept	0.230	0.885	0.795
Model fit	QIC=25 947.199 QICC=1983.064		

*P<0.05, ***p<0.001.

GEE, generalised estimating equation; NWLB, negative perceptions of their colleagues' work-life balance; QIC, quasi-likelihood under the independence model criterion; QICC, corrected QIC.

socialisation with colleagues in the competitive and fast-paced healthcare field should be managed. Such support is particularly crucial when coming from hospital staff regardless of position, particularly those who work closely with medical students. In addition, promoting a positive work environment through effective personnel management and establishing policies that promote a favourable work-life balance might be crucial in retaining medical staff and trainees.^{59 60} A positive work environment can be built using various approaches such as by ensuring more stable employment for mid-level faculty and staff, using funding and job pools to cover shortages caused by parental leave, ensuring the provision of sufficient childcare, creating a communication and advisory office for family and personal problems, developing schedules that accommodate family life or personal lives, and establishing a faculty culture supportive of families and non-work life.⁶⁰ Furthermore, well-being sessions might be a reasonable addition to hospital teaching curricula for individual trainees.⁶¹ In addition, the adequate allocation and interaction of various resources should be ensured, such as those of time; money; scope of decision making; and physical, emotional and social resources, because they are essential in maintaining individuals' work-life balance.⁶²

The findings of our study did not support the second hypothesis that the sex of medical students would affect the relationship between their NWLB and burn-out. A German study showed that nearly all medical students (male and female) indicated that they attached importance to the compatibility of work and family life on career expectations.⁶³ We might argue that the millennial generation similar to our medical students views work-life issues as common concerns without sex effects.⁷ It even revealed that responsibility for taking care of parents motivated male graduates at one Vietnamese medical school to choose a medical specialty more attached to family and the community.⁶⁴ Or, the female students in our study just

too young having no spouses or family responsibilities yet so that their NWLB would not have caused their perceptions to differ from those of male students.

Our results revealed that medical students living with a companion had decreased burn-out levels than did those living alone during their clinical workplace training. A similar finding was noted among Chinese medical students, among whom those who lived alone or had stressful relationships with their partners, classmates or friends had higher depression and anxiety scores.⁶⁵ Living companions, either family members or friends, can provide social support, thereby helping medical students to distress or relieve their distress accumulated at the workplace, particularly when transitioning from being medical students in school to clerks in clinical workplaces.⁵²

Our study has several limitations that should be addressed. First, NWLB was measured based on medical students' subjective self-reported outcomes that might not be corroborated with their colleagues' personal descriptions of clinical workplaces. This might have resulted in respondent bias or confounding of predictors for colleagues' work-life balance, particularly considering that high internal consistency (the Cronbach's alpha value was 0.967) was demonstrated for the five question items (predictors).⁶⁶ In addition, the individual observational cross-sectional surveys for the relationship between medical students' NWLB and burn-out at the individual clinical specialty rotations could not provide causal evidence. Moreover, our small sample size of a longitudinal observational cohort study of medical students (N=94) with a response rate of 49% (94/190) from one medical school might not be nationally representative. On the basis of the comment by the National Education Association, our sample size included in our study analysis (N=94) were relatively lower than the suggested size as 127 study subjects given the population of 190 medical students in one cohort,⁶⁷ although

our longitudinal data (2128 responses in our study) met the requirement by 20 times of the observed variables (20 variables in our study),^{68 69} instead of a priori power analysis applied. Future studies should explore how the relationship between work–life balance and culturally appropriate behavioural outcomes vary depending on the sociocultural context (eg, in Western vs non-Western countries).⁷⁰ Moreover, future longitudinal studies might follow-up on medical students to understand how their perceptions in their clerkship training might affect their subsequent professional behaviour, such as where they decide to practice, what specialty they pursue and what mechanisms underlie these decisions.

CONCLUSION

Our study revealed that medical students' NWLB was directly related to their burn-out during a 2-year clerkship without sex-specific differences. Advanced socialisation and mentoring should be provided to clerkship trainees who might be vulnerable during their transition to unfamiliar clinical workplaces. Moreover, we believe our findings emphasise the critical need for policies that promote employee work–life balance because of the potential of social contagion affecting novice medical professionals.

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Acknowledgements The authors are grateful for the medical students' participation in our study. We also would like to thank Wallace Academic Editing (<https://www.editing.tw/>) for English language editing.

Contributors YKL, BY-JL, C-DL and D-YC conceived the study and managed the data collection process. The first draft of the manuscript was written by YKL and BY-JL. YKL, BY-JL, C-DL and D-YC commented on all versions of the manuscript and read and approved the final manuscript.

Funding This study was funded by grants from the Taiwan Ministry of Science and Technology (NSC102-2511-S-039-001-MY3 and MOST 108-2410-H-182-011-SS3) in support of academic and administrative processes and publication processing fees.

Competing interests None declared.

Patient consent for publication Not applicable.

Ethics approval This study was approved by the Institutional Review Board of China Medical University Hospital (CMUH102-REC3-088).

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available on reasonable request. The data with departmental information and student identities removed are available for use on reapproval by any eligible research ethics committee.

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