Work xx (20xx) x–xx
DOI:10.3233/WOR-203203
IOS Press

Medical student burnout: Impact of the gap year in burnout prevention

Stephanie A. Guang[a], Adam E. M. Eltorai[a], Wesley M. Durand[a] and Alan H. Daniels[b,*]
[a]*Warren Alpert Medical School of Brown University, Providence, RI, USA*
[b]*Department of Orthopaedic Surgery, Warren Alpert Medical School of Brown University, Providence, RI, USA*

Received 17 October 2018
Accepted 24 July 2019

Abstract.
OBJECTIVE: Burnout is a common response to stress and is pervasive among medical students. An increasing proportion of students are taking "gap years" following undergraduate education and before matriculation to medical school. This study evaluates rates of and risk factors for burnout, with a particular focus on students who took gap years.
METHODS: Burnout was measured utilizing the abbreviated Maslach Burnout Inventory. The primary independent variable was whether a student took one or more gap years prior to medical school matriculation. Other variables included age, gender, year in medical school, choice in specialty, and status in a combined baccalaureate-M.D. program. Bivariate and multivariate regression was performed to elucidate relationships between student-level variables and burnout.
RESULTS: A total of 31.4% of respondents were found to be experiencing high levels of burnout. In multivariate analysis, gap years were independently associated with lower levels of burnout ($p = 0.041$). Further, burnout decreased in a stepwise fashion with students who took 0 ($p = 0.350$), 1 ($p = 0.192$), and 2+ ($p = 0.048$) gap years.
CONCLUSIONS: Students taking gap years exhibited significantly lower levels of burnout than those who did not. Efforts should be made in pre-medical and medical school curricula to better support students in their paths to medical school.

Keywords: Burnout, professional, education, medical, undergraduate, career choice, students, medical psychology, personal satisfaction, life change events

1. Introduction

Burnout syndrome, characterized by high levels of emotional exhaustion, depersonalization, and feelings of ineptitude, has been shown to affect up to 56% of medical students, far exceeding the prevalence in similar age cohorts of the general population [1]. Poor mental health among students has been studied at many institutions and appears to increase with time spent in medical school [2–5]. Although a small degree of stress is beneficial for learning, various forms of burnout are associated both psychological and physiological morbidity [6, 7].

Clinically, burnout is defined as "a psychological syndrome emerging as a prolonged response to chronic interpersonal stressors on the job," divided into three dimensions: overwhelming emotional exhaustion, feelings of cynicism and detachment from the job, and lack of effectiveness and accomplishment [8]. Several studies have linked burnout in medical students with adverse consequences, including: depression, suicidal ideation, thoughts of

*Address for correspondence: Alan H. Daniels, MD, Department of Orthopaedic Surgery, Warren Alpert Medical School of Brown University, 100 Butler Drive, Providence, RI 02906, USA. Tel.: +1 401 330 1420; Fax: +1 401 330 1495; E-mail: Alan_Daniels@Brown.edu.

1051-9815/20/$35.00 © 2020 – IOS Press and the authors. All rights reserved

Uncorrected Author Proof

dropping out of medical school, and other serious mental health concerns [9]. Burnout has also been shown to influence specialty choice, particularly with respect to lifestyle and controllability of specialty fields as opposed to primary care [10]. Additionally, burnout affects performance in health care, causing deterioration of compassion, empathy, and altruism for patients. These effects may manifest in poorer quality of care, decreased patient satisfaction, and increased rates of medical error [7, 11].

The various causes of poor mental health and burnout among medical students have been previously studied. In addition to academic pressure and stressors relating to patient care, students may also be subject to personal and social challenges; negative personal life events, in particular, have been shown to have a strong relationship with burnout and resiliency [12].

The average matriculating medical student age is 24 years old, and approximately 10% of students are age 27 or older in the United States [13]. Nationally, students aged 20–23 at matriculation are decreasing every year compared to increased numbers in older age groups, and 63.4% of students report taking at least one gap year [14]. Accordingly, a greater proportion of students are pursuing other interests prior to matriculation, i.e., "taking gap years". These "gap years" may offer students the opportunity to gain diverse experiences before committing to a career in medicine, and students themselves feel this is advantageous for their learning [15]. Many students pursue international fellowships, obtain graduate degrees, teach or engage in community service, or join the workforce, all of which lend experiences that helps relate to a larger population of patients. The AAMC currently lists 238 "career changer" post-baccalaureate programs, that are geared towards applicants who have non-science backgrounds and decided to pursue medicine after completing college, as opposed to pre-medical students who focus their undergraduate studies on pre-requisite science classes.

Other graduate disciplines similarly value post-graduate experience; some law schools have "Junior Deferral Programs" which accepts college students under the condition that they spend at least 2 years working, studying or pursuing other fellowships prior to law school matriculation. Most full-time M.B.A. programs also prefer candidates with at least one to two years of working experiences. Other studies have demonstrated the value of a gap year between high school and college, a common practice in many other countries, for personal maturation and more diversity in lived experiences [16–18].

The association between gap years and medical student burnout has not been previously studied. This study sought to elucidate the relationship between student characteristics and burnout, with particular focus on gap years and participation in a combined baccalaureate-M.D. program (B.A./M.D.).

2. Methods

2.1. Participants and design

An electronic cross-sectional survey was administered to Year 3 and Year 4 students at a single medical school in the U.S at the end of the academic year. Following institutional review board approval, a secure survey was created and distributed using RED Cap electronic data capture tools during 2016 and 2017.

2.2. Survey content

Demographic information was collected at the beginning of the survey. Respondents provided their age, year in medical school, gender identity, B.A./M.D. program or traditional premedical route (TPM) status, gap years between college and medical school, and intended specialty. Specialty choice was categorized as either those with a high level of controllability (anesthesiology, dermatology, emergency medicine, neurology, ophthalmology, otolaryngology, pathology, psychiatry, radiology) or low controllability (family practice, internal medicine, Ob/Gyn, orthopedic surgery, pediatrics, surgery [general], urology), as categorized in previous research according to the number of working hours, on-call responsibilities, and patient load [10].

Students then completed an abbreviated Maslach Burnout Inventory (aMBI) – Human Services, a validated tool for measuring burnout. The condensed version consists of a 9-item inventory that evaluates burnout with three questions, each for assessing 3 subscales of Emotional Exhaustion (EE), Depersonalization (DP), and Personal Accomplishment (PA). For the purposes of the present study, references to clients and personal were changed to "patients" and other relevant wording. The questions on the MBI portion of the survey are rated on a Likert scale of how often the student feels a certain way to his/her work (1 = Never, 2 = A few times per year,

Uncorrected Author Proof

3 = Once a month or less, 4 = A few times per month, 5 = Once a week, 6 = A few times per week, 7 = Every day). According to convention, high scores for depersonalization or emotional exhaustion were used for quantifying professional burnout. Clinically, high levels of burnout out are often identified as MBI-EE $\geq$14 or MBI-DP $\geq$ 12, which is proportionately scaled down for the abbreviated MBI [13]. Given lack of standardization of cut-off scores, however, arguments have been made against defining burnout as a dichotomous variable for research purposes [22]. Accordingly, burnout was analyzed as a continuous variable in this study.

2.3. Statistical analysis

Linear regression was performed to compare levels of burnout. A multivariate linear regression was performed to control for potential confounding covariates. Independent variables that both did and did not demonstrate significance in the bivariate analyses were included in the multiple regression analysis. Analyses were performed in StataSE version 15 for Mac (Stata Corp, College Station, Texas).

3. Results

Of the 246 students in Year 3 and Year 4 enrolled at the Warren Alpert Medical School (AMS), 20.7% (n = 51)completed the survey. The average age of respondents was 27 years old. 39% (20/51) of respondents were Year 3 students and 61% (31/51) were Year 4 students. 69% (35/51) identified as female and 31% (16/51) identified as male. 59% (21/51) of respondents took one or more gap years between their undergraduate education and medical school, with an average interval of 3.36 years (range = 13, median = 26, STD = 2.96). 57% (23/51) of respondents were admitted through the traditional premedical route, and 43% (28/51) were students enrolled through the B.A./M.D. program.

On bivariate analysis, students who took gap years before medical school exhibited lower levels of burnout as compared to students who did not (16.8 vs. 22.4, p = 0.002). Additionally, students in the B.A./M.D. program exhibited higher levels of burnout than those from traditional pathways (21.7 vs. 17.0, p = 0.01) (Table 1). No significant association was observed between burnout and age (p = 0.392), gender (p = 0.691), intended specialty (p = 0.391), or medical school year (p = 0.108).

On multivariate analysis, students who took gap years between college and medical school exhibited significantly less burnout than those who did not (–4.93, p = 0.041). While students in the B.A./M.D. program exhibited trending higher levels of burnout as compared to students who were admitted traditionally, this effect was not statistically significant after adjusting for other variables (+1.94, p = 0.39).

Frequency distributions show that B.A./M.D.'s took fewer gap years (average = 0.39 years) than their standard-admit counterparts (average 3.2 years) (Fig. 1) Chi-squared test of the binary of no gap

Table 1
Bivariate analysis of variables affecting burnout. Averages for MBI subscales of emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA) are shown across variables. Burnout is the sum of emotional exhaustion and depersonalization

	n	MBI-EE	MBI-DP	MBI-PA	Burnout	p-value
Age						0.392
24–26	28 (55%)	12.0	8.71	18.1	20.7	
27–37	23 (45%)	10.4	6.78	18.0	17.2	
Year in medical school						0.108
Year 3	20 (39%)	11.9	8.55	18.2	20.4	
Year 4	31 (61%)	10.8	7.31	17.9	18.1	
Gender						0.691
Female	35 (69%)	11.4	7.97	18.6	19.4	
Male	16 (31%)	11.0	7.56	16.8	18.6	
Time off						**0.002**
No	21 (41%)	13.1	9.29	17.9	22.4	
Yes	30 (59%)	9.97	6.83	18.1	16.8	
Specialty						0.391
Controllable	33 (65%)	11.5	8.18	18.3	19.7	
Uncontrollable	18 (35%)	10.8	7.20	17.4	18.0	
Program						**0.011**
Traditional premedical route	28 (55%)	10.1	6.93	18.4	17.0	
B.A./M.D. program	23 (45%)	12.7	8.96	17.6	21.7	

Uncorrected Author Proof

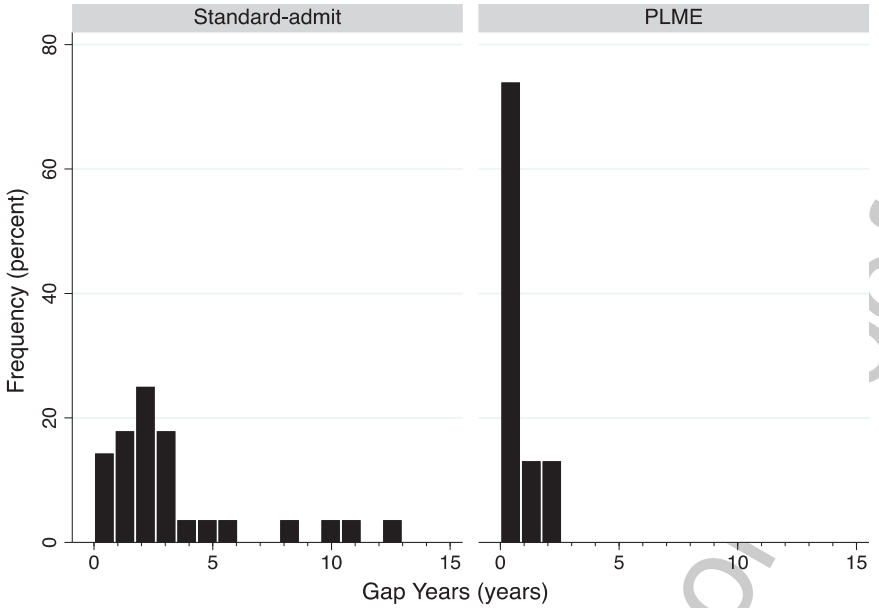

Fig. 1. Frequency distributions of gap years between traditional medical students and B.A./M.D. students.

Table 2
Multivariate Analyses of Burnout by Student Characteristics

(Reference level listed first)	Coefficient	95% Confidence interval	
		Lower	Upper
Age	0.231	–0.520	0.982
Year (Third, Fourth)	2.47	–1.29	6.22
Gender (Female, Male)	1.59	–5.13	8.31
Time off (No, Yes)	**–4.93**	**–9.65**	**–0.202**
Specialty (Uncontrollable, Controllable)	–1.90	–8.65	4.86
Program (TPM, B.A./M.D.)	1.94	–2.58	6.46

Table 3
Burnout within levels of gap years before medical school

	B	95% Confidence Interval	
		Lower	Upper
Gap years			
0	–5.85	–18.3	6.63
1	–8.57	–21.6	4.45
2+	–12.0	–24.4	0.44

years versus gap years yields a p-value of 0.0028. B.A./M.D. students were 18 times less likely to take time off before medical school.

Moreover, when the number of gap years taken is grouped into levels of 0, 1, vs 2+ years, there appears to be a dose response effect where increased number of gap years is more significantly related to lower burnout (Table 3). A multivariate analysis was performed and shows a significant decrease in burnout is seen with 2 or more years before medical school (adjusted R-squared = 0.215).

4. Discussion

This study evaluated the relationship between student characteristics and burnout. The journey from medical student to physician is an intense and long process [20]. The growing trend for medical students to take gap years before medical school is evident in the population of respondents, who were an average of 27 years old in their clinical years. We found that students who took gap years exhibited less burnout than those who did not; a dose-response effect was observed between the number of gap years and medical student burnout. While students in the B.A./M.D. program exhibited higher levels of burnout in bivariate analyses, this effect was not significant after adjusting for other confounding variables. B.A./M.D. students were less likely to take gap years than students admitted through the traditional route. This is anecdotally consistent, as students in the program tend not to take time off because they are

Uncorrected Author Proof

not required complete the full medical school application process. In the United States, eligibility for most medical school programs requires that students take the Medical College Admission Test (MCAT), fulfill prerequisites in the sciences and humanities, and apply and interview at the medical schools themselves. Students who require extra time after college to complete these steps or further strengthen their application often elect to take a gap year. Other individuals pursue careers in other fields before deciding to complete post-baccalaureate programs to apply to medical school.

Though a direct path from undergraduate to medical school has historically been preferred, there is a growing trending to pursue gap years and have different life experiences.

There are a number of potential mechanisms to account for our observation of lower burnout with increasing number of gap years. Students taking gap years often engage in work experiences, research, international or cross-cultural exchanges, military service, and completion of other graduate degrees; these activities may confer a wider range of experience, resulting in greater resilience among these students. Other literature from the U.K., where the practice of taking a gap year abroad before college, demonstrates increased civic engagement along with psychosocial and intellectual development because students are presented with challenges in unique, new environments. High school students were also found to have greater "self-authorship" which is a way of approaching difficult situations in a way that recognizes the contextual nature of knowledge and balances it with the students' understanding of self [21]. Analogously, medical students with non-academic gap year experiences outside of medical school might better be able to contextualize and manage the stresses encountered than students who have only been in higher education their whole lives [22].

Our findings suggest that direct matriculation into medical school has a negative effect on student well-being. Prior research on burnout among medical students indicates that students' personal lives, learning environment, and financial concerns are associated with burnout [23, 24]; it is possible that gap years may interact with these other factors. As medical school is becoming less didactic with more clinical integration in the pre-clinical years, physician burnout may have begun to affect the medical school experience as well.

A notable limitation of this study is the low response-rate of medical students to the administered survey. In-person paper surveys may be effective as a suggestion for future improvement, as medical students receive a high volume of emails and may be easier to access in a student spaces on their campuses. As this is a cross-sectional study, it is difficult to distinguish causal relationships from associations. Self-reporting of data may also have introduced bias. Burned out students may be more inclined to complete a survey on a personally relevant topic or, alternatively, may be either too apathetic or stressed to complete the survey. Future multi-institutional research is needed to further support and extend these results. Moreover, longitudinal data following medical students into residency could provide more insight into burnout than possible with a cross-sectional study. Finally, students deciding to pursue gap years in education may be less prone to burnout, rather than the gap year itself truly preventing burnout. Further study of the type of experiences undertaken during gap years may better parse out these findings.

5. Conclusion

Students taking gap years prior to medical school exhibited significantly lower levels of burnout than those who did not. Students in the combined baccalaureate-M.D. program exhibited higher levels of burnout on bivariate analyses, but not after adjusting for other characteristics; this may be attributed to the fact that combined baccalaureate-M.D. students were less likely to take gap years than students admitted through other routes. Efforts should be made in medical school and pre-medical school curricula to better support medical students in the timing and nature of their path to becoming physicians. Gap years should no longer be viewed as undesirable compared to direct entry into medical school. Taking time off to explore other opportunities and have life experiences should be encouraged, as it can play a role in reducing burnout.

Conflict of interest

None to report.

Ethical approval

Exemption from Federal Regulation 45 CFR 46 as meeting the criteria in 45 CFR 46.101(b) (2) was

Uncorrected Author Proof

obtained from April 18, 2016 from LifeSpan IRB (FWA-Rhode Island Hospital (RIH) 00001230).

Funding

None to report.

References

[1] Dyrbye LN, Massie FS, Eacker A, Harper W, Power D, Durning SJ, Thomas MR, Moutier C, Satele D, Sloan J, Shanafelt TD. Relationship between burnout and professional conduct and attitudes among US medical students. Jama. 2010;304(11):1173-80.

[2] Clark DC, Zeldow PB. Vicissitudes of depressed mood during four years of medical school. Jama. 1988;260(17):2521-8.

[3] Dyrbye LN, Thomas MR, Shanafelt TD. Medical student distress: causes, consequences, and proposed solutions. In Mayo Clinic Proceedings 2005 Dec 1 (Vol. 80, No. 12, pp. 1613-1622). Elsevier.

[4] Thomas NK. Resident burnout. Jama. 2004;292(23):2880-9.

[5] Dunn LB, Iglewicz A, Moutier C. A conceptual model of medical student well-being: promoting resilience and preventing burnout. Academic Psychiatry. 2008;32(1):44-53.

[6] Guthrie EA, Black D, Shaw CM, Hamilton J, Creed FH, Tomenson B. Embarking upon a medical career: psychological morbidity in first year medical students. Medical Education. 1995;29(5):337-41.

[7] Guthrie E, Black D, Bagalkote H, Shaw C, Campbell M, Creed F. Psychological stress and burnout in medical students: a five-year prospective longitudinal study. Journal of the Royal Society of Medicine. 1998;91(5):237-43.

[8] Novack DH, Epstein RM, Paulsen RH. Toward creating physician-healers: fostering medical students' self-awareness, personal growth, and well-being. Academic Medicine. 1999;74:516-20.

[9] Dyrbye LN, Thomas MR, Massie FS, Power DV, Eacker A, Harper W, Durning S, Moutier C, Szydlo DW, Novotny PJ, Sloan JA. Burnout and suicidal ideation among US medical students. Annals of Internal Medicine. 2008;149(5):334-41.

[10] Enoch L, Chibnall JT, Schindler DL, Slavin SJ. Association of medical student burnout with residency specialty choice. Medical Education. 2013;47(2):173-81.

[11] 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.

[12] Dyrbye LN, Thomas MR, Huntington JL, Lawson KL, Novotny PJ, Sloan JA, Shanafelt TD. Personal life events and medical student burnout: a multicenter study. Academic Medicine. 2006;81(4):374-84.

[13] AAMC. Age of Applicants to U.S. Medical Schools at Anticipated Matriculation by Sex and Race/Ethnicity, 2014-2015 through 2017-2018. [updated 2017 November 30; accessed 2018 June 7]. Available from https://www.aamc.org/download/321468/data/factstablea6.pdf

[14] AAMC Matriculating Student Questionnaire All Schools Summary Report & Individual School Report. AAMC; 2018 [cited 2019Apr4]. Available from: https://www.aamc.org/download/494044/data/msq2018report.pdf

[15] Paterson-Brown L, Paterson-Brown F, Simon E, Loudon J, Henderson-Howat S, Robertson J, Paterson-Brown S. The Influence of a 'Gap Year' on Medical Students. Journal of Education and Training Studies. 2015;3(4):49-56.

[16] Martin AJ. Should students have a gap year? Motivation and performance factors relevant to time out after completing school. Journal of Educational Psychology. 2010;102(3):561.

[17] Johan N, Sadler-Smith E, Tribe J. Informal and incidental learning in the liminal space of extended independent (gap year) travel. Academy of Management Learning & Education. 2018 Dec 20(ja).

[18] Clerkin A. A three-wave longitudinal assessment of socioemotional development in a year-long school-based 'gap year'. British Journal of Educational Psychology. 2019 Feb 3.

[19] Dyrbye LN, West CP, Shanafelt TD. Defining burnout as a dichotomous variable. Journal of General Internal Medicine. 2009;24(3):440.

[20] Viswanath O, Viswanath N, Viswanath K. Navigating the progressive intensity of lifelong learning from medical student to attending physician. Work (Reading, Mass.). 2018;61(4):509.

[21] O'shea J. Delaying the academy: A gap year education. Teaching in Higher Education. 2011;16(5):565-77.

[22] Magolda MB. Making their own way: Narratives for transforming higher education to promote self-development. Stylus Publishing, LLC.; 2004.

[23] Dyrbye LN, Thomas MR, Harper W, Massie Jr FS, Power DV, Eacker A, Szydlo DW, Novotny PJ, Sloan JA, Shanafelt TD. The learning environment and medical student burnout: a multicentre study. Medical Education. 2009;43(3):274-82.

[24] Dahlin ME, Runeson B. Burnout and psychiatric morbidity among medical students entering clinical training: a three year prospective questionnaire and interview-based study. BMC Medical Education. 2007;7(1):6.

Uncorrected Author Proof