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Burning the Candle for Both Degrees: A Comparison of Factors Influencing Medical Student Burnout among Undergraduate and Professional Students

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ABSTRACT

This project was intended to examine the factors influencing the three dimensions of burnout as described by Maslach's Burnout Inventory (MBI) Student-Survey: emotional exhaustion, cynicism, and academic efficacy, in a dataset of 886 medical track students in Switzerland. Multiple regressions were performed on each of the dimensions, separated into Bachelor's and Master's degree students. Seven predictors from a pool of nine were found to be significantly predictive of burnout depending on the dimension measured and the group sampled, including depression, anxiety, and weekly study hours.

INTRODUCTION

Physician burnout has been a rising concern of recent research, as studies show that physicians and other healthcare workers experience significantly higher rates of burnout than other professions. Not only does burnout result in physicians leaving the profession entirely, but physicians experiencing a high degree of burnout are more likely to make major medical errors and receive negative patient feedback. Thus, it is in the interest of the healthcare field to mitigate physician burnout.

For many physicians, burnout can begin in medical school or earlier. While many medical schools integrate mental health initiatives in their programs, a targeted approach is necessary to avoid adding unnecessary burdens on students. The goal of this project was to assess factors that had the largest impact on student burnout, based on the data of Carrard et. al.'s (2022) study on 886 Swiss students' burnout, mental health, and empathy. The dataset was divided into Bachelor's students (undergraduates) and Master's students (medical students).

Burnout was assessed in this study by Maslach's Burnout Inventory (MBI), which divides burnout into three dimensions: emotional exhaustion, cynicism, and academic efficacy. Higher emotional exhaustion and cynicism scores, and lower academic efficacy scores, indicate a higher degree of burnout.

METHODS

Carrard et. al.'s original data was accessed via Kaggle. The binary qualitative variable *degree* was created from the variable *year* to group together all Bachelor's and all Master's students. Separate datasets were created with only either Bachelor's (n = 523) or Master's (n = 363) students for use in regression analyses.

Nine quantitative variables were entered as predictors in multiple regression for each dimension of burnout, stratified by degree program: CES-D score, STAI-T score, age, weekly study hours, JSPE score, QCAE Cognitive score, QCAE Affective score, AMSP score, and GERT mean correct score. Backwards selection was used to find the best model in each category with a staying criteria of $p < 0.1$. Model selection was verified by examination of adjusted R^2 and Mallow's Cp values.

DATA DICTIONARY

CES-D Score: Score on the Center for Epidemiological Studies Depression Scale. A higher score indicates a higher incidence of depressive symptoms.
STAI-T Score: Score on the State-Trait Anxiety Inventory. A higher score indicates higher incidence of generalized anxiety.
QCAE Cog. Score: Score on the Cognitive section of the Questionnaire of Cognitive and Affective Empathy. A higher score indicates a greater ability to recognize the emotional states of yourself and others.
AMSP Score: Score on the Ability to Modify Self-Presentation Scale. A higher score indicates a greater ability to modulate one's behavior based on impressions of others.
JSPE Score: Score on the Jefferson Scale of Physician Empathy. A higher score indicates higher empathy for patients.

Table 1. Global statistics for selected models

	Emotional Exhaustion		Cynicism		Academic Efficacy	
	Bachelor's	Master's	Bachelor's	Master's	Bachelor's	Master's
Global *F*-statistic	90.59	64.49	37.49	23.28	64.56	29.00
Global *p*-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Adjusted R^2	0.3399	0.4123	0.2185	0.1976	0.3275	0.2789
Mallow's Cp	1.3428	3.6062	2.3889	1.4480	2.7529	5.8982

All selected models were the best in their category by Mallow's Cp. The Cynicism model for master's students was also best by adjusted R^2, and all others consistently ranked in the top 10 by adjusted R^2.

Table 2. *P*-values of predictor variables in selected models

	Emotional Exhaustion		Cynicism		Academic Efficacy	
	Bachelor's	Master's	Bachelor's	Master's	Bachelor's	Master's
CES-D Score	****	****	****	****	****	****
STAI-T Score	***	****		*	****	****
QCAE Cog. Score			*		****	**
Weekly Study Hours			*	*	****	***
Age in Years		*		*		*
AMSP Score	*		*			
JSPE Score		*				

Key: * p <0.1, ** p <0.01, *** p <0.001, **** p <0.0001

Table 3. Parameter estimates of predictor variable coefficients in selected models

	Emotional Exhaustion		Cynicism		Academic Efficacy	
	Bachelor's	Master's	Bachelor's	Master's	Bachelor's	Master's
CES-D Score	0.190	0.215	0.178	0.157	-0.108	-0.133
STAI-T Score	0.081	0.110		0.055	-0.104	-0.113
QCAE Cog. Score			-0.062		0.124	0.100
Weekly Study Hours			-0.026	-0.040	0.049	0.065
Age in Years		-0.164		-0.154		0.165
AMSP Score	0.071		0.094			
JSPE Score		0.048				

Figure 1. MBI Emotional Exhaustion Score by Degree Program

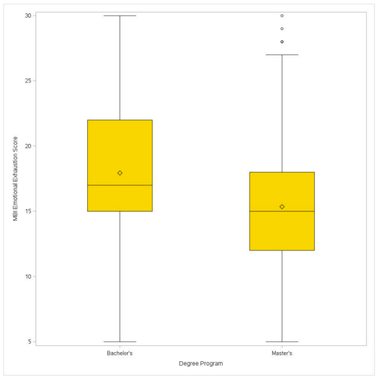

Figure 2. MBI Cynicism Score by Degree Program

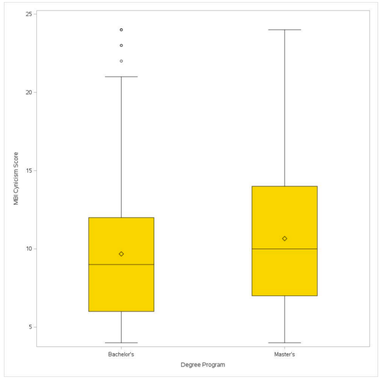

Figure 3. MBI Academic Efficacy Score by Degree Program

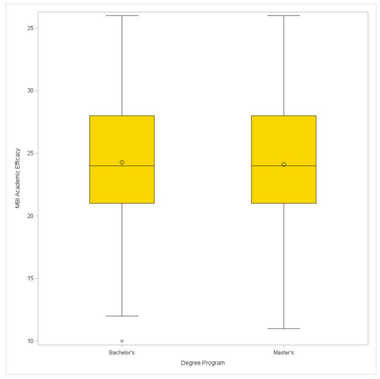

Figure 4. Age Distribution of Degree Programs

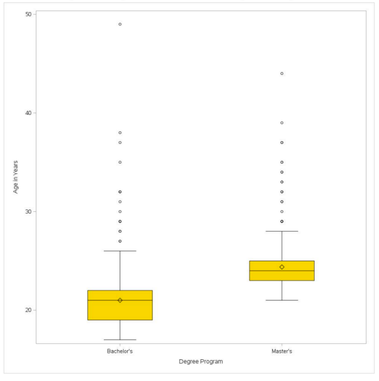

Table 4. Contingency Table of Mental Healthcare by Degree Program

	Consulted a Psychologist?		
Degree Program	Yes	No	Total
Bachelor's	120 22.9% 60.3%	403 77.1% 58.66%	523
Master's	79 21.76% 39.70%	284 78.2% 41.3%	363
Total	687	199	886

Count
Row Percent
Column Percent

Table 5. Stratified Descriptive Statistics of Predictor Variables by Degree Program

	Mean		Minimum		Maximum	
	Bachelor's	Master's	Bachelor's	Master's	Bachelor's	Master's
CES-D Score	19.98	15.26	0	0	56	54
STAI-T Score	44.37	40.78	20	20	77	69
QCAE Cog. Score	58.34	58.79	37	38	76	75
Weekly Study Hours	31.36	16.54	0	0	70	65
Age in Years	21.00	24.38	17	21	49	44
AMSP Score	23.24	23.02	6	10	35	35
JSPE Score	104.69	108.80	67	82	125	125

RESULTS

Key findings:

- All models selected had a global *p*-value of <0.0001 and ranked highest when selected by Mallow's Cp.
- Depression was a strongly significant predictor for all three dimensions of burnout in both degree programs.
- Anxiety was strongly predictive of emotional exhaustion and academic efficacy in both degree programs, and predictive of cynicism among master's students.
- Age in years was only predictive for master's students.
- QCAE Cognitive score was predictive of cynicism for bachelor's students, and academic efficacy for both degree programs.
- Weekly study hours was predictive of cynicism and strongly predictive of academic efficacy for both programs.
- AMSP score was only predictive of emotional exhaustion and cynicism in bachelor's students.

DISCUSSION

Understanding the factors that affect burnout among different groups is essential to developing targeted programs to reduce burnout in medical students and physicians. Using this data, the following recommendations can be made:

- Depression and anxiety are risk factors for burnout across dimensions and degree programs, so clearly students' overall mental health contributes significantly to burnout. However, as shown in Table 4, approximately 77% of students in both degree programs reported they had not consulted a psychologist for their mental health. **Schools should encourage students to seek mental health care, even as a preventative.**
- Age was protective against burnout, but only in master's students. **Medical schools should consider tailoring their burnout initiatives to different age groups**.
- A higher number of weekly study hours was also protective against burnout. The ability of students to devote time to studying is often dependent on many other external factors, such as employment and parental status. **Schools should examine what changes would allow their students to devote more time to studying.**
- QCAE Cognitive score was protective against some dimensions of burnout in both degree programs. Individuals with better cognitive empathy can observe their emotions separately from their experiences, and this can help them respond better to stress. **Schools should consider training their students on cognitive empathy for themselves in addition to empathy for others**.

Future research into this topic could explore how external factors such as employment and parental status influence burnout in medical students, and the relative effects of these compared to internal factors such as mental health or empathy level. Future research could also examine rates of burnout at schools that promote mental healthcare or have programs to prevent burnout in place.

SAS CODE

SAS Code for Bachelor's degree Emotional Exhaustion model:

```
proc reg data=work.medburnbach; *backwards selection;
        model mbi_ex = cesd stai_t age stud_h jspe qcae_cog qcae_aff
        amsp erec_mean / selection=b slstay=0.1;
run;

proc reg data=work.medburnbach; *by adjrsq;
        model mbi_ex = cesd stai_t age stud_h jspe qcae_cog qcae_aff
        amsp erec_mean / selection=adjrsq best=20;
run;

proc reg data=work.medburnbach; *by cp;
        model mbi_ex = cesd stai_t age stud_h jspe qcae_cog qcae_aff
        amsp erec_mean / selection=cp best=20;
run;

proc reg data=work.medburnbach; *global stats;
        model mbi_ex = cesd stai_t amsp / clb adjrsq;
run;
```

REFERENCES

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Niezink, L., & Train, K. (2020, July 13). *The Self in Empathy: Self-Empathy. Noticing, recognizing, and working with self in order to empathize with others.* Psychology Today. www.psychologytoday.com/us/blog/empathic-intervision/202007/the-self-in-empathy-self-empathy

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