

# Learning burnout: evaluating the role of social support in medical students

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## Research article

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# Abstract

## Background:

Burnout is a stress-induced syndrome that is considered closely related to work. Although social support could reduce burnout syndrome, the effect of it on learning burnout in medical students remains unclear. The objectives of the study are to evaluate the association between learning burnout and social support in a cohort of Chinese medical students.

## Methods:

A cross-sectional online survey was distributed to students who participated in online learning in a medical college in Wuhan during the COVID-19 epidemic. We used the Lian version of the Maslach Burnout Inventory (MBI) to assess learning burnout and the Social Support Rating Scale (SSRS) to assess social support.

## Results:

A total of 684 students completed the survey (response rate of 30.9%), of which 315 (46.12%) met standard criteria for learning burnout. We found grade, family income, learning time, and the number of interactions with teachers or classmates had an effect on students' learning burnout. After adjusting for the grade and residence, there was a significant and relevant association between the social support and learning burnout. (adjusted odds ratio, 0.93 for 1-point decrease in total SSRS score; 95% CI, 0.90 – 0.96;  $p < 0.001$ ).

## Conclusions:

Learning burnout was highly prevalent in medical students of our college. The social support especially subjective support and utilization of support played a protective role in reducing the risk of learning burnout.

## Practice Points

Social support, especially subjective support and utilization of support had a positive effect on alleviating learning burnout.

## Background

Burnout is a state of psychological distress, which is widely considered an important work-related syndrome. Research on burnout has been done based on the sample of practicing physicians in medical fields, however, more and more researchers are recently beginning to turn their attention to college students. Medical students could also be affected by burnout. The burnout is called learning burnout or academic burnout, which both originate from the definition of burnout and contain the same core

elements<sup>[1, 2]</sup>. Learning burnout is defined as a combination of emotional exhaustion, cynicism and academic inefficacy that cause by their incapacity to meet academic requirements<sup>[3, 4]</sup>.

Learning burnout has a higher prevalence among medical students. A systematic review reported 25.8% to 52.1% of medical students had above moderate levels of burnout in China<sup>[5]</sup>. The wide range of burnout levels may be explained by the use of different definitions, measurements and study designs. Moreover, learning burnout has serious negative effects on students and the quality of health care services. It could undermine medical students' professional development, diminish personal and professional qualities (e.g. honesty, integrity, altruism, self-regulation)<sup>[6-8]</sup>, and cause problems such as increased medical errors, reduced quality of patient care, and low patient satisfaction<sup>[9, 10]</sup>. Furthermore, some demographic variations may result in differences in learning burnout, such as gender, grade, family economic aspects, employment status<sup>[11, 12]</sup>. However, all studies have focused on burnout in the form of learning at school, but not online learning at home.

Social support is defined as assistance and protection provided by others through formal or informal means<sup>[13]</sup>. The absence of social support is considered to be one of the main stress-inducing factors, a predictor of developing burnout<sup>[14]</sup>. Good social support and other organizational factors such as good feedback and leadership are correlated with low levels of burnout in work environments<sup>[15]</sup>. Similarly, medical students with higher levels of social support are less likely to have burnout symptoms<sup>[16]</sup>. Although psychological literatures have confirmed that social support could reduce burnout through resilience<sup>[17, 18]</sup>, it is still unknown whether it would alleviate learning burnout in medical students and its alleviation mechanism.

Medical students are often exposed to academic pressure and a competitive environment which could cause the onset of learning burnout<sup>[2, 5, 19]</sup>. In this study, we aimed to assess how the social support that medical students received reduces learning burnout caused by online learning in isolation during the COVID-19 epidemic from a single college in Wuhan. In addition, we set out to explore which characteristics of the social support are associated with learning burnout. Moreover, we aimed to determine the effect size of social support by controlling for several demographic and occupational predictors of learning burnout.

## Method

### Data collection

The target population consisted of medical students at the Tongji Medical College Huazhong University of Science and Technology. The electronic survey was anonymous and confidential, and it was distributed electronically by WeChat tools to all 2241 students who participated in online learning on April 2020 with the Wenjuanxing platform. The study was approved by the institutional review boards of the Tongji Medical College Huazhong University of Science and Technology.

## Measures/Instruments

The self-administered questionnaire could be divided into 3 parts.

### Part 1 Demographic and learning characteristics

Part 1 consisted of demographic data, including age, gender, grade, residence, household income in 2019, whether to be a class leader during college, whether to receive a scholarship during college, and learning data, such as online learning time per day, average number of interactions with teachers or classmates per lesson.

### Part 2 Learning burnout

We used the Learning Burnout Scale (LBS) to measure online learning burnout of undergraduate students. LBS was developed by Chinese researchers based on the version of MBI<sup>[20]</sup>. It consisted of 20 items covering three domains of burnout: dejection (8 items), improper behavior (6 items) and reduced personal accomplishment (6 items). Items were scored on a 5-point Likert scale ranging from 1 (totally disagree) to 5 (totally agree). Additionally, we modified the expression of some items according to the characteristics of online learning (for example, changing the following “I felt exhausted after learning for a whole day” to “I felt exhausted after online learning for a whole day”). Learning burnout was defined as mean item score  $\geq 3$ . The Cronbach’s alpha achieved 0.907, 0.828, 0.787, and 0.776 in LBS and its dimensions of dejection, improper behavior, and reduced personal accomplishment, respectively.

### Part 3 Social support

Social support was assessed using the SSRS, which was developed by a Chinese researcher<sup>[21]</sup>. This widely utilized instrument includes three measurable dimensions of social support: subjective support (4 questions) and utilization of support (3 questions) and objective support (3 questions). Each response of subjective support and utilization of support is rated on a 4-point Likert scale. Objective support is measured according to the number of social support source. Researchers usually use the total score to assess social support and have demonstrated that SSRS had good predictive validity and internal consistency among Chinese medical students<sup>[21, 22]</sup>. Besides, we calculated the Cronbach’s alpha (0.678) to measure the internal consistency of SSRS in the present study.

## Statistical analysis

All analyses were performed with SPSS version 21 (IBM Corp., Armonk, NY, USA). Percentages, and continuous variables as mean  $\pm$  standard deviation. Categorical variables were compared with chi-square tests, and continuous variables with Student’s t-tests or analysis of variance. Multivariate logistic regression analysis was conducted to evaluate the association between social support (SSRS scores) and learning burnout, adjusted for factors that were independently related to learning burnout. A p-value of 0.05 (two-tailed) was considered to be statistically significant.

# Results

## 1. Descriptive statistics of demographics and learning burnout

From the 2214 students who were invited to participate, a total of 684 responses were received giving an overall response rate of 30.9%. Since medical students should study and live in the main campus in their first year, students in our college were mainly sophomores and juniors, accounting for 45.39% and 34.26%. The median age of the students was 20 years (range 17 – 24). Over fifty percent of respondents were female. The numbers (percentages) of municipalities or provincial capitals, prefecture-level cities, county-level cities, and town or rural areas were 132(19.33%), 167 (24.45%), 199(29.14%), and 185 (27.09%), respectively. More than three-fifths (63.69%) of the students' family income in 2019 bellows 14, 150 \$. A total of 367 respondents served as class cadres and 388 respondents received scholarships during college. Our results showed that 315 (46.12%) students displayed evidence of learning burnout, with 370 (54.1%) reporting high dejection, 329 (48.1%) reporting high improper behavior, and 295 (43.19%) reporting high reduced personal accomplishment during the online study. Table 1 shows the demographic characteristics and learning burnout of the responding students.

Table 1. Demographic Characteristics and learning burnout of respondents

## 2. Analysis of differences in variables according to demographic and learning characteristics

Table 2 displays differences of the numbers and percentages of learning burnout among demographic and online learning feature groups. We found that age ( $p = 0.084$ ), gender ( $p = 0.670$ ), residence ( $p = 0.107$ ) and whether to be a class leader ( $p = 0.466$ ) or obtain a scholarship ( $p = 0.123$ ) were not related to learning burnout. However, we found grade ( $p = 0.002$ ), total household income in 2019 ( $p = 0.008$ ), learning time ( $p < 0.001$ ) and communication times ( $p < 0.001$ ) were relevant to learning burnout. Considering that the residence was related to the two dimensions of learning burnout (Improper behavior,  $\chi^2=9.624$   $p = 0.047$ ; Reduced personal accomplishment,  $\chi^2=14.336$   $p = 0.006$ ), we took it together with grade as confounding variables and incorporated them into in a multivariate regression analysis. We found an inverse relationship between the mean SSRS score and the risk of learning burnout (adjusted odds ratio, 0.93 for 1-point decrease in total SSRS score; 95% CI, 0.90 – 0.96;  $p < 0.001$ ).

Table 2. Differences in learning burnout by demographic and online learning characteristics.

## 3. Analysis of the relationship between SSRS and learning burnout

We used student's t tests and binary regression to identify if students' social support was affected by various learning burnout symptoms. Results revealed that regardless of whether students presented learning burnout, SSRS scores were all decreased if they exhibited the corresponding symptoms (Table 3). Besides, we found a negatively relationship between social support and learning burnout ( $r = - 0.240$ ;  $P < 0.01$ ). Students, who exhibited a syndrome of learning burnout, had a lower score on subjective

support and utilization of support ( $t= 4.510, P <0.01$ ;  $t= 4.158, P <0.01$ ), but no difference in objective support ( $t= 1.128, P >0.05$ ). (Table 4)

Table 3. Differences in students' SSRS scores by learning burnout, dejection, improper behavior and reduced personal accomplishment groups

Table 4 Differences in the subscale of social support scores according to the presence of learning burnout syndrome

## Discussion

### Main findings

In this study, we examined the association between social support and learning burnout. We found that even after adjusting for the grade and residence, there was a significant and relevant association between the social support and learning burnout in our sample of Tongji medical college.

### Learning burnout prevalence

In our study, we found that an average of 45.9% students had symptoms suggestive of learning burnout. The result was much higher than the rates of 21.76% and 36.46% of Chinese medical students, that were described by Tang et al.<sup>[23]</sup> and Yang<sup>[24]</sup>, who used the same instrument and criteria. Students in Kingdom of Saudi Arabia had a moderate to high level of stress at the start of the COVID-19 outbreak<sup>[25]</sup>. Our students mainly came from Hubei province, which was the earliest and the worst area affected by COVID-19 in China. Therefore, they may have more physical and psychological stress, which was related to high burnout scores, during this period of home isolation.

### Environmental factors associated with learning burnout

In this study, we found that the prevalence of learning burnout was higher for students in more advanced years. The result was in line with previous research<sup>[5]</sup>. This may be due to the pressure of senior students facing employment or internships<sup>[26-28]</sup>. Besides, we calculated that the burnout rate of graduation students (63.6%) was much higher than that of non-graduation students (45.2%). Studies indicated that medical graduates faced more pressure, which involved in high burnout, than non-graduates<sup>[29, 30]</sup>. The possible reason could be that the uncertainty about the pandemic effect may have increased their worry about graduating, finding a job or enrolling in further study<sup>[31]</sup>.

We found that environmental factors, especially those related to the economy, were closely related to learning burnout. Besides, whilst there was no significant difference in burnout rates of medical students from different residences, medical students from rural areas had a significantly higher rate than those from cities in improper behavior or reduced personal accomplishment dimension. The economic pressure may be considered to facilitate the development of burnout<sup>[32, 33]</sup>. Students with family difficulties or in

rural areas had to face extra pressure of the economy from their families. This situation may give rise to more learning burnout. Besides, our results showed that the higher the learning time and frequency of communication, the lower the learning burnout. This phenomenon suggested that communicating with teachers or students may reduce students' learning burnout and increase the learning time. The two factors were all closely related to social support, especially the subjective support and utilization of support.

### **The protective effect of social support on learning burnout**

Social support have a protective effect for burnout symptom in medical students<sup>[34]</sup>. We found a similar effect of social support on learning burnout, but the subjective support and utilization of support have a greater impact on learning burnout. A meta-analysis also reported that seeking social support from friends or family members was already found to be correlated with burnout in a work setting<sup>[35]</sup>. Lazarus's stress and coping theory holds that active communication was an effective way to relieve stress. Our results also demonstrated that subjective support and utilization of support could reduce learning burnout by communicating with relatives or friends. Social support provides a buffering effect against stress in that an individual who has more social support is also more resilient to stress<sup>[36]</sup>. Besides, Thoits argued that social support served to regulate the stress itself and also provided a coping context, which could help the individual cope with stress or buffer the person against the demands<sup>[37]</sup>. This prompted us to further explore what social support environment and other mechanisms of social support to alleviate learning burnout.

### **Limitations**

The current study also has some limitations. First, although the response rate of 30.9% was relatively low, we collected 684 samples that exceed those of studies with higher response rates. Second, we measured students' burnout with LBS instead of MBI, Considering the differences in culture context, this may set obstacles comparing with peers over the world. However, this scale had been widely used in China. Moreover, our sample was drawn from a single school, and we should acknowledge that our results may be less generalizable to other schools and countries.

## **Conclusion**

We found a high prevalence of learning burnout among students participating in online learning during the COVID-19 epidemic period. Students' grade, family income, learning time and number of interactions were all closely associated with learning burnout. Social support, especially subjective support and utilization of support provided a buffering effect against stress faced by medical students and hence the possibility of their developing learning burnout. Considering the harmfulness of learning burnout, it is necessary to further look for other risk factors of learning burnout. Moreover, further research is also needed to identify other mechanisms of social support to relieve learning burnout in medical students.

# Abbreviations

COVID-19: Corona Virus Disease 2019; LBS: Learning Burnout Scale; MBI: Maslach Burnout Inventory; SSRS: Social Support Rating Scale.

# Declarations

## Funding

This work was supported by the Huazhong University of Science and Technology Teaching Research Project and 'Double First Class' International Cooperation Project.

## Availability of data and materials

Data generated or analyzed during this study are included in this published article.

## Authors' contributions

ZJY designed, analyzed, and contributed in collecting the data, interpreting the results, and writing the draft manuscript. FZC contributed in guiding research design and revising the manuscript. ST and XM contributed in collecting and organizing the data. All authors read and approved the final manuscript.

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## Ethics approval and consent to participate

This study was carried out according to the ethical principles for medical research involving human subjects of the WMA Declaration of Helsinki. No individual data were collected, anonymity was guaranteed, participation was voluntary, and informed consent was obtained. The ethical board of Tongji Medical College determined that the study was exempt from formal ethical review.

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## Competing interests

The authors declare that they have no competing interests.

## Consent for publication

Not applicable.

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## Tables

Table 1. Demographic Characteristics and learning burnout of Respondents

Variables	Items	N(%)
Grade	second	310(45.39)
	third	234(34.26)
	forth	128(18.74)
	fifth	11(1.61)
Median age, years (range)		20-24
Gender	male	290(42.46)
	female	393(57.54)
Area of residence	municipalities/provincial capitals	132(19.33)
	prefecture-level city	167(24.45)
	county-level cities	199(29.14)
	town	65(9.52)
	rural areas	120(17.57)
Total household income in 2019	50,000¥ and bellow	197(28.84)
	50,000¥-100,000¥	238(34.85)
	110,000¥-150,000¥	111(16.25)
	150,000¥-200,000¥	68(9.96)
	200,000¥ and above	69(10.1)
Whether to be a class leader during college	no	316(46.27)
	yes	367(53.73)
Whether to obtain a scholarship during college	no	295(43.19)
	yes	388(56.81)
Learning burnout	no	368(53.88)
	yes	315(46.12)
Dejection	no	313(45.83)
	yes	370(54.17)
Improper behavior	no	355(51.98)
	yes	328(48.02)
Reduced personal accomplishment	no	383(56.08)
	yes	300(43.92)

Table 2. Differences in learning burnout and its subscales by demographic and online learning characteristics.

Variables	Learning burnout	
	N (%)	$\chi^2(p)$
<b>Grade</b>		
second	123(39.68)	<b>14.607</b>
third	111(47.44)	<b>(0.002)</b>
forth	73(57.03)	
fifth	8(72.73)	
<b>Age</b>		
18 and bellow	4(28.57)	6.661
19-20	163(42.78)	(0.084)
21-22	132(51.36)	
23 and above	16(51.61)	
<b>Gender</b>		
Male	131(45.17)	0.182
Female	184(46.82)	(0.67)
<b>Residence</b>		
Municipalities/ provincial capitals	51(38.64)	7.603
prefecture-level city	77(46.11)	(0.107)
county-level cities	91(45.73)	
town	29(44.62)	
rural areas	67(55.83)	
<b>Family income in 2019</b>		
7,075\$ and bellow	110(55.84)	<b>13.9</b>
7,075\$ to 14,150\$	110(46.22)	<b>(0.008)</b>
14,150\$ to21,225\$	41(36.94)	
21,225\$ to28,300\$	28(41.18)	
28,300\$ and above	26(37.68)	
<b>Whether to be a class leader during college</b>		
no	141(44.62)	0.532
yes	174(47.41)	(0.466)
<b>Whether to obtain a scholarship during college</b>		
no	146(49.49)	2.375
yes	169(43.56)	(0.123)
<b>Online learning time per day</b>		
2h and bellow	58(92.06)	<b>107.699</b>
2-4h	126(59.15)	<b>(&lt;0.001)</b>
4-6h	91(37.92)	
6-8h	28(24.78)	
8h and above	12(22.22)	
<b>Average number of interactions with teachers or classmates per lesson</b>		
2 and bellow	203(57.02)	<b>44.915</b>
2-4	86(40.19)	<b>(&lt;0.001)</b>
4-6	16(23.53)	
6-8	7(26.92)	
8 and above	3(15.79)	

Table 3. Differences in students' SSRS scores by learning burnout, dejection, improper behavior and reduced personal accomplishment groups

Scale	Item	Mean $\pm$ sd	t	p
Learning burnout	Not burnout	27.86 $\pm$ 4.60	4.370	<0.001
	Burnout	26.33 $\pm$ 4.53		
Dejection	Not dejected	27.99 $\pm$ 4.52	4.416	<0.001
	Dejected	26.45 $\pm$ 4.60		
Improper behavior	Not have	27.93 $\pm$ 4.63	4.602	<0.001
	Have	26.32 $\pm$ 4.48		
Reduced personal accomplishment	Not competent	27.76 $\pm$ 4.49	3.917	<0.001
	Competent	26.38 $\pm$ 4.69		

Table 4 Differences in the subscale of social support scores according to the presence of learning burnout syndrome

Scale	Learning burnout	Without learning burnout	t	p
	Mean $\pm$ sd	Mean $\pm$ sd		
Subjective support	11.44 $\pm$ 2.05	12.14 $\pm$ 1.98	4.510	<0.001
Objective support	8.12 $\pm$ 1.93	8.29 $\pm$ 2.05	1.128	0.260
Utilization of support	6.77 $\pm$ 2.02	7.43 $\pm$ 2.12	4.158	<0.001

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

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