Learning burnout: evaluating the role of social support in medical students under the influence of COVID-19 epidemic

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Abstract

Background:

Learning burnout is a stress-induced syndrome, which could affect medical students.

Some environmental and personal factors could give rise to serious consequences, such as depression and suicide. We aimed to evaluate the association between learning burnout and social support among our students under the influence of corona virus disease 2019 (COVID-19).

Methods

We conducted a cross-sectional online survey among students who participated in online learning in a medical college in Wuhan. We used the Lian version of the Maslach Burnout Inventory (MBI) to assess learning burnout and the SSRS to assess social support.

Results

A total of 684 students completed the survey (response rate 30.9%), of which 315 (46.12%) met standard criteria for learning burnout. We found grade, area of residence, household income, learning time, and number of interactions with teachers or classmates had an effect on students' learning burnout. These factors except grade were also associated with social support. Besides, we found subjective support and utilization of support had an inverse association with learning burnout.

Conclusions

Learning burnout was highly prevalent in our college students. Results suggested that some demographic and learning characteristics were closely associated with learning burnout. The social support especially subjective support and utilization of support played an important role in reducing the risk of learning burnout.

Background

Burnout is a state of psychological distress, which is widely considered an important work-related syndrome. Students could also be affected by learning burnout, which originate from the definition of burnout and contain the same core elements while focus on student population or restrict to academic-induced [1, 2]. Learning burnout is affected not only by individual traits but also by learning environment. We aim to analyze the role of social support in students with learning burnout under the influence of corona virus disease 2019 in this study.

Learning burnout has a higher prevalence and serious negative effects on the mental and physical health of medical students. Chunming et al [3] reported 25.8–52.1% of medical students had above moderate levels of burnout in China. Learning burnout could undermine medical students' professional development and diminish a number of personal and professional qualities (e.g. honesty, integrity, altruism and self-regulation) [4–6]. Learning burnout could also influence the quality of health care they would provide in their future career and cause problems such as increased medical errors, reduced quality of patient care, and low patient satisfaction [7, 8].

Medical students were often exposed to academic pressure and competitive environment which cause the onset of learning burnout [2, 3, 9]. However, medical students with higher levels of social support were less likely to have burnout symptoms[10]. Psychological literatures confirmed that social support (family and community [i.e. school]) could reduce the risk of burnout through resilience, which was the ability to remain positive despite adversity [11, 12]. Besides, data suggested that providing high levels of social support to learners may not only facilitate resilience, but also promote learning for students especially

during periods of high challenge[13]. Under the stressful circumstances, social support was assumed as an important protective factor against depression, which was associated with learning burnout [9, 14].

In this study, we investigated the prevalence of learning burnout in our college under the influence of COVID-19. In addition, we explored factors that were associated with students' learning burnout. Moreover, we analyzed the relationship between learning burnout and social support on medical students under this situation.

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 which participated in e-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 contained 24 items and divided into 3 parts.

Part 1 Demographic and learning characteristics

Part 1 consisted of demographic data including age, gender, grade, area of residence, total household income in 2019, whether to be a class leader during college, whether to receive a scholarship during college.

Part 2 Learning burnout

We used the Learning Burnout Scale (LBS), which developed by Chinese researchers based on the version of MBI, to measure online learning burnout of undergraduate students [15]. It consisted of 20 items covering the 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≥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

An assessment of social support was made using the Social Support Rating Scale (SSRS), which developed by a Chinese researcher [16]. This widely utilized instrument involves 10 items include three measurable dimensions of social support: subjective support (four questions) and utilization of support (three questions) and objective support (three questions). Each response of subjective support and utilization of support rated on a 4-point Likert scale. Objective support was used to assess the source of social support, the number of sources counted as scores. Zhang et al has demonstrated that it had good predictive validity and internal consistency among Chinese medical students [16, 17]. We calculated the total score to assess social support and 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). Categorical variables were presented as numbers and percentages, and were analysed by chi-square tests. Continuous variables were reported as mean ± standard deviation and were compared by Student's t-tests or analysis of variance. The correlation between the instruments and

subscales was performed using Spearman's correlation coefficient. 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 683 responses were received giving an overall response rate of 30.8%. Since medical students should study and live in the main campus in their first year, students in our college are 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 bellow 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 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 and its subscales among demographic and online learning feature groups. We found significant different rates of learning burnout between different grades students (χ^2 = 14.723, P<0.01). Additionally, we also found different rates of learning burnout's dimensions (P <0.05). However, we did not found differences in the prevalence of learning burnout, dejection, and reduced personal accomplishment between genders and age groups, but the results indicated that the proportion of improper behavior increased with age (χ^2 = 11.209, P <0.05).

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

We found no association between students' residences and learning burnout (P=0.107) and dejection (P=0.222). But students whose family located in economically developed cities such as municipalities/provincial capitals had less improper behavior and lower personal accomplishment compare to the less developed areas (χ^2 = 9.624, P <0.05; χ^2 = 14.336, P <0.01). In contrast, an analysis of household income indicated significant relationships with learning burnout. We also found 55.33% and 54.82% students with household income of less than 7250 $ reported higher improper behavior (χ^2 = 11.021, P <0.05) and lower personal accomplishment (χ^2 = 16.233, P <0.05). Besides, our survey results showed whether to be a class leader or obtain a scholarship during college had no relationships with learning burnout. However, students, who gain a scholarship during college, presented with less symptoms of improper behavior and personal accomplishment than those who have not. With respect to online learning characteristics, the results showed that the total score of learning burnout was lower with the increase of learning time, communication times and learning satisfaction.

3. Analysis of the association between SSRS and its dimensions according to demographic and online learning characteristics

We selected variables that had an impact on learning burnout to explore its influence on each dimension of SSRS (Table 3). We found that grade was not associated with SSRS and its dimensions (P=0.677, P=0.343, P=0.808, P=0.358). We also found that students with high family income were more likely to receive subjective support and social support than the population with low family income. In addition, the results showed that with the increase of learning time, communication

times and learning satisfaction, the scores of subjective support, utilization of support and SSRS were all higher (P <0.05), although most correlation coefficients were small.

Tables 3. Correlations of social support and learning characteristics (Spearman rho).

4. **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 showed that regardless of which subscale of learning burnout, SSRS scores were all decreased if they exhibited the corresponding symptoms. Besides, we found an inverse relationship between social support and learning burnout (odds ratio, 0.929 for 1-point increase in social support score; 95% CI, 0.898 - 0.961; P< 0.01) (Table 4). Students, who showed 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 the objective support (t= 1.128, P >0.05). (Table 5)

Table 4. Differences in students' SSRS scores by learning burnout, dejection, improper behavior and reduced personal accomplishment groups

Table 5 Differences in the subscale of social support scores according to the presence of learning burnout syndrome

Discussion

In this study, we observed that learning burnout prevalence was as high as 45.9% in our college. We found that environmental factors, especially those related to the economy, were closely related to learning burnout or sub-dimension. We discovered that social support, especially subjective support and utilization of support, was more likely to relieve students' learning burnout.

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% in Chinese medical students, that were described by Tang et [18] and Yang[19], who used the same instrument and criteria. A recent study indicates that stress was associated with high scores for burnout [20]. Our students, who mainly came from Hubei province, which was the worst area affected by COVID-19 in China, may have more physical and psychology stress during this period. The symptoms of students' learning burnout were mainly manifested as dejection. This result was similar to the findings of previous studies [18, 19].

The prevalence of learning burnout was higher for students in more advanced years, for example, grade 5 students' learning burnout prevalence was as high as 70%. This may be due to the pressure of senior students facing employment or internships [21−23]. In contrast, participants of different genders did not report inconsistent levels of burnout in our study, this was in line with the other studies in China [18, 19]. A systematic review conducted in surgical specialties indicated that income may be a factor contributing to burnout [24]. We also found that students with lower family income were more likely to cause learning burnout. Besides, although there were no difference on learning burnout rates between students at different residential locations or whether they were awarded scholarships, we found that students in rural areas or not obtained scholarships had higher improper behavior and lower sense of accomplishment than students from urban sources. Besides, we found that the higher the learning time and frequency of communication, the lower the learning burnout and the higher the learning satisfaction. This phenomenon indicated that communicating with teachers or students may reduce students' learning burnout. These factors were all closely related to social support, especially subjective support and utilization of support.

Social support could have a protective effect for burnout symptom in medical students [25]. We found a similar effect of social support on learning burnout, but 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 [26]. Lazarus's stress and coping theory holds that active communication was an effective way to relieve stress. Subjective support and utilization of support may be more effective than objective support in alleviating learning burnout. Social support provides a buffering effect against stress in that an individual who has more social support is also more resilient to stress [27]. 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 [28]. This prompted us to further explore what social support environment and how subjective support and utilization of support could alleviate learning burnout.

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

Conclusion

We found a high prevalence of learning burnout among students participating in online learning during COVID-19 epidemic period. Demographic characteristics such as area of residence and family income, and learning characteristics such as learning time and number of interactions were all closely associated with learning burnout or its different dimensions. However, social support, especially subjective support and utilization of support, have a positive effect on alleviating learning burnout. Besides, we also found that environmental factors may partly influence learning burnout through social support. Considering the harmfulness of learning burnout, it is necessary to further look for the risk factors of learning burnout. Besides, further research is also needed to identify other effective solutions to address 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

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.

Consent to publish

Not applicable.

Availability of data and materials

The original data is presented in the article as the attached material. Data generated or analyzed during this study are included in this published article.

Competing interests

The authors declare that they have no competing interests.

Funding

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 contributed in collecting and organizing the data. XM contributed in collecting the data and guiding the revision of the manuscript. All authors read and approved the final manuscript.

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Tables

The position of Table 1-5 were listed in the article.

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（17-24）
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		Dejection		Improper behavior		Reduced personal accomplishment	
	N (%)	χ^2(p)	N (%)	χ^2(p)	N (%)	χ^2(p)	N (%)	χ^2(p)
Grade								
second	123(39.68)	**14.607**	153(49.35)	**8.825**	127(40.97)	**15.144**	124(40)	**9.382**
third	111(47.44)	**(0.002)**	130(55.56)	**(0.033)**	118(50.43)	**(0.002)**	101(43.16)	**(0.025)**
forth	73(57.03)		78(60.94)		75(58.59)		67(52.34)	
fifth	8(72.73)		9(81.82)		8(72.73)		8(72.73)	
Age								
18 and bellow	4(28.57)	6.661	7(50)	0.666	3(21.43)	**11.209**	6(42.86)	4.602
19-20	163(42.78)	(0.084)	202(53.02)	(0.888)	172(45.14)	**(0.011)**	154(40.42)	(0.203)
21-22	132(51.36)		144(56.03)		132(51.36)		124(48.25)	
23 and above	16(51.61)		17(54.84)		21(67.74)		16(51.61)	
Gender								
Male	131(45.17)	0.182	162(55.86)	0.579	151(52.07)	3.305	122(42.07)	0.704
Female	184(46.82)	(0.67)	208(52.93)	(0.447)	177(45.04)	(0.069)	178(45.29)	(0.401)
Area of residence								
Municipalities/ provincial capitals	51(38.64)	7.603	61(46.21)	5.713	55(41.67)	**9.624**	45(34.09)	**14.336**
prefecture-level city	77(46.11)	(0.107)	94(56.29)	(0.222)	84(50.3)	**(0.047)**	69(41.32)	**(0.006)**
county-level cities	91(45.73)		110(55.28)		89(44.72)		85(42.71)	
town	29(44.62)		33(50.77)		29(44.62)		35(53.85)	
rural areas	67(55.83)		72(60)		71(59.17)		66(55)	
Total household income in 2019								
7,075$ and bellow	110(55.84)	**13.9**	119(60.41)	7.4	109(55.33)	**11.021**	108(54.82)	**16.233**
7,075$ to 14,150$	110(46.22)	**(0.008)**	131(55.04)	(0.119)	119(50)	**(0.026)**	102(42.86)	**(0.003)**
14,150$ to21,225$	41(36.94)		57(51.35)		43(38.74)		42(37.84)	
21,225$ to28,300$	28(41.18)		30(44.12)		30(44.12)		26(38.24)	
28,300$ and above	26(37.68)		33(47.83)		27(39.13)		22(31.88)	
Whether to be a class leader during college								
no	141(44.62)	0.532	167(52.85)	0.416	144(45.57)	1.419	142(44.94)	0.245

	Social support n(%)	stat	Subjective support n(%)	stat	Objective support n(%)	stat	Utilization of support n(%)	stat
yes	174(47.41)	(0.466)	203(55.31)	(0.519)	184(50.14)	(0.234)	158(43.05)	0.621
Whether to obtain a scholarship during college								
no	146(49.49)	2.375	158(53.56)	0.079	155(52.54)	**4.248**	144(48.81)	**5.041**
yes	169(43.56)	(0.123)	212(54.64)	(0.779)	173(44.59)	**(0.039)**	156(40.21)	**(0.025)**
Online learning time per day								
2h and bellow	58(92.06)	**107.699**	59(93.65)	**59.981**	54(85.71)	**122.058**	46(73.02)	**46.668**
2-4h	126(59.15)	(<0.001)	129(60.56)	(<0.001)	142(66.67)	(<0.001)	112(52.58)	(<0.001)
4-6h	91(37.92)		114(47.50)		96(40.00)		94(39.17)	
6-8h	28(24.78)		44(38.94)		30(26.55)		35(30.97)	
8h and above	12(22.22)		24(44.44)		6(11.11)		13(24.07)	
Average number of interactions with teachers or classmates per lesson								
2 and bellow	203(57.02)	**44.915**	223(62.64)	**25.225**	209(58.71)	**40.711**	187(52.53)	**30.515**
2-4	86(40.19)	(<0.001)	101(47.20)	(<0.001)	89(41.59)	(<0.001)	83(38.79)	(<0.001)
4-6	16(23.53)		28(41.18)		18(26.47)		23(33.82)	
6-8	7(26.92)		13(50.00)		7(26.92)		4(15.38)	
8 and above	3(15.79)		5(26.32)		5(26.32)		3(15.79)	
Overall satisfaction with online learning								
Highly dissatisfaction	48(88.89)	**167.632**	48(88.89)	**141.642**	46(85.19)	**123.584**	45(83.33)	**109.308**
partly dissatisfaction	112(74.67)	(<0.001)	120(80.00)	(<0.001)	108(72.00)	(<0.001)	99(66)	(<0.001)
satisfaction	132(43.56)		163(53.80)		140(46.20)		122(40.26)	
partly satisfaction	22(14.01)		38(24.20)		32(20.38)		32(20.38)	
highly satisfaction	1(5.26)		1(5.26)		2(10.53)		2(10.53)	

Tables 3. Correlations of social support and learning characteristics (Spearman rho).

Variables	Social support	Subjective support	Objective support	Utilization of support
Total household income in 2019	0.152**	0.255**	0.011	0.085*
Online learning time each day	0.160**	0.213**	0.049	0.107**
Average number of interactions with teachers or classmates each class	0.162**	0.167**	0.017	0.188**
Overall satisfaction with online learning	0.162**	0.179**	0.019	0.163**

** p < 0.01, * p < 0.05

Table 4. Differences in students' SSRS scores by learning burnout, dejection, improper behavior and reduced personal accomplishment groups

Scale	Item	Mean ± sd	t	p	Odds ratio (95% confidence interval)
Learning burnout	Not burnout	27.86±4.60	4.370	<0.001	0.929
	Burnout	26.33±4.53			(0.898 to 0.961)
Dejection	Not dejected	27.99±4.52	4.416	<0.001	0.928
	Dejected	26.45±4.60			(0.897 to 0.960)
Improper behavior	Not have	27.93±4.63	4.602	<0.001	0.925
	Have	26.32±4.48			(0.895 to 0.957)
Reduced personal accomplishment	Not competent	27.76±4.49	3.917	<0.001	0.936
	Competent	26.38±4.69			(0.905 to 0.968)

Table 5 Differences in the subscale of social support scores according to the presence of learning burnout syndrome

Subscale of social support	Learning burnout Mean ± sd	Without learning burnout Mean ± sd	t	p	Odds ratio (95% confidence interval)
Subjective support	11.44±2.05	12.14±1.98	4.510	<0.001	0.842(0.780 to 0.909)
Objective support	8.12±1.93	8.29±2.05	1.128	0.260	0.957 (0.888 to1.033)
Utilization of support	6.77±2.02	7.43±2.12	4.158	<0.001	0.857(0.795 to 0.923)

Supplementary Files

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

- renamedd217e.pdf
- originaldata.xlsx