Assessment of stress among pharmacy educators: Validation of the faculty stress index and 2-year cross-sectional follow-up in a Lebanese pharmacy school

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Abstract

Background: Exploring faculty stress and coping strategies among pharmacy educators has not been previously addressed among Lebanese pharmacy schools. The study's aim was to validate the Faculty Stress Index (FSI) among pharmacy educators and to assess stress and coping strategies in a school of pharmacy in Lebanon. **Methods:** A cross-sectional study was conducted using a self-administered web-based questionnaire. **Results:** The FSI structure was validated with factor analysis. All items had good factor loading that ranged from 0.561 to 0.926. All models were verified to be adequate with satisfactory KMO measures of sampling adequacy and a significant Bartlett's test of sphericity with $p < 0.001$. FSI reliability was confirmed by the very good to excellent Cronbach's alpha values for each stress area that ranged from 0.851 to 0.972. Faculty members had mean total stress scores of 129.43 (±56.90) and 115.59 (±57.34) over 2 academic years, respectively, with higher scores indicating more stress. The greatest stress areas were Time Constraint and Satisfaction with Online Courses. Spending time with family, spirituality, and getting enough sleep were the stress coping strategies considered by the majority of faculty members. **Conclusion:** This study provided a watchful apprehension of stress levels and key areas precipitating stress among pharmacy educators.

Introduction

Stress is a modern-day phenomenon that occurs in a wide range of work settings and is an essential part of employees' lives (Mustafa *et al.*, 2015; Syed *et al.*, 2020). It can be either positive or negative where positive stress, known as "*eustress*," is believed to be vital for performance as it gives employees energy and motivates them to strive, while negative stress, also called "*distress*" possesses harmful effects on the employees (Gupta *et al.*,

2015). Nowadays, stress is frequently used to refer to the tension or tiredness typically brought on by work overload or excessively demanding work (Wu *et al.*, 2019). According to the National Institute of Occupational Safety and Health (NIOSH), occupational stress is defined as "*harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources and needs of the worker*" (Girma *et al.*, 2021). Over the past 30 years, workplace stress has gained substantial and growing attention and is considered one of the most difficult issues in

occupational safety and health (Balducci & Fraccaroli, 2019; Martinez-Torvisco *et al.*, 2022). Due to globalisation and the worldwide financial crisis, occupational stress has recently increased and become recognised as a pervasive problem with an impact on nearly all countries, professions, work categories, as well as families and societies (Balducci & Fraccaroli, 2019; Jain *et al.*, 2018). It can adversely affect both the organisations and the employees leading to work-related delays or errors, absenteeism, interpersonal conflicts, high turnover rate, hypertension, musculoskeletal disorders, cardiovascular disorders, anxiety, depression, and substance use (Barattucci *et al.*, 2019; Bolliger *et al.*, 2022; Martinez-Torvisco *et al.*, 2022).

Stress is no longer limited to certain professions and could extend to the teaching profession (Syed *et al.*, 2020). Studies showed growing evidence that educators are experiencing high levels of stress (Agai-Demjaha *et al.*, 2015; Kavita & Hassan, 2018; Wettstein *et al.*, 2021). University faculty members experience stress levels incomparable to any other employed group of individuals (Al-Shoqran *et al.*, 2021). Faculty stress was defined by Gmelch and Colleagues as the faculty member's expectation of inability to respond appropriately to a perceived demand, associated with the anticipation of negative consequences due to the insufficient response to work demands (Gmelch *et al.*, 1986).

Among pharmacy faculty, the literature suggests particularly significant stress, with more than 40 hours per week of regular work and multiple requirements to fulfil institutional and professional commitments at the school, department, and university levels (Lindfelt *et al.*, 2015; El-Ibiary *et al.*, 2017). Pharmacy academics perform a wide range of duties, such as instructing and mentoring students, preparing lectures, conducting research, participating in conferences, serving on committees, overseeing administrative, supervisory, or managerial activities and others. Apart from this, they also need to manage their obligations in their personal lives, social lives, and other areas outside the academic setting (Achhnani & Sinha, 2014; Tan, 2017). As a result of such various responsibilities, pharmacy faculty members experience high-stress levels and have to deal with demanding workloads, time pressure, organisational culture, role ambiguity, poor work-life balance, job insecurity, and lack of control. These factors can negatively impact the quality of teaching, research, and services by contributing to specific stress-related responses such as decreased job satisfaction, increased turnover, increased anxiety and depression, and being overwhelmed and exhausted (Reevy & Deason, 2014; Bhui *et al.*, 2016; Naidoo-Chetty & du Plessis, 2021). In addition, prolonged high-stress levels may result in faculty burnout (Enns *et al.*, 2018), a condition defined as a state of mental, physical and emotional exhaustion,

usually resulting from chronic and persistent stress (El-Ibiary *et al.*, 2017; Edú-Valsania *et al.*, 2022). Therefore, stress is considered detrimental to the health of pharmacy faculty members.

The COVID-19 pandemic and its associated shift in the educational processes have been an additional culprit that significantly impacted pharmacy faculty members' stress levels. In Lebanon, a developing country with economic, political, social and health crises, online teaching represented an overwhelmingly stressful and new experience (Abouzeid *et al.*, 2021; Safwan *et al.*, 2022). The sudden shift to remote instruction has forced pharmacy educators to quickly adapt to new technology and pedagogical approaches, often without adequate training or support. They also had to navigate the challenges of teaching students who may not have access to reliable internet or the necessary technology (Bashir *et al.*, 2021). This has led to increased workload, time pressure, isolation, and disconnection from students and colleagues. Additionally, faculty members dealt with personal and family stressors related to the pandemic, such as health concerns and caregiving responsibilities. These factors increased stress among pharmacy faculty members (Dhawan, 2020; Khalil *et al.*, 2020; Oyedotun, 2020; Turnbull *et al.*, 2021; Halat *et al.*, 2022).

Literature indicates that pharmacy educators may engage in self-care practices such as exercise, mindfulness meditation, and social support from colleagues and family, to try to cope with stress (Desselle *et al.*, 2020; Shahin *et al.*, 2023). They also try to manage their workload by setting clear goals and prioritising tasks that are most important (Prescott, 2020). Some faculty members may engage in professional development opportunities or seek mentoring to address specific stressors or personal challenges (Hill *et al.*, 2022). Additionally, many pharmacy schools offer wellness programmes and resources to support the well-being of their faculty members (Kennedy *et al.*, 2022). Pharmacy faculty members can better manage stress and maintain their health and productivity in the challenging academic environment through these coping strategies and support systems.

Accordingly, and as part of the general stress management strategy, every institution has to implement measurement tools that can target the different organisational dimensions which determine faculty stress with the aim of continuous improvement of both work processes and internal relations (Nappo, 2020). Therefore, assessing stress levels among pharmacy faculty members is crucial for identifying potential sources of stress and implementing effective interventions to improve their well-being. The Faculty Stress Index (FSI) is a widely used tool developed by Walter Gmelch, Wilke, and Lovrich for assessing stress

among faculty members in academic settings (Gmelch *et al.*, 1986). It assesses stress levels across various domains, including personal, interpersonal, organisational, and environmental factors, including workload, time pressure, administrative responsibilities, student issues, and personal relationships (Gmelch *et al.*, 1986). The FSI has been used in numerous studies to examine the factors that contribute to faculty stress and to evaluate interventions aimed at reducing stress levels. The tool represents a reliable and valid measure of faculty stress and has contributed to a better understanding of the challenges faculty members face in higher education (Iqbal & Kokash, 2011; Parveen, 2013; Tan, 2017; Syed *et al.*, 2020). To the authors' knowledge, exploring faculty stress and coping strategies among pharmacy educators has not been previously addressed among Lebanese pharmacy schools and perhaps very rarely in Lebanese higher education institutions in general. The aim of this study was to validate the FSI among pharmacy educators and to assess stress and coping strategies among faculty members in a school of pharmacy in Lebanon.

Methods

Study design and population

A cross-sectional study was conducted among all full-time and part-time faculty members in the School of Pharmacy at the Lebanese International University over the academic years 2020 and 2021, using an anonymous, self-administered, web-based questionnaire.

Variables

All research questions were addressed by the questionnaire, which was pre-tested and evaluated by the researchers to ensure clarity. The questionnaire was divided into two sections. The first section included the FSI for evaluating stress areas and satisfaction. (Gmelch *et al.*, 1986). The FSI consists of different items that are divided into five subscales representing the type of stressor: 1) Reward and recognition; 2) Time constraints; 3) Departmental influence; 4) Professional identity; and 5) Student interaction. Of important note is that the FSI questionnaire ascertains occupational stress on a five-point Likert scale from "*very slight pressure*" to "*excessive pressure*". In addition, an option for "*not applicable pressure*" was added if participants did not feel that the particular item contributed to their stress. Given the shift to remote education, an additional area was added to the FSI for assessing faculty members' satisfaction with online courses by rating ten statements on a five-point Likert scale from "*strongly disagree*" to "*strongly agree*". The total faculty stress score was determined by getting the sum of ratings for all items, where a high total faculty stress score was indicative of a high degree of faculty stress. In the second section, participants were asked to select the strategies that usually help them to cope with their stress.

Statistical analysis

Data were analysed using SPSS version 26.0. Descriptive statistics were reported by their frequencies and percentages, and means (± standard deviation, SD). Factor analysis with principal component analysis (PCA) using Varimax rotated component matrix was used to validate the structure of the FSI. For every model, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, Bartlett's test for sphericity, and the total percentage of variance explained were reported. The Cronbach's alpha measure was used to assess reliability. The Internal consistency and reproducibility of the FSI were confirmed by measuring the Pearson correlation coefficients of each item with its stress area and each area with other areas and with the full index. The significance level was $p < 0.05$ with 95% confidence interval (CI) and an acceptable margin of error = 5%.

Ethical considerations

The study was approved by the Ethics and Research Committee of the School of Pharmacy at the Lebanese International University (2020RC-056-LIUSOP). Participants' privacy, anonymity, and confidentiality were protected through using codes, limiting access of data to the study team, and securely storing data. In addition, faculty members who agreed to participate provided informed consent.

Results

Sample description

In the sample for the academic year 2020, 30 faculty members responded to the questionnaire. Almost two-thirds of participants (66.7%) were females and held Pharm.D. as the highest degree of education, 40% were clinical instructors, 76.7% had no administrative position, and 33.3% had two to five years of experience in academia. The mean age of faculty members was 35.33 (±6.92), with a mean number of teaching courses and credits of 3.03 (±1.22) and 13.03 (±3.95) respectively.

In the sample for the academic year 2021, a total of 41 faculty members participated, of whom 73.2% were females, 63.4% hold Pharm.D. as the highest degree of education, 36.6% were clinical instructors, 85.4% did not have an administrative position, and 36.6% had six to ten years of experience in academia. The mean age of faculty

members was 36.02 (±7.182), with a mean number of teaching courses and credits of 2.32 (±1.23) and 11.51 (±4.76) respectively. Table I shows the complete demographic and academic data for 2020 and 2021.

Table I: Demographic and academic data for participating faculty cohorts in the 2020 and 2021 questionnaires

Variable	2020		2021	
	Mean or frequency	**SD or %**	**Mean or frequency**	**SD or %**
Age	35.33	6.92	36.02	7.182
Gender				
Male	10	33.3	11	26.8
Female	20	66.7	30	73.2
Marital status				
Single	9	30	13	31.7
Married	21	70	28	68.3
Highest degree of education				
Pharm.D.	20	66.7	26	63.4
Master's degree	4	13.3	6	14.6
Ph.D.	6	20	9	22
Academic rank				
Instructor	0	0	6	14.6
Lecturer	1	3.3	4	9.8
Assistant professor	3	10	3	7.3
Associate professor	1	3.3	1	2.4
Professor	1	3.3	1	2.4
Clinical instructor	12	40	15	36.6
Clinical assistant professor	2	6.7	3	7.3
Clinical associate professor	10	33.3	8	19.5
Position				
Dean	1	3.3	1	2.4
Assistant dean	2	6.7	2	4.9
Department chair	4	13.3	3	7.3
Faculty/preceptor	23	76.7	35	85.4
Current employment status				
Part-time	16	53.3	13	31.7
Full-time	14	46.7	12	29.3
Full-time equivalent (FTE)			16	39
Department				
Biomedical sciences	9	30	11	26.8
Pharmaceutical sciences	8	26.7	13	31.7
Pharmacy practice	8	26.7	10	24.4
Pharm.D.	5	16.7	7	17.1
Number of years in academia				
> 20	3	10	2	4.9
16 to 20	4	13.3	3	7.3
11 to 15	5	16.7	7	17.1
6 to 10	8	26.7	15	36.6
2 to 5	10	33.3	8	19.5
Currently a course coordinator				
No	10	33.3	24	58.5
Yes	20	66.7	17	41.5
Number of courses per term	3.03	1.22	2.32	1.23
Number of credits per term	13.03	3.95	11.51	4.76
Main working campus				
Beirut	19	63.3	28	68.3
Bekaa	11	36.7	13	31.7

Validation of the faculty stress index

Factor analysis

Factor analysis was run to confirm the construct and structure validity of the FSI. All factors were extracted with Varimax rotation and that loaded on one factor, except for the reward and recognition (Area 1) and satisfaction with online courses (Area 6) that loaded on two factors. All items had good factor loading that ranged from 0.561 to 0.926. All models were verified to be adequate with KMO measures of sampling adequacy that ranged from 0.643 for Area 4 to 0.899 for Area 2, with significant Bartlett's test of sphericity for all models with $p < 0.001$. The percentage of explained variance ranged from 63.87% (Area 4) to 78.42% (Area 5). The factor analysis of the FSI with Varimax rotation is presented in Table II.

Table II: Factor analysis of the faculty stress index with Varimax rotated component matrix

Factor	Factor 1	Factor 2	Cronbach's alpha
Area 1: Reward and recognition			
Not having clear criteria for evaluation of research and publication activities	0.911		
Receiving insufficient institutional recognition for research performance	0.853		
Lacking personal impact on departmental/institutional decision making	0.811		
Resolving differences with my chair	0.691		
Receiving insufficient recognition for teaching performance	0.622		
Having to teach subject matter for which I am not sufficiently prepared	0.622		
Having job demands which interfere with other personal activities (Recreation, family and other interest)		0.802	0.935
Having inadequate time for teaching preparation		0.786	
Making class preparations		0.761	
Participating in departmental or University committees		0.666	
Having insufficient reward for institutional / departmental services		0.655	
Receiving inadequate university recognitions for community services		0.629	

Kaiser-Meyer-Olkin (KMO) = 0.882; Bartlett's test of sphericity $p < 0.001$; Percentage of variance explained 68.37%

Factor	Factor 1	Factor 2	Cronbach's alpha
Area 2: Time constraint			
Attending meetings which take up too much time	0.926		
Writing letters and memos and responding to other paperwork	0.908		
Dealing with programme changes or reduced enrollment on my job	0.895		
Having insufficient time to keep abreast of current developments in my field	0.881		
Meeting social obligations (parties, volunteer work) expected of me because of my position	0.881		
Feeling that I have too heavy a workload, one that I cannot possibly finish during normal work day	0.874		
Resolving conflicts with students	0.870		
Resolving differences with fellow faculty members	0.860		0.972
Assignments of duties that take me away from my office	0.847		
Participating in departmental or University committees	0.839		
Participating in work-related activities outside regular working hours	0.836		
Being drawn into conflict between colleagues	0.810		
Being interrupted frequently by telephone calls and drop-in visitors	0.786		
Complying with departmental and university rules and regulations	0.776		
Feeling pressures to compete with my colleagues	0.721		

Kaiser-Meyer-Olkin (KMO) = 0.899; Bartlett's test of sphericity $p < 0.001$; Percentage of variance explained 72.07%

Factor	Factor 1	Factor 2	Cronbach's alpha
Area 3: Departmental influence			
Current Job status affect my performance	0.915		0.931
Lacking congruency in institutional, departmental and personal goals	0.903		

Table II: Factor analysis of the faculty stress index with Varimax rotated component matrix (Continued)

Factor	Factor 1	Factor 2	Cronbach's alpha
Teaching workload effect on my job performance	0.901		
Not having clear criteria for evaluating service activities	0.868		
Not knowing how my chair evaluate my performance	0.815		
Cultural differences	0.767		
Kaiser-Meyer-Olkin (KMO) = 0.835; Bartlett's test of sphericity $p < 0.001$; Percentage of variance explained 74.49%			
Area 4: Professional identity			
Being unclear as to the scope and responsibilities of my job	0.859		
Believing that the progress in my career is not what it should or could be	0.819		
Securing financial support for my research	0.809		0.856
Imposing excessively high self-expectations	0.760		
Making presentations at professional conferences and meetings	0.744		
Kaiser-Meyer-Olkin (KMO) = 0.643; Bartlett's test of sphericity $p < 0.001$; Percentage of variance explained 63.87%			
Area 5: Students' interaction			
Evaluating the performance of students	0.913		
Making class presentations	0.895		0.906
Having students evaluate my teaching performance	0.869		
Teaching/advising inadequately prepared students	0.865		
Kaiser-Meyer-Olkin (KMO) = 0.780; Bartlett's test of sphericity $p < 0.001$; Percentage of variance explained 78.42%			
Area 6: Satisfaction with online courses			
I am emotionally drained from preparing and delivering online materials.	0.888		
I feel that working from home has affected my personal responsibilities (family, caregiver, spouse, etc.).	0.885		
Changes in my workload are difficult to manage.	0.878		
I feel that my personal responsibilities (family, caregiver, spouse, etc.) have an effect on my productivity when working from home.	0.853		
I feel that my workload has increased due to remote/online learning.	0.788		0.851
My role as a healthcare provider or pharmaceutical researcher has added stress to my position as a pharmacy educator.	0.768		
I do not feel that my personal responsibilities were acknowledged in the transition to a remote working format.	0.625		
I feel that there are clear expectations for me as an educator in the remote format.		0.904	
I feel that I have control over my autonomy as an educator in the remote learning setting.		0.830	
I am highly satisfied with online teaching		0.561	
Kaiser-Meyer-Olkin (KMO) = 0.761; Bartlett's test of sphericity $p < 0.001$; Percentage of variance explained 70.48%			

Validity measures

The reliability of the FSI was confirmed by measuring the Cronbach's alpha values for each stress area. The values were very good to excellent and ranged from 0.851 (Area 6) to 0.972 (Area 2) (Table II). The internal consistency and construct validity were further confirmed by measuring the correlation of each stress item with its measuring area and the correlation of the stress areas with each other and with the full index. All items correlated well with their subsequent areas; the

Pearson correlation coefficients ranged from 0.505 to 0.924. All areas also correlated well with each other and with the full index with Pearson correlation coefficients ranging from 0.485 to 0.960. The reproducibility of the FSI was confirmed by the highly significant correlation of all items with their areas and the highly significant correlation of all areas with each other and with the full index (all p-values < 0.001). The internal consistency and reproducibility measures of the FSI are shown in Table III.

Table III: The internal consistency and reproducibility measures of the faculty stress index

	Pearson correlation					
	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6
Total stress areas	**0.951**	**0.960**	**0.902**	**0.888**	**0.854**	**0.716**
Area 1: Reward and recognition		0.886	0.882	0.832	0.753	0.605
Not having clear criteria for evaluation of research and publication activities	0.821					
Receiving insufficient institutional recognition for research performance	0.804					
Lacking personal impact on departmental/institutional decision making	0.771					
Resolving differences with my chair	0.749					
Receiving insufficient recognition for teaching performance	0.799					
Having to teach subject matter for which I am not sufficiently prepared	0.704					
Having job demands which interfere with other personal activities (Recreation, family and other interest)	0.783					
Having inadequate time for teaching preparation	0.692					
Making class preparations	0.670					
Participating in departmental or University committees	0.666					
Having insufficient reward for institutional/departmental services	0.859					
Receiving inadequate university recognitions for community services	0.845					
Area 2: Time constraint	0.886		0.828	0.839	0.759	0.626
Attending meetings which take up too much time		0.924				
Writing letters and memos and responding to other paperwork		0.910				
Dealing with programme changes or reduced enrollment on my job		0.891				
Having insufficient time to keep abreast of current developments in my field		0.878				
Meeting social obligations (parties, volunteer work) expected of me because of my position		0.883				
Feeling that I have too heavy a workload, one that I cannot possibly finish during normal work day		0.876				
Resolving conflicts with students		0.873				
Resolving differences with fellow faculty members		0.858				
Assignments of duties that take me away from my office		0.844				
Participating in departmental or University committees		0.838				
Participating in work-related activities outside regular working hours		0.837				
Being drawn into conflict between colleagues		0.810				
Being interrupted frequently by telephone calls and drop-in visitors		0.790				
Complying with departmental and university rules and regulations		0.776				
Feeling pressures to compete with my colleagues		0.720				
Area 3: Departmental influence	0.882	0.828		0.813	0.786	0.485
Current Job status affect my performance			0.913			
Lacking congruency in institutional, departmental and personal goals			0.905			
Teaching workload effect on my job performance			0.899			
Not having clear criteria for evaluating service activities			0.870			
Not knowing how my chair evaluate my performance			0.821			
Cultural differences			0.759			
Area 4: Professional identity	0.832	0.839	0.813		0.729	0.530
Being unclear as to the scope and responsibilities of my job				0.848		
Believing that the progress in my career is not what it should or could be				0.816		
Securing financial support for my research				0.822		
Imposing excessively high self-expectations				0.759		
Making presentations at professional conferences and meetings				0.744		
Area 5: Students' interaction	0.753	0.759	0.786	0.729		0.697
Evaluating the performance of students					0.914	
Making class presentations					0.887	

Table III: The internal consistency and reproducibility measures of the faculty stress index (Continued)

	Pearson correlation					
	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6
Having students evaluate my teaching performance					0.863	
Teaching/advising inadequately prepared students					0.877	
Area 6: Satisfaction with online courses		0.605	0.626	0.485	0.530	0.697
I am emotionally drained from preparing and delivering online materials.						0.842
I feel that working from home has affected my personal responsibilities (family, caregiver, spouse, etc.).						0.779
Changes in my workload are difficult to manage.						0.822
I feel that my personal responsibilities (family, caregiver, spouse, etc.) have an effect on my productivity when working from home.						0.801
I feel that my workload has increased due to remote/online learning.						0.799
My role as a healthcare provider or pharmaceutical researcher has added stress to my position as a pharmacy educator.						0.833
I do not feel that my personal responsibilities were acknowledged in the transition to a remote working format.						0.639
I feel that there are clear expectations for me as an educator in the remote format.						0.585
I feel that I have control over my autonomy as an educator in the remote learning setting.						0.505
I am highly satisfied with online teaching						0.819

Stress assessment

A total of 30 faculty members responded to the questionnaire in the academic year 2020, and 41 faculty members responded in the academic year 2021. The faculty members had mean total stress scores of 129.43 (±56.90) and 115.59 (±57.34) for the academic years 2020 and 2021 respectively, with higher scores indicating more stress. The greatest stress area in 2020 was time constraint (Area 2) followed by satisfaction with online courses (Area 6) with mean stress scores of 35.10 (±20.78) and 32.03 (±8.12) respectively. The same stress areas were associated with the greatest stress scores in 2021 with a mean of 31.27 (±8.11) for Area 6 and 29.59 (±20.59) for Area 2. On the other hand, students' interaction (Area 5) was associated with the lowest stress with a mean score of 9.67 (±5.18) in 2020 and 8.00 (±5.49) in 2021. The stress scores of the total faculty index and the subsequent six stress areas for 2020 and 2021 are shown in Table IV.

Table IV: The stress scores of the total faculty index and the subsequent stress areas

Stress area	Mean	SD	Median	Minimum	Maximum
2020					
Total stress areas	129.43	56.90	134.00	43.00	240.00
Area 1: Reward and recognition	27.73	14.02	27.00	6.00	60.00
Area 2: Time constraint	35.10	20.78	41.00	2.00	69.00
Area 3: Departmental influence	12.10	8.21	12.50	0.00	28.00
Area 4: Professional identity	12.80	5.94	13.50	0.00	22.00
Area 5: Students' interaction	9.67	5.18	10.00	0.00	20.00
Area 6: Satisfaction with online courses	32.03	8.12	30.00	20.00	47.00
2021					
Total stress areas	115.59	57.34	118.00	14.00	253.00
Area 1: Reward and recognition	25.12	14.43	24.00	0.00	58.00
Area 2: Time constraint	29.59	20.59	33.00	0.00	72.00
Area 3: Departmental influence	10.54	8.47	8.00	0.00	30.00
Area 4: Professional identity	11.07	6.42	12.00	0.00	25.00
Area 5: Students' interaction	8.00	5.49	9.00	0.00	20.00
Area 6: Satisfaction with online courses	31.27	8.11	30.00	14.00	48.00

Comparison of stress scores

The stress scores were higher in 2020 compared to 2021 with a mean difference of 13.84 (95% CI -13.54737; 41.24331) for the total index, 2.61 (95% CI -4.22; 9.45) for Area 1 (Reward and recognition), 5.51 (95% CI -4.39; 15.42) for Area 2 (Time constraint), 1.56 (95% CI -2.45; 5.57) for Area 3 (Departmental influence), 1.73 (95% CI -1.26; 4.71035) for Area 4 (Professional identity), 1.66 (-0.90; 4.24) for Area 5 (Students' interaction), and 0.77 (95% CI -3.12; 4.65505) for Area 6 (Satisfaction with online courses). However, none of the differences in the stress scores were statistically significant (Figure 1).
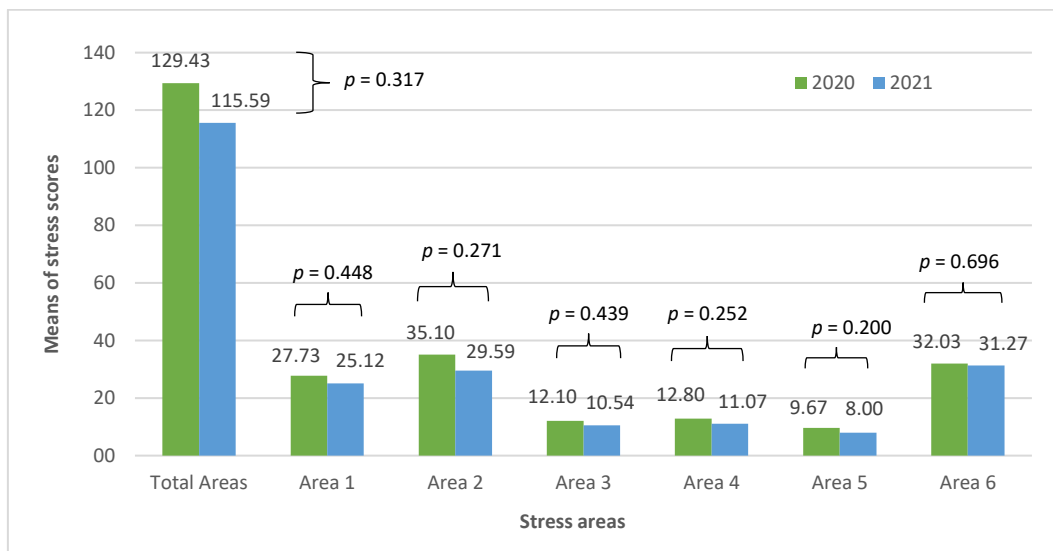

Figure 1: Comparison of stress scores for the total stress index and subsequent stress areas between 2020 and 2021

Stress coping strategies

The assessment of faculty behaviours on strategies to cope with stress revealed that spending time with family (96.7% in 2020 and 95.1% in 2021), spirituality and prayers (83.3% in 2020 and 87.8% in 2021), and getting enough sleep (80% in 2020 and 82.9% in 2021) are the strategies considered by the majority of faculty members to cope with stress. On the other hand, the use of medications such as anxiolytics or tranquilisers (3.3% in 2020 and 9.8% in 2021) and yoga and meditation (16.7% in 2020 and 34.1% in 2021) are the least considered strategies. Figure 2 presents the strategies that are considered by faculty members to cope with stress.
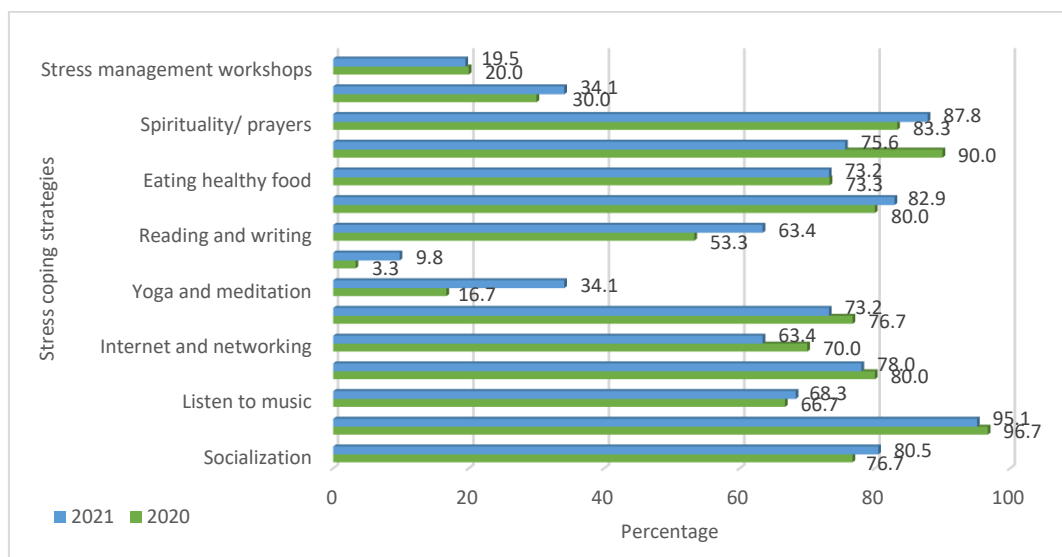
Figure 2: Stress coping strategies by faculty member

Discussion

The current study was able to reveal stress areas and compare their magnitudes among pharmacy faculty in a private pharmacy school over two consecutive years. With stress being a major factor to affect productivity (Albort-Morant *et al*., 2020), with pharmacy faculty reported to have high levels of stress (Darbishire *et al*., 2020), and given the deteriorating situation in Lebanon, as of 2019 (Zahreddine *et al*., 2022), evaluation and monitoring of stress among pharmacy faculty is much needed.

The study validated the FSI for pharmacy educators, with the scale being carefully adopted to assess reward and recognition, time constraint, departmental influence, professional identity, students' interaction, and satisfaction with online courses.

Furthermore, the study was able to upgrade the FSI in consistency with published literature (Iqbal & Kokash, 2011; Parveen, 2013; Tan, 2017; Syed *et al*., 2020). The current upgraded version used in this analysis includes an additional area for satisfaction with online courses, which was not present in the previous versions of the FSI, and which appeared necessary to add given the shift to remote education that accompanied the pandemic. This new dimension added to the questionnaire may appear particularly relevant in the era of digitally enriched education, and it may be tempting to further explore and follow up, especially in line with the huge shift in digital pedagogies, artificial intelligence, and data science, all expected to have a profound effect on education (Walsh, 2020; Kumar *et al*., 2023). Also, inquiry about stress coping strategies among pharmacy faculty was an addition to published surveys and was helpful in getting insights about how faculty tend to undergo self-remediation and cope with adversities of the workplace as well as the daunting situation the country was and is still to face.

The present study is also the first to confirm the construct and structural validity, internal consistency and reliability of the stress areas of the FSI. The index showed very good psychometric properties, and therefore it is recommended for use in academic and research settings. To the best of the authors' knowledge, no previous studies assessed the construct validity of the stress index among pharmacy educators. The present findings confirmed the construct validity of the FSI by factor analysis. The current results showed that all items have good factor loading and accordingly confirm the adequacy of all assessment areas of the stress index. The evaluation of the psychometric properties of the index confirmed its reliability, as revealed by Cronbach's alpha values for all areas (Taber, 2018). Furthermore, all stress items correlated

well with their respective area, and all areas highly correlated with each other and the full index. The reproducibility of the upgraded index was also verified by the highly significant correlation of each stress item with its area and the highly significant correlation of all areas with each other and the full index. On the other hand, it was not possible to examine the convergent and divergent validity measures of the FSI as the current faculty assessment did not include other stress or mental health assessment indices. Additional assessment of convergent and divergent validity measures would provide more comprehensive evidence of how the FSI relates to other established measures on faculty stress. Therefore, future work will involve administering other existing instruments that assess similar constructs among faculty members and examine the extent to which the FSI aligns with existing measures of stress, job satisfaction, burnout, or related constructs. Moreover, in terms of validating the structure of the FSI, exploratory factor analysis (EFA) was conducted as the initial step. The purpose of this approach was to explore and identify the underlying factor structure of the FSI, as this study aimed to develop and validate an updated version of the instrument that incorporated a new dimension of assessment related to online courses. Since there was limited prior research in this specific context, EFA was employed to gain a comprehensive understanding of the index's factor structure. However, to further strengthen the validation process and address the expanded scope of the assessment with the inclusion of online course-related stress, future research will involve confirmatory factor analysis (CFA). This CFA will confirm the validation of the upgraded FSI and provide a more robust assessment of the instrument's factor structure.

This study assessed the level of stress among pharmacy educators by determining the stress score for each stress area and the total FSI. Findings revealed an important level of stress during both academic years identified by the majority of stress areas, remarkably time and online education. Since a similar analysis was not conducted across this sample in the period preceding 2020 with both the pandemic and the multiple-aspect Lebanese crises, it remains difficult to confer, from the present results, whether these factors have attenuated stress in the study's population, like other previous studies have shown (Voltmer *et al*., 2021; von Keyserlingk *et al*., 2022). In fact, this points out the lack of similar studies among Lebanese pharmacy faculty and highlights the need to address such a research gap, although stress levels among the Lebanese population (Younes *et al*., 2022b) and among Lebanese pharmacy students (Hammoudi Halat *et al*., 2022; Safwan *et al*., 2023), have been already

described. In general, pharmacy educators have been previously reported to work over 40 hours per week and to have high stress and low satisfaction with their work-life balance despite high career satisfaction (Barnett *et al*., 2022). Also, lack of work-life balance was a major factor behind pharmacy faculty intentions to stay in academia (Lindfelt *et al*., 2018). This is aligned with the current findings that time was a major area of stress among surveyed faculty, perhaps importantly revealing the need for administrators and stakeholders to revisit workload, teaching duties, research activities, services, and multiple academic tasks and promote a culture that reduces time constraint for pharmacy faculty.

After stress caused by time constraint, satisfaction with online education was the second major stressor for this sample. The outbreak of COVID-19 affected all sections of society with self-quarantine at home to prevent the spread of the virus and the serious consequences that the lockdown had on mental health, precipitating frustration, stress, and depression (Chaturvedi *et al*., 2021). Likewise, in pharmacy education, this period has been unlike any other in academia. Pharmacy education had major modifications within a few weeks in Spring 2020 than it had experienced throughout the last ten years. Educators were suddenly faced with the breadth and complexity of the issues brought on by the pandemic, raising questions about the procedures that had been in place for a long time and those that had only recently been put into practice to deliver educational programmes remotely. The fundamental components of community, time, and location that were used as the cornerstones for success in pharmacy colleges suddenly were undermined by the pandemic (Brazeau, 2020). COVID-19 has introduced new stressors that challenge how faculty teach and mentor students, how they conduct research, how procedures are used to govern schools, faculty interaction with peers, and their service to the profession (Brazeau *et al*., 2020). It is, therefore, not surprising to see online education as the second area of stress, given all changes the faculty had to tailor and implement within limited periods, and this is in parallel with published data (Kawaguchi-Suzuki *et al*., 2020; Alzubaidi *et al*., 2021). In the 2021 study, this factor remained second to time area as a stressor, with a decrease that was not significant, perhaps affected by minor adaptation the faculty had developed to the online tools. The challenges and opportunities to convert classroom learning and experiences, as well as student assessments, to a remote or online format did have their effect on educators and should shed light on areas needing improvement for mitigating stress among pharmacy educators in the future.

While Area 2 (time constraint) and Area 6 (satisfaction with online courses) were associated with the highest stress levels in the surveyed sample of faculty, it is noteworthy that Area 5 (students' interaction) scored lowest using the FSI. Although face-to-face interaction between faculty and students was limited in both 2020 and 2021, it cannot be assumed that this alone led to the lowest scores on Area 5, as all norms of advising, tutoring, and support to students were moved to virtual means. However, it may be anticipated that the culture of the school, being student-oriented, student-friendly, and open to student interaction might have reduced the impact of this factor on the faculty. The atmosphere of the school, with wide open doors, transparent administrative roles, and focus on student satisfaction (Younes *et al*., 2022a) may have affected this result, which is tempting to further check with the return to regular education.

Collectively looking into the six areas of stress addressed by the questionnaire, the present results showed a minor decrease in their magnitude in 2021 compared to 2020, although the decrease was not significant. This slight decrease cannot be exquisitely explained given these results, although it might relate to some interventions the school has done in 2021 like hiring new full-time faculty, reducing the involvement of school administrators in committees, and assigning new roles to active, competent faculty who initially had fewer responsibilities. This may have reduced the departmental influence scale. The overall minor reduction in workload may have buffered stress levels although not to a significant extent, but are worthy to further investigate, especially in light of previous findings about workload and associated stress and burnout (Zhang *et al*., 2020). Furthermore, the student interaction scale might have decreased because teaching, advising, course and exam preparation duties became slightly less demanding as instructors and students were getting used to remote instruction. This was a new norm in 2020 and a possible source of stress when the survey was first administered. Nevertheless, a major change in results between 2020 and 2021 was not expected to occur in one year, especially given the multiple challenges associated with the Lebanese situation. The minor change seen could reflect the robustness and consistency of the instrument used given all the associated external factors of the economic, social, and financial crises on top of the pandemic (Al-Mulki *et al*., 2022). For example, rewards and recognition are not expected to increase with the prevailing status of working from home and less in-person interaction among leaders, faculty and students. Apart from such findings, the administration of this stress tool twice changed the school's perspective regarding faculty stress and well-being and

helped to spread awareness about faculty burnout and stress in the workplace.

Faculty reported different measures they use to cope with stress, like family time, spirituality, scheduling, exercise, getting enough sleep, and others, many of which were previously reported (Alosaimi *et al.*, 2015; Alosaimi *et al.*, 2018; Białek & Sadowski, 2019; Shahin *et al.*, 2023). Only a few faculty acknowledged yoga and meditation as a coping strategy, despite being previously described as effective for ameliorating stress (Green & Kinchen, 2021; Maddux *et al.*, 2018). Also, not more than 20% of the faculty resorted to coping with stress through stress management workshops, initiatives reported to enhance well-being and significantly reduce stress among different populations not limited to educators (Acquadro Maran *et al.*, 2018; Ene *et al.*, 2021; Ugwuanyi *et al.*, 2021). These data provide baseline evidence of the need to provide adequate stress management training, coaching, and mentorship to pharmacy faculty and establish a contextual framework in which stress coping strategies are used, and their influence on stress levels is purposefully assessed. Therefore, universities must prioritise faculty support and provide resources such as training, technology support, and mental health services (Harris *et al.*, 2022). Faculty members need to be counselled regarding the management of their stress, such as setting realistic expectations, seeking support from colleagues, and prioritising self-care. With effective support and coping strategies, faculty members can navigate the challenges of their profession (Gearhart *et al.*, 2022; Lewis *et al.*, 2022).

Strengths and limitations

This study has several strengths. It is the first study to upgrade the FSI to include an assessment for stress that is related to online learning. It is also the first study that confirms the construct and structure validity of the stress index and measures its psychometric properties. Although the sample size was relatively small, it was sufficient to carry out different statistical analyses for validation measures, and the adequacy of the various models was confirmed. The outcomes of the study also apply post-pandemic and for future faculty stress assessment. On the other hand, several limitations couldn't be avoided. It was not possible to determine the sensitivity and specificity of the FSI because no criterion validity could be identified in the absence of a gold standard in the literature. the sample size was also relatively small and thus did not allow to perform a multivariable analysis to determine stress predictors and the association of stress levels with the sociodemographic and academic characteristics of the faculty members. Further studies are still recommended in this context to resolve these

limitations, perhaps by involving a larger sample, including pharmacy faculty from other schools across Lebanon, and comparing faculty stress in different contexts of pharmacy education known to be rich and varied across the country.

Conclusion

The current study validated and upgraded the FSI, as well as confirmed the construct validity, internal consistency and reliability of its stress areas. The baseline results reported herein about pharmacy faculty stress in Lebanon provided a watchful apprehension of stress levels and key areas precipitating stress in the population. Juggling professional and personal responsibilities while facing time constraint and unexpected changes that may happen to their usual roles, pharmacy faculty expressed conspicuous stress levels over two consecutive years. The findings from this preliminary analysis should alert stakeholders on the importance of setting contexts for coping with faculty stress and should warrant further research in this area, especially with the multiple challenges facing academia in Lebanon and the fear that a fulfilling career path for pharmacy academics might convert to a stressful job.

Conflict of interest

The authors declare no conflict of interest.

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