

Impact of Overcrowded Classroom Condition on Perceived Stress and Academic Outcomes among University Students

Ameer Jawad Obiad¹, Akeel Muslim Adel², Riyad Saad Atshan³, Asaad M. Masyab Almihrab⁴

^{1,2}Middle Euphrates University, Iraq

^{3,4}Al-Furat Al-Awsat Technical University, Iraq



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ABSTRACT

Objective: This study aims to explore the direct impact of overcrowded classroom conditions on perceived stress and academic performance among university students.

Method: An analytical cross-sectional design was utilized. The participants included a random sample of 747 students at Al-Furat Al-Awsat University located in the Al-Najaf Al-Ashraf Governorate. The data collection instruments include Perceived Classroom Crowding Scale, Perceived Stress Scale, and Academic Performance Scale. This research was conducted during November 20, 2025–February 10, 2026. **Results:** A significant proportion of the students (47.7%) have been found experiencing crowded classrooms. Furthermore, more than half of the participants felt moderately stressed. The results show that the linear regression model had a significant positive relationship between perceived classroom overcrowding and psychological stress. In other words, overcrowding leads to an increase in psychological stress. There were no effects of classroom overcrowding on academic performance. **Novelty:** It acts as a stressor, positively correlating with students' stress levels, though it does not directly correlate with academic performance. Improving the physical learning environment and implementing supportive institutional policies are crucial for managing student stress.

INTRODUCTION

The subjective measure of external expectations and demands faced by an individual is called perceived stress that can negatively affect their well-being and health. Perceived stress has been reported to result in several negative outcomes such as anxiety, depression, and poor academic performance [1]. New academic and social demands as well as the transition into college often leads to increased stress commonly described by students as "overwhelming pressure" [2]. Consequently, perceived stress (PS) is common among university students; however, PS is frequently increased in overcrowded classrooms. Increased levels of perceived stress may be due to unique challenges associated with academic life [3].

Social relationships, academic stressors, and environmental factors including classroom setting are other sources of stressors. One important environmental factor that has been related to higher levels of stress and affecting academic performance and overall well-being is classroom congestion [4]. Educational settings, classroom crowding can be used in two ways; physical density of pupils in a room and psychological reactions to that density [5]. Classrooms in universities are supposed to be sites of constructive pressure, whereas crowding increases the levels of stress and reduces learning outcomes [6]. Problems with perceived psychological stress in classrooms are common and exist

especially in cases when classrooms are crowded, thus lacking fresh air [7].

Crowding can lead to negative emotions such as stress and anxiety that can further impair cognitive processes necessary for proper learning. In the case of freshmen students who already had time to adjust to their surroundings, subjective perception of crowding or being overwhelmed by the number of peers in one place can increase feelings of stress and isolation [5], [6], [7], [8]. Several studies have shown that overcrowding in classrooms can lead to poor academic performance. For example, in their paper, Tanzini et al. have found a statistically significant correlation between stress and anxiety in students and their perceptions of classroom environment [9]. When feeling crowded in classes, students usually tend to become less interested and motivated, which consequently negatively affects their academic performance [7], [8], [9].

Good teachers do not only provide students with quality educational experiences but are also excellent partners in developing professional and comfortable educational environment [10]. Moreover, good teachers realize the importance of creating classroom conditions where each student will be able to flourish [10], [11]. Thus, it is important to understand the role of overcrowded classrooms in the rise of stress levels in order to develop interventions that can improve the academic performance of students and reduce stress in classrooms [7], [8], [9], [10], [11], [12]. Thus, this paper aims at analyzing the impact of classroom crowding on perceived stress and academic outcomes of students studying at Al-Furat Al-Awsat University in Al-Najaf Al-Ashraf Governorate.

RESEARCH METHOD

The analytical cross-sectional study was used to assess the effects of classroom crowding on perceived stress and educational achievement. The study involved the use of validated tools to measure perceived classroom crowding and perceived stress as well as official academic record. The study was carried out from November 20, 2025, to February 10, 2026.

The study setting extends for a period from November 20, 2025, to February 10, 2026 in university students at Al-Furat Al-Awsat University in Al-Najaf Al-Ashraf Governorate.

For selecting a study sample, probability sampling method has been applied and specifically simple random sampling. A population was constituted by all undergraduates studying in university with a total of 8,443 subjects. However, a random sample of 747 students was selected randomly, which is much higher than the minimum required sample size of 382 subjects calculated according to the Slovin formula. As the formula shows, with 95% confidence level and 5% margin of error [13]. The minimum sample size needed would be 382 students. Thus, a larger sample was selected to increase the statistical power of the research as well as the generalizability of results.

Part I: The study instrument consists of the socio-demographic characteristics of the student such as; Sex, Age, Level of studies, Type of study, Marital status, College/Institute, Monthly family income, Last cumulative GPA, working during study, Place of residence during studies, Time taken to reach university, Average number of

students in practical classes, Average number of students in theoretical lectures, Number of attendances to crowded classroom, Weekly study hours.

Part II: The Perceived Classroom Crowding Scale (PCCS) was used to assess students' perceptions of classroom overcrowding. The scale consists of 10 items rated on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree), with higher scores indicating higher perceived overcrowding. The Arabic version of the scale was applied in the current study, through reliability and internal consistency analysis. The findings reveal that the 'Perceived Classroom Crowding' scale possesses excellent internal consistency ($\alpha = 0.928$), indicating a remarkably high degree of cohesion among its 10 items [2], [14].

Part III: Perceived stress was assessed using the 10-item Perceived Stress Scale (PSS-10), a widely used self-report instrument originally developed by Cohen et al. to measure the degree to which individuals perceive their lives as stressful. Responses are rated on a five-point Likert scale ranging from 0 (never) to 4 (very often). The Arabic version of the PSS-10 has demonstrated acceptable psychometric properties when applied to university students, with demonstrated a good and scientifically acceptable reliability coefficient (Cronbach's $\alpha \approx 0.790$) and evidence of good construct validity supported by confirmatory factor analysis and measurement invariance across student samples, supporting its suitability for use in academic research among undergraduate populations [15], [16].

Part IV: The assessment of perceived academic performance was performed via the Academic Performance Scale (APS), including the APS validated in the Arabic language for use in Arabic speaking student samples. The Academic Performance Scale is an eight-item questionnaire used for assessing the academic behavior and involvement of students on a five-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree." Both the original and Arabic versions exhibit satisfactory psychometric properties in student samples, exhibited good internal consistency ($\alpha = 0.838$), supporting their use as reliable measures of academic performance in educational research [17], [18].

The statistical package for social science (IBM), version 26, was utilized for coding and analyzing the data. The distribution of data was not normal. Consequently, non-parametric statistical methods were applied. The Spearman's rho correlation, Mann-Whitney U-Test, and Kruskal-Wallis Test were employed.

RESULTS AND DISCUSSION

Result

Table 1. Demographic Characteristics of the Study Participants (N = 747).

Variable	Categories	f	%
Age (Years)	Less than 20 years	171	22.9%
	20 - 22 years	425	56.9%
	More than 22 years	151	20.2%
<i>Mean $\pm$ SD = 21.42 $\pm$ 3.23</i>			

Variable	Categories	f	%
Sex	Male	268	35.9%
	Female	479	64.1%
Marital Status	Single	668	89.4%
	Married	74	9.9%
	Separated	5	0.7%
Monthly Family Income	Sufficient	233	31.2%
	Somewhat Sufficient	332	44.4%
	Insufficient	182	24.4%
Employment Status	Working during study (Yes)	229	30.7%
	Not working (No)	518	69.3%
Place of Residence	With Family	626	83.8%
	University Dormitory	74	9.9%
	Independent / Apartment	47	6.3%
Commute Time (Minutes)	Less than 30 minutes	196	26.2%
	30 - 60 minutes	449	60.1%
	More than 60 minutes	102	13.7%
<i>Mean ± SD = 44.36 ± 29.31</i>			

f: Frequency, %: Percentage.

Table (1) shows the demographic distribution of the study sample (n=747). It is evident that the majority of participants are female (64.1%), and the sample is concentrated in the (20-22) age group at (56.9%), with a mean age of 21.42 years. The data also shows that the vast majority of students are unmarried (89.4%), live with their families (83.8%), and are full-time students without employment (69.3%). Regarding the economic level, 44.4% reported that their family income is 'fairly sufficient'. Such results prove the existence of significant homogeneity of socioeconomic background among the studied students and demonstrate that most students lead a relatively stable life in which their primary concern is studies. Average travel time of students to the university was estimated at 44.36 minutes; thus, it can be stated that travel burden is quite significant.

Table 2. Assessment Level of Perceived Classroom Crowding among University Students (N = 747)

Scale	Min- Max (10-50)	M ± SD	Score (Sev)	f	%
PCS	10.00 - 50.00	34.58 ± 9.11	LC (10-23)	101	13.5
			MC (24-36)	290	38.8
			HC(37-50)	356	47.7
			Total	747	100.0

PCS: Perceived Crowding Scale, *f*: Frequency, %: Percentage, Min: Minimum; Max: Maximum, M: Mean for total score, SD: Standard Deviation for total score, Sev: Severity, LC: Low Crowding, MC: Moderate Crowding, HC: High Crowding.

Table (2) demonstrates the assessment levels of the perceived overcrowding phenomenon inside classrooms. From the results, about half of the sample (47.7%)

indicated their perception of the overcrowding as a high level, while (38.8%) perceived the level of the overcrowding to be 'medium' and the arithmetic mean in total was (34.58) out of 50 points. It demonstrates a clear and obvious sense that students have about the existence of overcrowding as a problem, which means that the overcrowding problem is not a mere statistic in the records of universities but an actual environmental and psychological situation that the student feels and knows about the problems arising therefrom.

Table 3. Assessment Level of Perceived Stress among University Students (N = 747)

Scale	Min- Max (0-40)	M ± SD	Score (Sev)	f	%
(PSS-10)	3.00 - 37.00	21.10 ± 6.11	LS (0-13)	80	10.7
			MS (14-26)	526	70.4
			HS (27-40)	141	18.9
			Total	747	100.0

f: Frequency, %: Percentage. Min: Minimum; Max: Maximum, M: Mean for total score, SD: Standard Deviation for total score, (PSS-10): Perceived Stress Scale, Sev: Severity, LS: Low Stress, MS: Moderate Stress, HS: High Stress.

Table (3) presents the frequency distribution of the students' perceived stress levels according to PSS-10 scale. In general, it was found that the majority of the sample belongs to the category of 'moderate' stress (70.4%), followed by (18.9%) in the category of 'high' stress, and the overall mean score was (21.10). In other words, the state of continuous and moderate psychological burden characterizes the current students' academic environment. While they did not exceed the threshold of acute stress levels, it can be seen as a 'chronic exhaustion' state.

Table 4. Simple Linear Regression Analysis for the Impact of Crowding on Stress and Academic Outcomes (N = 747)

Y	X	R ²	F -value	Unstd (B)	Std (Beta)	P -value
PS	C			17.095		0.000
	PC	.030	22.886	0.116	.173	0.000*
AO	C			29.033		0.000
	PC	.004	2.724	0.035	.060	0.099

* Significant at the 0.01 level, Std: Standardized, Unstd: Unstandardized, C: Constant, PC: Perceived Crowding, X: Predictor, Y: Dependent Variable, PS: Perceived Stress, AO: Academic Outcomes.

Table (4) summarizes the results of the linear regression analysis for the predictive effect test of perceived overcrowding. The results confirmed a significant and positive effect of perceived overcrowding on stress levels ($F = 22.886$, $p = 0.000$, $Beta = 0.173$), meaning that overcrowding does indeed contribute to increased psychological stress for students. On the other hand, the analysis showed no statistically significant effect of overcrowding on academic performance ($p = 0.099$).

Table 5. One-Way ANOVA for Differences by Environmental Characteristics (N = 747)

Variable	Categories	N
Practical Class Size	Less than 25	118
	25 - 50 students	452
	More than 50	177
PC	PS	AO
M ± SD	M ± SD	M ± SD
29.34 ± 9.52	19.57 ± 6.09	32.10 ± 4.60
34.75 ± 8.75	20.95 ± 6.34	30.00 ± 5.06
37.61 ± 8.22	22.47 ± 5.16	29.55 ± 5.67
	<i>F-value (p-value)</i>	
31.788 (0.000*)	8.448 (.000*)	9.776 (0.000*)
Practical Class Size	Less than 50	65
	50 - 100 students	190
	More than 100	492
PC	PS	AO
M ± SD	M ± SD	M ± SD
29.61 ± 11.06	20.80 ± 6.84	31.06 ± 5.51
31.90 ± 8.28	21.00 ± 5.98	29.66 ± 5.07
36.27 ± 8.65	21.17 ± 6.06	30.33 ± 5.20
	<i>F-value (p-value)</i>	
28.255 (0.000*)	0.134 (0.875)	2.031 (0.132)
Variable	Categories	N
Attending Crowded Classes (Frequency)	Once	95
	2-3 times	292
	More than 3 times	360
PC	PS	AO
M ± SD	M ± SD	M ± SD
30.63 ± 9.54	21.31 ± 6.63	30.60 ± 5.27
34.53 ± 8.28	20.98 ± 6.34	29.46 ± 4.99
35.65 ± 9.36	21.12 ± 5.77	30.74 ± 5.30
	<i>F-value (p-value)</i>	
11.760 (0.000*)	0.113 (0.893)	5.148 (0.006*)
Weekly Study Hrs	1 - 4 hours	295
	5 - 8 hours	267
	More than 8 hours	185

Variable	Categories	N
PC	PS	AO
M ± SD	M ± SD	M ± SD
33.94 ± 9.28	21.30 ± 6.15	28.98 ± 5.34
35.40 ± 8.81	20.80 ± 5.99	30.88 ± 5.18
34.40 ± 9.22	21.18 ± 6.21	31.25 ± 4.62
<i>F-value (p-value)</i>		
1.853 (0.157)	0.507 (0.602)	14.616 (.000*)

* Significant at the 0.05 level, PC: Perceived Crowding, PS: Perceived Stress, AO: Academic Outcomes.

The results demonstrated that classroom size (both practical and theoretical) and the frequency of attendance in crowded classrooms play a crucial and significant role ($p=0.000$). Regarding perceived stress, the size of the practical classroom was the only environmental variable that produced a statistically significant difference ($p=0.000$).

Concerning academic performance, the results showed a highly significant impact of the size of practical classrooms ($p=0.000$) and the frequency of attendance in crowded classrooms ($p=0.006$), and the number of weekly study hours ($p=0.000$).

Discussion

The demographic profile indicates that the majority of participants are in their early adulthood, aligning with the typical age distribution of university students in their early academic stages. It goes without saying that such a period of life plays an important role in the formation of students' body, psyche, and skills in terms of studies. Naturally, psychological and social pressures are expected to become stronger in connection with the specified reasons. It is possible to note that the prevalence of females among the sample is in line with the general trend according to which females are more inclined to study at health care facilities [19], [20]. The mentioned information is relevant since it is known that females usually feel themselves more stressed than males. Moreover, the majority of students are not married. In turn, it can be explained by the fact that students' age does not allow them to concentrate on marriage yet [21], [22].

There is no doubt that socioeconomic factors matter as well. For example, some people are satisfied with their family's financial state, but others find it inadequate, and the latter problem has a direct connection with stress. In other words, insufficient money leads to poor academic performance because students cannot buy all necessary things [23]. As for the place of living, the great number of students focuses on studying exclusively and lives with his or her family members. This situation helps reduce psychological stress due to providing money and support [22]. However, this advantage may be offset by the need to get to class every day since some students spend a lot of time travelling to the university campus. Long trips are associated with fatigue and lack of comfort [24]. These reasons may have indirect impact on mental state and academic activity.

As for the classroom atmosphere, it is possible to note that many students perceive classrooms as highly overcrowded, meaning that this is the case for health care students. The finding corresponds to the recent investigation revealing that over crowdedness affects students' performance negatively [7]. At the same time, the current literature states that such conditions as high classroom density restrict the possibility for students to participate actively and receive adequate attention from teachers. In its turn, this factor causes psychological stress [10]. Moreover, it is stated that the characteristics of the classroom itself affect the process of learning [25]. High classroom density is associated with such negative effects on learners as a reduction in student motivation, concentration, and scores [26].

The assessment of students' perception concerning the level of experienced stress shows that most university learners have a moderate or high level of stress. Moreover, very few people report having low stress. The specified fact means that stress is a regular component of university learners' academic life. According to recent investigations, university students undergo a great deal of stress that can lead to deterioration of their psychological well-being and educational activities [19], [20], [21], [22], [23], [24], [25], [26], [27]. In its turn, it should be stated that moderate stress is considered to be the norm nowadays. In spite of this, it may be useful in order to motivate students to study provided there are appropriate coping strategies.

The analysis has shown a direct positive correlation between the level of crowding and experienced stress. It means that people who live in overcrowded spaces tend to suffer from high stress level. At the same time, such a relationship is consistent with the recent literature suggesting the direct connection between students' stress and their density in classroom] 28[. Moreover, crowding is considered to be an essential reason for people to experience stress and lose comfort [27]. At the same time, it should be stated that the relationship between perceived congestion and academic performance is not significant. The explanation is that students are able to cope with the specified condition and provide good academic performance [28].

Moreover, it is possible to state that the size of practical classes plays a significant role since in larger practical groups there are more restrictions that can cause students to feel uncomfortable. The mentioned problem is consistent with the results of the recent studies indicating that overcrowded practical groups have negative impacts on learners' well-being]19[. On the other hand, large groups of learners attending theoretical lectures feel themselves uncomfortable in the specified conditions but do not have high stress levels and scores. Additionally, frequent attendance in crowded classrooms heavily impacts both perceived crowding and academic outcomes, while the amount of weekly study hours independently affects academic success. These outcomes validate those behavioral habits and the physical learning environment concurrently shape academic performance]27[. Ultimately, optimizing the size of practical sessions and reducing exposure to highly packed classrooms are essential strategies to minimize perceived congestion and support students' overall academic and psychological resilience.

CONCLUSION

Fundamental Finding : Performing linear regression analysis of the influence of overcrowding on stress and academic achievements showed statistically significant positive associations between crowding and stress, whereas no statistically significant link between overcrowding and poor academic performance was found. **Implication :** Educational institutions should offer students assistance in managing academic stress effectively by providing students with appropriate psychological support and stress management programs. Faculty and academic administration should try to foster a supportive learning environment that would not unnecessarily expose students to stressors. **Limitation :** Overcrowding is an environmental factor common among health and nursing students that reflects some problems with the academic setting. **Future Research :** It is recommended for future researchers to consider additional psychological and environmental factors affecting the academic performance and stress levels of nursing students.

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***Ameer Jawad Obiad (Corresponding author)**

Middle Euphrates University, Iraq

Email: ameerobaid@atu.edu.iq

Akeel Muslim Adel

Middle Euphrates University, Iraq

Email: akeel.alasadi@atu.edu.iq

Riyad Saad Atshan

Al-Furat Al-Awsat Technical University, Iraq

Email: riyadh.atshan.iku@atu.edu.iq

Asaad M. Masyab Almihrab

Al-Furat Al-Awsat Technical University, Iraq

Email: asaad.musaib@atu.edu.iq
