



## War-related trauma and post-traumatic stress disorder prevalence among Syrian university students

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### ABSTRACT

**Background:** Posttraumatic stress disorder (PTSD) is one of the most prevalent mental disorders in war-affected regions. Syria has endured 9 years of war and yet little is known about the impact of the conflict on the well-being of Syrians who remain. In this study, we investigated trauma and estimated PTSD prevalence among university students in Deir-ez-Zor, a Syrian governorate that was under the siege by ISIS for over 3 years.

**Methods:** A descriptive cross-sectional study design was used on a sample of Al-Furat university students in Deir-ez-Zor. We collected data on socio-demographics, trauma exposure, and stress levels. PTSD Checklist for DSM-5 was used to provide prevalence rate estimates, and determine the symptom severity among Syrian university students. Binary logistic regression was used to identify factors associated with the development of PTSD symptoms.

**Results:** A total of 833 students were recruited into the study, 86.4% of the participants were exposed to at least one traumatic event. The estimated PTSD prevalence was 28.2%, and the highest PTSD rates were found among students who were forced into sexual act (46.3%). A significant association was found between PTSD and internal displacement ( $p = .032$ ), academic year ( $p = .002$ ), and social economic status ( $p = .000$ ). Binary logistic regression indicated that PTSD symptoms were predicted by smoking and third-year university students.

**Conclusions:** The results presented in this research revealed a high prevalence of trauma exposure and PTSD symptoms among a sample of university students in Deir-ez-Zor. These findings call for immediate actions to help the affected population in restoring their mental health, so they can be prepared to face the challenges and demands of the post-conflict period.

### Prevalencia de Trauma relacionado con la guerra y trastornos por estrés postraumático entre estudiantes universitarios sirios

**Antecedentes:** El trastorno de estrés postraumático es uno de los trastornos mentales más prevalentes en las regiones afectadas por la guerra. Siria ha soportado 9 años de guerra y, sin embargo, se sabe poco sobre el impacto del conflicto en el bienestar de los Sirios que quedan. En este estudio, investigamos el trauma y estimamos la prevalencia de TEPT entre estudiantes universitarios en Deir-ez-Zor, una gobernación Siria que estuvo bajo el asedio de ISIS durante más de 3 años.

**Métodos:** Se utilizó un diseño de estudio descriptivo transversal en una muestra de estudiantes universitarios de Al-Furat en Deir-ez-Zor. Recopilamos datos sociodemográficos, sobre exposición al trauma y niveles de estrés. Se utilizó la lista de verificación de TEPT para el DSM-5 para proporcionar estimaciones de la tasa de prevalencia y determinar la gravedad de los síntomas entre los estudiantes universitarios sirios. Se utilizó regresión logística binaria para identificar factores asociados con el desarrollo de síntomas de TEPT.

**Resultados:** Un total de 833 estudiantes fueron reclutados para el estudio, el 86,4% de los participantes estuvieron expuestos a al menos un evento traumático. La prevalencia estimada de TEPT fue del 28,2%, y las tasas más altas de TEPT se encontraron entre los estudiantes que fueron forzados a tener relaciones sexuales (46,3%). Se encontró una asociación significativa entre el TEPT y el desplazamiento interno ( $p = .032$ ), el año académico ( $p = .002$ ) y el estatus socioeconómico ( $p = .000$ ). La regresión logística binaria indicó que los predictores de síntomas del TEPT fueron tabaquismo y cursar tercer año de Universidad.

**Conclusiones:** Los resultados presentados en esta investigación revelaron una alta prevalencia de exposición al trauma y síntomas de TEPT entre una muestra de estudiantes universitarios en Deir-ez-Zor. Estos hallazgos exigen acciones inmediatas para ayudar a la población afectada a recuperar su salud mental, para que pueda estar preparada para enfrentar los desafíos y demandas del período posconflicto.

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### PALABRAS CLAVE

Trastorno De Estrés Postraumático; Prevalencia; Exposición Al Trauma; Estudiantes; Siria; Guerra

### 关键词

创伤后应激障碍; 流行率; 创伤暴露; 学生; 叙利亚; 战争

### HIGHLIGHTS

- In this cross-sectional study, we investigated trauma and PTSD prevalence among university students in Deir-ez-Zor, a Syrian governorate that was under the siege by ISIS for over 3 years.
- PTSD Checklist for DSM-5 was used to provide prevalence rate estimates, and determine the symptom severity among Syrian university students.
- Binary logistic regression was used to identify factors associated with the development of PTSD symptoms.
- We found a high prevalence of trauma exposure and PTSD among the 833 university students who participated in the study.
- These findings call for immediate actions to help the affected population in restoring their mental health, so they can be prepared to face the challenges and demands of the post-conflict period.

### 叙利亚大学生中战争相关创伤和创伤后应激障碍流行率

**背景:** PTSD 是受战争影响地区最普遍的精神障碍之一。叙利亚已经经历了 9 年的战争, 但对冲突对留下来的叙利亚人幸福感的影响知之甚少。在本研究中, 我们考查了代尔祖尔 (一个被 ISIS 围困了 3 年多的叙利亚省) 大学生的创伤和 PTSD 流行率。

**方法:** 在一个代尔祖尔阿尔富拉特大学的大学生样本使用了描述性横断面研究设计。我们收集了关于社会人口统计学, 创伤暴露和压力水平的数据。使用 DSM-5 PTSD 检查表提供流行率估计值, 并确定叙利亚大学生的症状严重程度。使用二元逻辑回归识别与 PTSD 症状发展相关因素。

**结果:** 共招募了 833 名学生参与研究, 86.4% 的参与者至少经历过一次创伤事件。估计的 PTSD 流行率为 28.2%, 在被迫进行性行为的学生中发现 PTSD 发生率最高 (46.3%)。发现 PTSD 与国内流离失所 ( $p=.032$ ), 学年 ( $p=.002$ ) 和社会经济地位 ( $p=.000$ ) 之间存在显著关联。二元逻辑回归表明 PTSD 症状由以下因素预测: 吸烟和三年级大学生。

**结论:** 本研究结果显示, 代尔祖尔大学生样本中创伤暴露和 PTSD 症状的流行率很高。这些结果呼吁立即采取行动去帮助受害者恢复心理健康, 以便他们准备好迎接冲突后时期的挑战和要求。

## 1. Background

Posttraumatic stress disorder (PTSD) constitutes a significant global burden of disease (Ahmadi et al., 2011; Collins et al., 2011; Hoppen & Morina, 2019). A systematic review in conflict-affected populations found that the prevalence of PTSD was 12.9% (Charlson et al., 2016). Accordingly, the largest international Delphi panel was assembled to address PTSD as a public health priority (Collins et al., 2011). Delphi technique is a structured communication method using controlled feedback to reach agreement within a panel of experts.

War and conflict have a substantial impact on mental health, and the consequences affect the population as well as future generations (Carta, Moro, & Bass, 2015). Studies show that PTSD is a prevalent mental disorder in war-torn communities, especially those with no recent history of conflict (Priebe et al., 2010). Specific stressors that may induce PTSD development in war ridden regions include explosions, sexual assaults, imprisonment, kidnapping, displacement under threat, torture, siege, and many other scarring events. (Morina, Stam, Pollet, & Priebe, 2018) One meta-analysis placed the international prevalence of PTSD among adult war survivors at 23.8%, while a recent systematic review reported that 26% of civilian survivors of war across the globe have PTSD (Hoppen & Morina, 2019; ST AMaS, 2015). Finally, studies that focused on war-affected zones revealed that PTSD is prevalent in 35.9% of children in Gaza Strip (Espie et al., 2009), 23.2% of adults in Palestine (Hasanovic, Sinanovic, Selimbasic, Pajevic, & Avdibegovic, 2006), and around 50% of the population in Bosnia Herzegovina (Kinzie, Sack, Angell, Clarke, & Ben, 1989) 48% among traumatized Cambodian children (Perkins, Ajeeb, Fadel, & Saleh, 2018). In 2018, a study was conducted to assess the prevalence of psychological disorders among Syrian children during the Syrian war crisis, PTSD (35.1%) was found to be the most prevalent disorder (Omar, 2020)

Studies with Syrian refugees in neighbouring countries have been the only indicators so far of the mental health situation for Syrians where the numbers of refugees has soared to 5.6 million (Alpak et al., 2015); Turkey, Jordan, Lebanon, and Iraq are among the leading countries for asylum (Al-Shagran, Khasawneh, Ahmed, & Jarrah, 2015; Gharibah & Mehchy, 2020; Ibrahim & Hassan, 2017; Kazour et al., 2017). The estimated prevalence of PTSD was reported as 33.5%, 31%, 35.4%, and 60% respectively. A further 6.6 million Syrians are internally displaced, some more than once (Alpak et al., 2015). Hence, no studies about the prevalence of PTSD among university students during the Syrian war crisis have been conducted. We selected university students as our study sample, due to the high susceptibility of trauma exposure, as evidenced by various studies. (Breslau et al., 1998; Scarpa et al., 2002; Vrana & Lauterbach, 1994) Students who develop PTSD demonstrate a higher risk for substance misuse than their non-PTSD counterparts, where smoking is chosen as a refuge to cope with these stress-related symptoms. (Association Psychiatric Pub, 2013; Ibrahim, Ertl, Catani, Ismail, & Neuner, 2018) Previous findings suggest that trauma exposure is related to both academic achievement and university drop out. (Boyras, Granda, Baker, Tidwell, & Waits, 2016). Understanding the association between PTSD factors such as stress, smoking habits, and socio-demographic characteristics in this sensitive group is crucial for identifying a target population to provide the necessary treatment and support required in this pernicious time.

The crisis in Syria has surpassed its ninth year with no sign of any political solution emerging soon. The war has had catastrophic impacts on the country's population with a plethora of negative factors that affect psychological health. A few of these factors include, traumatic violations, socioeconomic disadvantages, poverty, lack of education, dense residential areas, racism, sexual abuse, isolation, and shortages in

food and health services. (Read, Ouimette, White, Colder, & Farrow, 2011) Regions of North-East Syria consisting of 3 governorates (Ar-Raqqah, Deir-ez-Zor and Al-Hasakah) have been living under siege of Islamic State of Iraq and the Levant (ISIS) for over 3 years with currently only 2 functioning hospitals (Cusack et al., 2019). During this period, the residents suffered from the daily terrorism that was exercised by ISIS. Populations formerly and currently outside government control, as well as those under siege throughout the war, constitute a higher-risk population in terms of both risks of PTSD as well as unavailability of diagnosis and therapy treatment.

The aim of this study is to provide an estimated prevalence of PTSD among trauma-exposed university students in Deir-ez-Zor, Syria, a war ridden region. The objectives are to study the different types of trauma to which the students were exposed to, study the association between PTSD and multiple covariates including, socio-demographic characteristics, smoking habits, academic performance, and stress levels, and identify factors that influence the development of PTSD symptoms.

## 2. Materials and methods

### 2.1. Setting

This study took place in January 2017, at the main assembly hall of the university campus. Our target population was the students of Al-Furat University in Deir-ez-Zor who were invited to the event via their university emails. Students gave written consent to participate in the study. The sample size calculated was 323 students based on error margin 5%, and confidence level of 95%, for a population of 2000 students using a sample size calculator website: [http://www.raosoft.com/sample\\_size.html](http://www.raosoft.com/sample_size.html). Sampling was conducted by using an electronic random sampling table where each student was given a unique number, and 1000 numbers were randomly generated. We only had the capacity to facilitate the survey among this number of students. A value of  $P < 0.05$  was considered statistically significant.

### 2.2. Study design and participants

This descriptive cross-sectional study included participants studying at Al-Furat University, living in Deir-ez-Zor (regions under control of the Syrian government), and had never been forcibly displaced to another Syrian governorate. The exclusion criteria of the study included the participants who were not previously or currently diagnosed with any mental illness or substance use disorders, to easily and safely facilitate the survey, and not affect the outcomes and goals of the study. Participants' electronic database medical records were checked for mental health diseases and substance use

disorders. Finally, all subjects must have agreed voluntarily to participate in the study. We excluded anyone who did not meet these inclusion criteria.

### 2.3. Study instrument

For the purpose of this study, we designed a questionnaire that consisted of two parts. The first part included socio-demographic information questions about age, gender, education status, marital status, smoking, family economic status, internal displacement, harm caused by the conflict, stressful life events, and any life-threatening traumas experienced by the participant or his/her family. Stress was measured by assessing the occurrence of stressful events, but not traumatic. Participants endorsed whether an event had occurred over the last 12 months via a yes/no response. Stressful events included serious illness or injury, broken relationship, laid off or fired from a job, failed exams, failed year, etc. The responses from each participant with 'yes' coded as 1 and 'no' coded as 0. Scores were divided into normal (0–3), mild (4–6), moderate (7–9), severe (10–12), and extremely severe ( $x < 12$ ). Stress was measured by assessing the occurrence of stressful events, but not traumatic. Participants endorsed whether an event had occurred over the last 12 months via a yes/no response. Stressful events included serious illness or injury, broken relationship, laid off or fired from a job, failed exams, failed year, etc. The responses from each participant with 'yes' coded as 1 and 'no' coded as 0. Scores were divided into normal (0–3), mild (4–6), moderate (7–9), severe (10–12), and extremely severe ( $x < 12$ ). (Cusack et al., 2019) Trauma exposure was assessed using 10 scenarios, students chose between the scenarios they witnessed and/or experienced, these were recorded as the number of traumatic exposures. The subsections were validated from previous questionnaires and reviewed by two physician specialists in the field of psychiatry. (Al-Shawi, Al-Hemiary, Al-Diwan, & Tahir, 2011; Berenz et al., 2016; Nwoga, Audu, & Obembe, 2016) The second part was a PTSD Checklist for DSM-5 (PCL-5), a 20-item self-report measure that assesses the 20 DSM-5 symptoms for PTSD diagnosis (Fortney et al., 2016). The questions assessed PTSD symptoms with a 4-point severity scale: 0 (not at all), 1 (a little bit), 2 (moderately), 3 (quite a bit), 4 (extremely). PTSD symptom clusters were divided into the following: 1 – re-experiencing memory, 1 – persistent avoidance, 2 – negative alternations in mood and cognitions, and 2 – alterations in arousal and reactivity, with a score between 31 and 33 was considered significant for meeting probable diagnosis criteria of PTSD based on instrument standards (Othieno, Okoth, Peltzer, Pengpid, & Malla, 2015). For this study, we used the Arabic version of PCL-5 that was validated for evaluating PTSD in a previous study (Pereira et al., 2018). The English and Arabic versions of the questionnaire and PCL-5 are available in Appendix 1.

## 2.4. Data analysis

Data entry and analysis were done using Statistical Package for Social Sciences (SPSS) version 23. Frequencies and percentages were used to present socio-demographic information in addition to distribution of PTSD according to the number of experienced traumas, types of traumas, and stress levels. One-way analysis of variance (ANOVA) was used to study the association between PTSD and stress levels, economic status, number of failed years, and current university year, while Pearson chi-square test was employed to study the association between estimated PTSD prevalence, and gender, displacement and water pipe smoking. Binary logistic regression using backwards stepwise method was run, with PTSD as the outcome variable to identify potential predictors among the demographic variables: gender, smoking, economic status, year group, exposure to traumatic events, failed courses, and. The accepted confidence interval, and *p*-value were 95%, and <0.05, respectively.

## 3. Results

### 3.1. Socio-demographic characteristics of participants

Of 833 participants, the mean was  $22.4 \pm 3.2$  years and the majority (52.3%) was in the age group 22–25 years. The majority were females (67.1%), single (85.4%),

and had a fair economic status (income that provides essential needs for the family but no luxury) (56.8%). Poor income does not provide essential needs of the family, good income provides essential needs and some luxury, and excellent income provides luxury needs. The percentage of smokers was 23.3%, and 91.5% of those had started smoking within the year preceding the study. A total of 78.6% of the participants had been internally displaced as a result of conflict. Of those, 22.2% have been displaced 3 times, while 18.8% were displaced over 5 times. Regarding the academic performance, 26.2% of the participants failed in more than 10 courses, while 29.5% failed in one academic year. Finally, 40.0% of the participants reported that the crisis had a major impact on their grade point average (GPA). Details on socio-demographic data of our sample are available in (Table 1).

### 3.2. Exposure to traumatic events and estimated PTSD prevalence

Out of the 833 participants, 720 (86.4%) reported experiencing at least one traumatic event (Figure 1). According to the PCL-5, 28.2% of the participants met the full criteria for probable PTSD diagnosis (score >31). Information on sample distribution based on trauma exposure and estimated PTSD diagnosis is summarized in (Table 2).

**Table 1.** Socio-demographic characteristics of participants.

Variable		N	%	Variable		N	%
Gender	Male	274	32.9	Internal displacement	No	178	21.4
	Female	559	67.1		Yes	655	78.6
Current academic year	1	137	16.4	Number of times internally displaced	1	141	16.9
	2	169	20.3		2	127	15.2
	3	218	26.2		3	185	22.2
	4	250	30.0		4	142	17
	5	59	7.1		5	81	9.7
Age in groups	<22 years	369	41.8	>5	157	18.8	
	22–25 years	461	52.3	Students fields of education	Medical	264	29.89
	≥25 years	53	6.0		Engineering	301	34.04
Smoking status	No	603	72.4	Humanities	318	36.01	
	Cigarettes	194	23.3	Number of failing courses	0	8	1
	Bubbly	36	4.3		1	47	5.6
	Total	833	100.0		2	84	10.1
Economic Status	Poor <sup>a</sup>	159	19.1		3	80	9.6
	Fair <sup>b</sup>	473	56.8		4	69	8.3
	Good <sup>c</sup>	169	20.3		5	72	8.6
	Excellent <sup>d</sup>	32	3.8		6	46	5.5
GPA <sup>e</sup>	> 50	261	31.3		7	42	5
	> 60	264	31.7		8	63	7.6
	> 70	216	25.9		9	50	6
	> 80	62	7.4	10	54	6.5	
	> 90	30	3.6	> 10	218	26.2	
Number of failing years	0	30	6.7	Total	833	100.0	
	1	246	29.5	Crisis effect on GPA	None	30	3.6
	2	244	29.3		Minor	92	11
	3	159	19.1		Average	150	18
	4	71	8.5		Major	333	40
	5	57	6.8		Reason for failure	228	27.4

<sup>a</sup>Poor: income does not provide essential needs of the family.

<sup>b</sup>Fair: income provides essential needs of the family but no more.

<sup>c</sup>Good: income provides essential needs and some luxury.

<sup>d</sup>Excellent: income provides luxury needs.

<sup>e</sup>100 is the maximum given grade

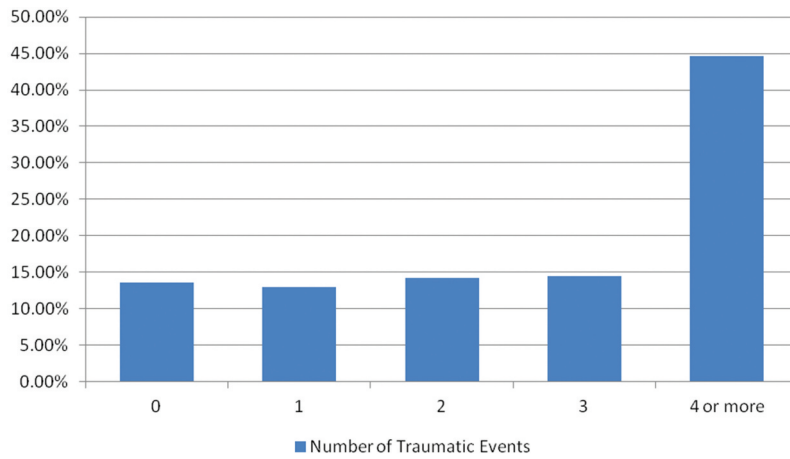


Figure 1. Exposure to traumatic events and PTSD prevalence.

Table 2. Sample distribution according to trauma exposure and PTSD diagnosis.

PTSD presence	Number of exposed traumatic events	Frequency	%
No PTSD	0	113	18.9
	1	89	14.9
	2	88	14.7
	3	87	14.5
	4 and more	221	37
	Total	598	100.0
PTSD	1	19	8.1
	2	31	13.2
	3	34	14.5
	4 and more	151	64.3
	Total	235	100.0

(41.7%). PTSD was also present among participants who witnessed a serious car/work accident (37.9%), an action in which someone was hurt badly (37.7%), worked in non-combat work in a war zone (36.5%), had a life-threatening illness (35.9%), and who experienced the death of a family member or a close friend (35.2%). The lowest prevalence of PTSD was among participants who witnessed violent natural or war-related crisis (33.8%). The most experienced/witnessed traumatic event was witnessing an action in which someone was hurt badly 470 (56.4) while the least was being forced into sexual act 80 (9.6%), (Table 3) summarizes these results.

### 3.3. Types of trauma

Concerning the different types of traumatic events, the following represent the percentages of students who had been exposed to a traumatic event and that also fell above the PTSD cut off. We observed that PTSD was most prevalent among participants who were forced into sexual acts (46.3%). Next were participants who witnessed childhood trauma or violence and those who witnessed violence as adults (42.6%) followed closely by participants who had suffered a war related accident or feared dying or getting hurt

### 3.4. Stress and PTSD

The chi-square test was employed to study the association between PTSD prevalence, and stress levels. Sample distribution over stress levels was as follows: normal (39.5%), mild (16.0%), moderate (17.8%), severe (17.3%), and extremely severe (9.8%). A statistically significant association was found between PTSD prevalence and stress severity ( $p < .001$ ). A total of 36% of students with no PTSD had normal stress levels, while 3.5% of students with

Table 3. Types of trauma distribution among the students, and PTSD prevalence within each trauma subtype among the exposed group and total sample.

Type of trauma	N(%)	PTSD prevalence (within exposed group) (%)	PTSD prevalence (within total sample) (%)
Had serious car/work accident	269(32.3)	37.9	12.2
Worked non-combat work in a war zone	230(27.6)	36.5	10.1
Witnessed violent natural or war related crisis	390(46.8)	33.8	15.8
Diagnosed with life-threatening illness	64(7.7)	35.9	2.8
Witnessed childhood trauma or violence	188(22.6)	42.6	9.6
Witnessed violence as adults	242(29.1)	42.6	12.4
Forced into sexual act	80(9.6)	46.3	4.4
Hurt by an accident or feared getting hurt or dying	372(44.7)	41.7	18.65
Experienced death of family member or close friend	443(53.2)	35.2	18.75
Witnessed an action in which someone was hurt badly	470(56.4)	37.7	21.2

**Table 4.** The relationship between stress levels and PTSD.

		Stress level * PTSD Cross tables			Chi-Square test		
		PTSD Presence			Total	Chi-Square	p-value
		No PTSD	PTSD				
Stress	Normal	Count	300	29	329	169.115	0.000*
		within Stress Strength(%)	91.2	8.8	100		
		within PTSD(%)	50.2	12.3	39.5		
		Total(%)	36.0	3.5	39.5		
	Mild	Count	108	22	130		
		within Stress Strength(%)	83.1	16.9	100		
		within PTSD (%)	18.1	9.4	15.6		
		Total(%)	13.0	2.6	15.6		
	Moderate	Count	93	55	148		
		within Stress Strength(%)	62.8	37.2	100		
		within PTSD(%)	15.6	23.4	17.8		
		Total(%)	11.2	6.6	17.8		
	Severe	Count	65	79	144		
		within Stress Strength(%)	45.1	54.9	100		
		within PTSD(%)	10.9	33.6	17.3		
		Total	7.8	9.5	17.3		
	Extremely Severe	Count	32	50	82		
		within Stress Strength(%)	39.0	61.0	100		
		within PTSD(%)	5.4	21.3	9.8		
		Total(%)	3.8	6.0	9.8		
Count		598	235	833			
Total	within Stress Strength(%)	71.8	28.2	100			
	within PTSD(%)	100.0	100.0	100			
	Total	71.8	28.2	100			

**Table 5.** Socio demographic variables and PTSD.

		Gender * PTSD Cross tabulation			Chi-Square test	
		Gender		Total	Chi-Square	p-value
		Male	Female			
PTSD	Not PTSD	171	373	544	0.013	0.486
	PTSD	72	154	226		
Changing Residence * PTSD Cross tabulation		Changing Residence		Total	Chi-Square test	p-value
PTSD	Not PTSD	138	460	598	3.682	0.032*
	PTSD	40	195	235		
Smoking/bubbly * PTSD Cross tabulation		PTSD		Total	Chi-Square test	p-value
Smoking/bubbly	No	440	163	603	1.6	0.452
	Yes	134	60	194		
	Previous Smoker	24	12	36		
Economic Statues * PTSD Cross tabulation		PTSD		Total	Chi-Square test	p-value
Economic Statues	Bad	90	69	159	22.8	0.000*
	Median	353	120	473		
	Good	130	39	169		
	Excellent	25	7	32		
Current Class * PTSD Cross tabulation		PTSD		Total	Chi-Square test	p-value
Current Class	Not PTSD	100	37	137	16.857	0.002*
	First Year	117	52	169		
	Second Year	177	41	218		
	Third Year	169	81	250		
	Fourth Year	35	24	59		
No. Years Of Failure * PTSD Cross tabulation		PTSD		Total	Chi-Square	p-value
No. Years Of Failure	Not PTSD	41	15	56	8.82	0.117
	There isn't	178	68	246		
	1	177	67	244		
	2	114	45	159		
	3	56	15	71		
	4	32	25	57		

**Table 6.** Binary logistic regression for variables associated with post-traumatic stress symptoms.

Variable	B	p-value	OR	95% C.I. for OR	
				Lower	Upper
Dependent Variable: PTSD vs No PTSD					
Gender (Female vs male)	0.359	0.080	1.432	0.958	2.140
Smoking (No vs Yes)	-1.349	0.034*	0.259	0.075	0.900
Economic Status (Bad vs Excellent)	0.761	0.121	2.141	0.819	5.598
Economic Status (Moderate vs Excellent)	0.030	0.949	1.031	0.408	2.602
Economic Status (Good vs Excellent)	-0.001	0.998	0.999	0.377	2.650
Current Class		0.036*			
Current Class (Second year vs fifth year)	-0.246	0.472	0.782	0.400	1.528
Current Class (Third year vs fifth year)	-0.820	0.019*	0.441	0.222	0.873
Current Class (Fourth year vs fifth year)	-0.132	0.689	0.876	0.459	1.672
Current Class (First year vs fifth year)	-0.319	0.382	0.727	0.356	1.485
Exposed traumatic events (0 vs 1,2,3,4 and more)	-20.315	0.996	0.000	0.000	0.000
failing years (0 vs 1,2,3,4,5)	0.004	0.990	1.004	0.491	2.056
Failing years		0.293			
Failing years (2 vs1)	-0.103	0.638	0.902	0.586	1.388
Failing years (3 vs1)	-0.047	0.847	0.954	0.591	1.539
Failing years (4 vs1)	-0.353	0.307	0.703	0.357	1.382
Failing years (5 vs1)	0.559	0.110	1.749	0.882	3.470
Failing courses (0 vs 1,2,3,4,5,6,7,8,9,10,>10)	0.494	0.584	1.639	0.279	9.628
Changing Residence (Yes vs No)	0.341	0.115	1.407	0.920	2.151

probable PTSD had normal stress levels. Additional details are available in (Table 4).

### 3.5. Socio-demographic variables and PTSD

No significant association was found between estimated PTSD prevalence and gender (chi-square = 0.01,  $p = .486$ ), number of failing years (chi-square = 8.82,  $p = .117$ ), or smoking habits (chi-square = 1.60,  $p = .452$ ). On the other hand, we found a significant relation between internal displacement and estimated PTSD prevalence (chi-square = 3.68,  $p = .032$ ), where 83% of participants who met PTSD criteria for probable diagnosis had changed their residence. Moreover, a significant association was found between the current academic year and PTSD (chi-square = 16.86,  $p < .001$ ) as the highest rates of PTSD were noticed among fourth-year students (9.7%). Finally, PTSD was significantly prevalent among people of poor (8.3%) and fair (14.4%) economic status (Figure 1), which suggests a significant association between PTSD and the economic status (chi-square = 22.80,  $p < .001$ ). In total, 29.4% and 51.1% of participants who met probable PTSD diagnosis were of poor income and of fair income. All details are available in Table 5.

Binary Logistic Regression: Binary logistic regression revealed that only smokers (vs. non smokers, OR = 0.259,  $p = .034$ ) and third-year students (vs. fifth year, OR = 0.44,  $p = .019$ ) were significantly associated with PTSD (Table 6).

## 4. Discussion

Years of war and conflict have left their mark on all aspects of life in Syria. In this study, we focused on trauma exposure and estimated PTSD prevalence in

the governorate of Deir-ez-Zor. To the best of our knowledge, this is one of the few studies to estimate PTSD prevalence in a region that had fallen under the control of ISIS. Our target population consisted of university students who were still living in Deir-ez-Zor. Many previous studies investigated trauma exposure and PTSD among college students. In our study, 86.4% of the studied sample reported experiencing at least one traumatic event throughout their lifetime. This value is among the highest reported rates of trauma events, which could be attributed to the exceptionally violent circumstances through which the inhabitants of the governorate of Deir-ez-Zor had experienced. In studies conducted by Boyaz et al. and Read et al., respectively, 52.2% and 66% of the recruited college students reported experiencing a traumatic event that meets criteria for probable PTSD diagnosis according to DSM-V (Boyraz et al., 2016; Read et al., 2011). Moreover, Cusack et al. estimated the lifetime prevalence of traumatic events in a college sample to be 70.0%, of which 66.2% are accidental traumatic events (Cusack et al., 2019). In contrast, the lowest rate of trauma among college students was reported to be 12.4% (Boyraz et al., 2016).

Our results showed that estimated PTSD prevalence among university students was 28.2%. This result is lower than what was reported by Cusack et al. (34.4%) in their study of freshman college students (Cusack et al., 2019). However, it is consistent with what was reported by other studies that focused on samples similar to ours. For instance, in Nigeria, where an internal conflict was raging, the prevalence of PTSD among college students was 23.5% (Nwoga et al., 2016). In Iraq, 22.9% of university students in Baghdad had PTSD (Al-Shawi et al., 2011). Studies

conducted in the United States placed PTSD prevalence among their college students at 19–20% (Berenz et al., 2016; Fortney et al., 2016). Finally, low prevalence rates of PTSD were reported in studies that targeted university students in Kenya (15.8%) Othieno et al., 2015) and Brazil (14.0%) (Pereira et al., 2018).

In studying the different types of traumatic events, our results revealed that being forced into sexual acts, witnessing childhood trauma or violence and witnessing violence as adults were significantly associated with meeting probable PTSD diagnosis. Other studies had shown that the loss of a personal possession with associated threats to life, and the witnessing of the death of a relative or loved ones were significantly associated with having a positive diagnosis of PTSD (Nwoga et al., 2016). Finally, the number of experienced lifetime potentially traumatic events (PTE) was positively associated with PTSD symptoms (Al-Shawi et al., 2011; Berenz et al., 2016; Cusack et al., 2019).

As for demographic variables, we found no significant relation between PTSD diagnosis and gender (chi-square = 0.01,  $p = .486$ ), in contrast of other studies that have concluded that females are at a higher risk of experiencing traumatic events (Berenz et al., 2016; Read et al., 2011), except for one study that reported a lower risk of experiencing traumatic events among females (Tolin & Foa, 2006). This conclusion was also reported by Al-Shawi et al. in their study of PTSD in Iraqi university students (Al-Shawi et al., 2011). However, one systematic review had concluded that females had a higher risk of developing PTSD (Greene, Neria, & Gross, 2016). One way to explain this discrepancy is that females are more likely to experience sexual violence in non-conflict settings. Therefore, they are more susceptible to develop PTSD symptoms when compared to males (Wilson & Keane, 2004). In contrast, violent actions vary and affect both genders in conflict settings. Hence, there is no association between PTSD and gender in these areas. Finally, being internally displaced was found to be correlated with PTSD diagnosis in our study, due to the outcomes of war, many homes are lost, leaving people to shelter in the streets, which can increase the likelihood of experiencing a traumatic event. This was also reached by Cusack et al. in their study of PTSD prevalence among freshman college students (Bryan, Bryan, Hinkson, Bichrest, & Ahern, 2014; Cusack et al., 2019). Regarding the academic performance of our sample, no significant association was found between PTSD and the number of failure years (chi-square = 8.82,  $p$ -value = 0.117); also we identified a significant association between PTSD and the current academic year of the students and PTSD (chi-square = 16.86,  $p < .001$ ) as the highest rates of PTSD were noticed among fourth-year students (9.7%). As final year students, the majority are older than lower years, meaning that they had

a greater opportunity of experiencing more traumatic events. In the literature, the results reported on this matter vary across the studies. In one study, Boyraz et al. found no relation between PTSD and academic achievement (Boyraz, Horne, Owens, & Armstrong, 2013). However, the same authors published a later study that concluded that higher PTSD symptomatology negatively affected students' GPA (Boyraz et al., 2016). An association between PTSD and GPA was also supported by two more studies (Bryan et al., 2014; Cusack et al., 2019).

We found that PTSD was associated with smoking and third-year university students; however, no association was found for gender, and exposure to traumatic events. A study on Syrian refugees in Lebanon could not identify any predictors of PTSD, while a study among Syrian refugees in Turkey revealed that females, exposure to 2 or more traumatic events, and positive family history of psychiatric disorder were associated with PTSD. Another study among Syrian refugees in Jordan revealed that females, and one or both parents died. (Alpak et al., 2015; Beni Yonis et al., 2020; Kazour et al., 2017).

## 5. Limitations

This study was conducted in one Syrian institution that may not be generalized to the whole nation. Another limitation is that we targeted a specific group that may not reflect the actual situation of the overall Syrian population. There may be the need to conduct a similar study on a national level for better generalization. Also, students who were planning to immigrate and those who were indecisive about specialization were not captured in the study, PTSD was not clinically assessed, and the study was cross-sectional in design. As the present study focuses on the severity of PTSD among university students, excluding students with mental illness is a significant limitation of the study. From another perspective, we did not find trusted published data regarding the impact of the Syrian crisis on the mental health care.

## 6. Conclusions

The results presented in this research reveal a high prevalence of trauma exposure and PTSD among university students in a war-affected zone, Deir- ez-Zor. Poor and fair income participants are considered the most vulnerable category for PTSD. These findings call for immediate actions to help the affected population in restoring their mental health, so they can be active members of society to face the challenges and demands of the post-conflict period.



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## Disclosure statement

No potential conflict of interest was reported by the author(s).

## Ethics approval and consent to participate

This study was approved by the institutional review board (IRB) at the Syrian Private University (SPU) and it was rated as a study with humans not on humans. A written consent was obtained of all participants. Participation in the study was voluntary and participants were assured that there would be no victimization of anyone who did not want to participate or who decided to withdraw after giving consent.

## Authors' contributions

YL conceptualized the study, participated in the design, wrote the study protocol, performed statistical analysis and drafted the manuscript. NI participated in the design, did literature search and revision of draft. BS participated in literature search, supervised data collection and revision of draft. OE & HAN participated in design, literature search and revision of draft. All authors read and approved the final draft.

## Competing interests

None of the authors have any competing interests. The authors alone are responsible for the content and writing of the article. No conflict of interest is declared.

## Data availability statement

Data are available within the article or its supplementary materials.

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## References

Ahmadi, N., Hajsadeghi, F., Mirshkarlo, H. B., Budoff, M., Yehuda, R., & Ebrahimi, R. (2011). Post-traumatic stress disorder, coronary atherosclerosis, and mortality. *The American Journal of Cardiology*, 108(1), 29–33. doi:10.1016/j.amjcard.2011.02.340

Alpak, G., Unal, A., Bulbul, F., Sagaltici, E., Bez, Y., Altindag, A., ... Omar, A. (2015). Post-traumatic stress

disorder among Syrian refugees in Turkey: A cross-sectional study. *International Journal of Psychiatry in Clinical Practice*, 19(1), 45–50. doi:10.3109/13651501.2014.961930

- Al-Shagran, H., Khasawneh, O. M., Ahmed, A. K., & Jarrah, A. M. (2015). Post-traumatic stress disorder of Syrian refugees in Jordan. *International Journal of Liberal Arts and Social Science*, 3(3), 36–48.
- Al-Shawi, A. F., Al-Hemiary, N. J., Al-Diwan, J. K., & Tahir, D. H. (2011). Tahir post-traumatic stress disorder among university students in Baghdad: A preliminary report. *Iraqi Journal of Community Medicine*, 24(2), 4.
- Association Psychiatric Association, DSM-5 Task Force. (2013). *Diagnostic and statistical manual of mental disorders (DSM-5®)* (5th ed.). American Psychiatric Publishing, Inc. doi:10.1176/appi.books.9780890425596
- Beni Yonis, O., Khader, Y., Jarboua, A., Al-Bsoul, M. M., Al-Akour, N., Alfaqih, M. A., ... Amarneh, B. (2020). Post-traumatic stress disorder among Syrian adolescent refugees in Jordan. *Journal of Public Health*, 42(2), 319–324. doi:10.1093/pubmed/fdz026
- Berenz, E. C., Kevorkian, S., Chowdhury, N., Dick, D. M., Kendler, K. S., & Amstadter, A. B. (2016). Posttraumatic stress disorder symptoms, anxiety sensitivity, and alcohol-use motives in college students with a history of interpersonal trauma. *Psychology of Addictive Behaviors*, 30(7), 755–763. doi:10.1037/adb0000193
- Boyraz, G., Granda, R., Baker, C. N., Tidwell, L. L., & Waits, J. B. (2016). Posttraumatic stress, effort regulation, and academic outcomes among college students: A longitudinal study. *Journal of Counseling Psychology*, 63(4), 475–486. doi:10.1037/cou0000102
- Boyraz, G., Horne, S. G., Owens, A. C., & Armstrong, A. P. (2013). Academic achievement and college persistence of African American students with trauma exposure. *Journal of Counseling Psychology*, 60(4), 582–592. doi:10.1037/a0033672
- Breslau, N., Kessler, R. C., Chilcoat, H. D., Schultz, L. R., Davis, G. C., & Andreski, P. (1998). Trauma and post-traumatic stress disorder in the community: The 1996 detroit area survey of trauma. *Archives of General Psychiatry*, 55(7), 626–632. doi:10.1001/archpsyc.55.7.626
- Bryan, C. J., Bryan, A. O., Hinkson, K., Jr., Bichrest, M., & Ahern, D. A. (2014). Depression, posttraumatic stress disorder, and grade point average among student servicemembers and veterans. *Journal of Rehabilitation Research and Development*, 51(7), 1035–1046. doi:10.1682/JRRD.2014.01.0012
- Carta, M. G., Moro, M. F., & Bass, J. (2015). War traumas in the Mediterranean area. *International Journal of Social Psychiatry*, 61(1), 33–38. doi:10.1177/0020764014535754
- Charlson, F. J., Flaxman, A., Ferrari, A. J., Vos, T., Steel, Z., & Whiteford, H. A. (2016). Post-traumatic stress disorder and major depression in conflict-affected populations: An epidemiological model and predictor analysis. *Global Mental Health*, 3, e4. doi:10.1017/gmh.2015.26
- Collins, P. Y., Patel, V., Joestl, S. S., March, D., Insel, T. R., Daar, A. S., ... Walport, M. (2011). Grand challenges in global mental health. *Nature*, 475(7354), 27–30. doi:10.1038/475027a
- Cusack, S. E., Hicks, T. A., Bourdon, J., Sheerin, C. M., Overstreet, C. M., Kendler, K. S., ... Amstadter, A. B. (2019). Prevalence and predictors of PTSD among a college sample. *Journal of American College Health*, 67(2), 9.
- Espie, E., Gaboulaud, V., Baubet, T., Casas, G., Mouchenik, Y., Yun, O., ... Moro, M. (2009). Trauma-

- related psychological disorders among Palestinian children and adults in Gaza and West Bank, 2005-2008. *International Journal of Mental Health Systems*, 3(1), 21. doi:10.1186/1752-4458-3-21
- Fortney, J. C., Curran, G. M., Hunt, J. B. (2016). Prevalence of probable mental disorders and help-seeking behaviors among veteran and non-veteran community college students. *General Hospital Psychiatry*, 38, 99-104. doi:10.1016/j.genhosppsy.2015.09.007
- Gharibah, M., & Mehchy, Z. (2020). COVID-19 pandemic: Syria's response and healthcare capacity. <http://eprints.lse.ac.uk/103841/>
- Greene, T., Neria, Y., & Gross, R. (2016). Prevalence, detection and correlates of PTSD in the primary care setting: A systematic review. *Journal of Clinical Psychology in Medical Settings*, 23(2), 160-180. doi:10.1007/s10880-016-9449-8
- Hasanovic, M., Sinanovic, O., Selimbasic, Z., Pajevic, I., & Avdibegovic, E. (2006). Psychological disturbances of war-traumatized children from different foster and family settings in Bosnia and Herzegovina. *Croatian Medical Journal*, 47(1), 85-94.
- Hoppen, T. H., & Morina, N. (2019). The prevalence of PTSD and major depression in the global population of adult war survivors: A meta-analytically informed estimate in absolute numbers. *European Journal of Psychotraumatology*, 10(1), 1578637. doi:10.1080/20008198.2019.1578637
- Ibrahim, H., Ertl, V., Catani, C., Ismail, A. A., & Neuner, F. (2018). The validity of posttraumatic stress disorder checklist for DSM-5 (PCL-5) as screening instrument with Kurdish and Arab displaced populations living in the Kurdistan region of Iraq. *BMC Psychiatry*, 18(1), 259. doi:10.1186/s12888-018-1839-z
- Ibrahim, H., & Hassan, C. Q. (2017). Post-traumatic stress disorder symptoms resulting from torture and other traumatic events among Syrian Kurdish refugees in Kurdistan Region, Iraq. *Frontiers in Psychology*, 8, 241. doi:10.3389/fpsyg.2017.00241
- Kazour, F., Zahreddine, N. R., Maragel, M. G., Almustafa, M. A., Soufia, M., Haddad, R., & Richa, S. (2017). Post-traumatic stress disorder in a sample of Syrian refugees in Lebanon. *Comprehensive Psychiatry*, 72, 41-47. doi:10.1016/j.comppsy.2016.09.007
- Kinzie, J. D., Sack, W., Angell, R., Clarke, G., & Ben, R. (1989). A three-year follow-up of Cambodian young people traumatized as children. *Journal of the American Academy of Child & Adolescent Psychiatry*, 28(4), 501-504. doi:10.1097/00004583-198907000-00006
- Morina, N., Stam, K., Pollet, T. V., & Priebe, S. (2018). Prevalence of depression and posttraumatic stress disorder in adult civilian survivors of war who stay in war-afflicted regions. A systematic review and meta-analysis of epidemiological studies. *Journal of Affective Disorders*, 239, 328-338. doi:10.1016/j.jad.2018.07.027
- Nwoga, C. N., Audu, M. D., & Obembe, A. (2016). Prevalence and correlates of posttraumatic stress disorder among medical students in the University of Jos, Nigeria. *Nigerian Journal of Clinical Practice*, 19(5), 475-486. doi:10.4103/1119-3077.188704
- Omar, A. (2020). Understanding and preventing attacks on health facilities during armed conflict in Syria. *Risk Management and Healthcare Policy*, 13, 191. doi:10.2147/RMHP.S237256
- Othieno, C. J., Okoth, R., Peltzer, K., Pengpid, S., & Malla, L. O. (2015). Traumatic experiences, posttraumatic stress symptoms, depression, and health-risk behavior in relation to injury among University of Nairobi students in Kenya. *The International Journal of Psychiatry in Medicine*, 50(3), 299-316. doi:10.1177/0091217415610310
- Pereira, J. L., Guedes-Carneiro, G. M., Netto, L. R., Cavalcanti-Ribeiro, P., Lira, S., Nogueira, J. F., & Quarantini, L. C. (2018). Types of trauma, posttraumatic stress disorder, and academic performance in a population of university students. *Journal of Nervous & Mental Disease*, 206(7), 507-512. doi:10.1097/NMD.0000000000000842
- Perkins, J. D., Ajeeb, M., Fadel, L., & Saleh, G. (2018). Mental health in Syrian children with a focus on post-traumatic stress: A cross-sectional study from Syrian schools. *Social Psychiatry and Psychiatric Epidemiology*, 53(11), 1231-1239. doi:10.1007/s00127-018-1573-3
- Priebe, S., Bogic, M., Ajdukovic, D., Franciskovic, T., Galeazzi, G. M., Kucukalic, A., ... Schützwohl, M. (2010). Mental disorders following war in the Balkans: A study in 5 countries. *Archives of General Psychiatry*, 67(5), 518-528. doi:10.1001/archgenpsychiatry.2010.37
- Read, J. P., Ouimette, P., White, J., Colder, C., & Farrow, S. (2011). Rates of DSM-IV-TR trauma exposure and posttraumatic stress disorder among newly matriculated college students. *Psychological Trauma: Theory, Research, Practice, and Policy*, 3(2), 148-156. doi:10.1037/a0021260
- Scarpa, A., Fikretoglu, D., Bowser, F., Hurley, J. D., Pappert, C. A., Romero, N., & Van Voorhees, E. (2002). Community violence exposure in university students: A replication and extension. *Journal of Interpersonal Violence*, 17(3), 253-272. doi:10.1177/0886260502017003002
- ST AMaS. (2015). Acute stress disorder in Palestinian children in the Gaza Strip. *International Neuropsychiatric Disease Journal*, 4(2), 11.
- Tolin, D. F., & Foa, E. B. (2006). Sex differences in trauma and posttraumatic stress disorder: A quantitative review of 25 years of research. *Psychological Bulletin*, 132(6), 959-992. doi:10.1037/0033-2909.132.6.959
- Vrana, S., & Lauterbach, D. (1994). Prevalence of traumatic events and post-traumatic psychological symptoms in a nonclinical sample of college students. *Journal of Traumatic Stress*, 7(2), 289-302. doi:10.1002/jts.2490070209
- Wilson, J. P., & Keane, T. M. (2004). *Assessing psychological trauma and PTSD*. Guilford Press. <https://www.guilford.com/books/Assessing-Psychological-Trauma-and-PTSD/Wilson-Keane/9781593850357>