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# Impact of socioeconomic and political stressors on mental health: a cross-sectional study on university students in Lebanon

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## Abstract

A cross-sectional study was conducted investigating the association between exposure to financial, political, academic and social stressors, and symptoms of depression, anxiety and burnout among university students in Lebanon. Lebanon is a developing country experiencing a financial crisis and sociopolitical turmoil with poorly characterized impacts on the mental health of residents. To assess burnout and symptoms of depression, anxiety, a condensed version of the Malach-Pines Burnout Measure and the Patient Health Questionnaire-4 (PHQ-4) were used, respectively. Out of 240 respondents, 52.3% experienced burnout, 29.3% experienced high/very high burnout, and 54.2% reported symptoms of depression, anxiety. Women had poorer mental health outcomes. The strongest associations were between little sleep and burnout (aOR = 6.78, $p < 0.001$) and symptoms of depression, anxiety (aOR = 2.84, $p < 0.001$). Exposure to high financial and COVID-19 pandemic stressors were associated with high levels of burnout and symptoms of depression and anxiety. The results highlight the gravity of the psychological state of university students in Lebanon, as they navigate through the struggles of an uncertain future.

**Keywords** Mental health, Crisis, Economic recession, Uncertainty

## Background

Global crises can trigger diffuse mental health issues [1], as the wellbeing of a population is strongly influenced by socioeconomic status [2]. Recessions drive financial instability, poverty, and unemployment, which creates insecure attachment, negative interpersonal relations, and feelings of helplessness. As a result, poor mental health outcomes like anxiety and depression are expected [1]. Developing countries lack infrastructure to compensate for turbulent socioeconomic conditions, leaving residents vulnerable to negative mental health outcomes. Natural, man-made and industrial disasters have long-lasting mental health effects, with the most frequently encountered problems being post-traumatic-stress-disorder (PTSD), anxiety, and depression [3]. Exposure to

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multiple or recurring disasters causes further deterioration of these outcomes [4].

Such is the case for Lebanon, having experienced a 15-year civil war (1975–1990), various regional clashes like the 2006 July war, and mass-migration following the 2011 crisis in neighboring Syria [5]. These events created generational trauma that was overcome through resilience. Repeated exposure has normalized loss and suffering with little regard for their cost on mental health [6].

In the last five years, Lebanon has endured profound economic, political, and social instability. Most notably, the country faced one of its worst financial collapses in history beginning in late 2019. The Lebanese Lira once pegged at the US dollar at 1,500LBP=$1 devalued, and now exceeds 90,000LBP to the dollar. The end of 2019 marked the beginning of a deteriorating state for Lebanon, which has since experienced shortages in almost all basic necessities, from medication and fuel to bread and cooking oil [7].

When micro and ambient stressors like socioeconomic turmoil are compounded with crises such as the COVID-19 pandemic, mental health is expected to deteriorate proportionately. The pandemic heavily influenced psychological processes such as mortality perception, core belief violation, and feelings of meaninglessness which contributed to declining levels of mental health [8].

The impact of the COVID-19 pandemic was felt worldwide, though its impact was personified in developing countries already in crisis such as Lebanon [9]. When the COVID-19 pandemic reached Lebanon in early 2020, strained healthcare systems were unable to cope. Lockdowns halted business, heightening the economic crisis. Residents were suddenly isolated and traditional communal living was disrupted. In the midst of the crisis, on August 4th, 2020, a nuclear-like explosion in the port of Beirut killed approximately 200 people and displaced 300,000 residents [10]. A recent qualitative study on university students showed that the Beirut blast triggered emotional and traumatic responses in survivors [11]. El Khoury et al. (2022) reported a significantly higher prevalence of major depressive disorder (MDD) two to three months following the explosion [12]. Being physically injured, witnessing casualties, and proximity to the explosion site were associated with a greater likelihood of PTSD and anxiety. Interestingly, children of parents who perceived themselves as more financially comfortable than most were less likely to screen positive for depression, anxiety and PTSD, displaying a link between socioeconomic status and mental health outcomes [10].

Living in Lebanon during this time was stressful physically, emotionally, and mentally. Studies show that students in particular were heavily affected [11, 13, 14]. Academic life experienced serious disturbances due to social and political unrest. Simultaneously, the COVID-19 pandemic prompted an unprecedented transition from in-person to online learning. This unfamiliarity, limited peer-to-peer interaction, and the widespread lack of digital infrastructure markedly decreased students' motivation [15]. Difficulty in adjusting to the online mode of learning, as well as the process of transitioning back to in-person learning, put students under immense psychological and emotional pressure [16]. Notably, education in Lebanon has become hardly accessible because private institutions require payments in dollars or at the black-market exchange rate, which the average resident cannot afford. With people's life savings frozen in banks, university tuition, which was already out of reach for many, has almost become an impossibility [7].

The current multi-fold crisis in Lebanon is uniquely under-researched. Though the Beirut blast and the COVID-19 pandemic have independently been reported on, no studies investigate the combined impact of these factors and the financial crisis on the mental health of students within the context of Lebanon's general collapse. Although the crisis impacted the Lebanese population as a whole, university students face unique losses related to their social and academic life, in addition to financial losses that increase the burden of tuition fees. Such losses generate stressors which we expect have great psychological impacts. This cross-sectional study investigated the impact of the aforementioned stressors (COVID-19 pandemic, financial collapse, Beirut port explosion, and political unrest) on mental health outcomes in students at the American University of Beirut (AUB), with a focus on depression, anxiety, and burnout symptoms.

## Methods

### Study design

A cross-sectional study was conducted between January and May 2023 at AUB. Through LimeSurvey software, the IRB sent survey invites to a random and anonymous list of student emails. Additionally, posters with a QR code to access the survey were displayed concurrently around campus. Participation was voluntary and done entirely via LimeSurvey software. The researchers had no access to student emails. Responses were automatically assigned a random number through the software and no personal identifiers were present.

### Setting

AUB is a private university that houses approximately 8,000 students, mostly Lebanese. It is one of the oldest universities in the Middle East and includes seven faculties. The university practices on the American liberal arts model of higher education. Tuition fees are among the most expensive in Lebanon, but AUB has a financial aid

program which provides need-based grants to students. The university also offers merit-based scholarships.

### Data Collection

All undergraduate sophomores, juniors, and seniors, as well as graduate/medical students over the age of 18 at AUB were eligible for participation in the study. Participants were informed of study aims, confidentiality, and questionnaire contents on the first page of the survey before deciding on proceeding. Participants who continued the survey were acknowledged as consenting to the study. Students below 18 were not permitted to complete the survey. Freshmen were excluded as the majority had not yet declared a major, and participants were categorized by major. Out of 608 survey attempts, 240 students fit the inclusion criteria and made it to the final sample. 34 were excluded due to lack of informed consent, and 334 were excluded due to an incomplete survey.

The survey questionnaire included four sections:

1. Section one entailed questions about students' demographic and family information. Participants were asked about age, class standing, field, cumulative grade point average (GPA), scholarship, housing conditions, job, and parents' occupations and marital status. The survey also included lifestyle questions to gather data on caffeine and nicotine consumption, alcohol consumption, and physical activity.
2. Section two asked participants to rate the impact of stressors using a 5-point Likert scale from 1 (least significant) to 5 (most significant). For each of the four stressors, the 'overall stressor score' was calculated by summing the scores of the five relevant items, yielding a total score between 5 and 25. This total was then converted to a percentage, ranging from 0 to 100. Participants were also asked about details like injuries due to the explosion and life plan changes. They rated the impact of the COVID-19 pandemic, financial collapse, the Beirut blast and political unrest on various aspects of their life such as academic pressure and safety. To ensure internal consistency of the questionnaire results, we calculated Cronbach's alpha for all the items and got a Cronbach's alpha = 0.86, which is a good reliability score.
3. Section three examined mental health. Symptoms of depression, anxiety were assessed using the Patient Health Questionnaire-4 (PHQ-4), a four-item questionnaire combining the GAD-2 (General Anxiety Disorder-2) questionnaire, and the PHQ-2, a shorter version of the PHQ-9 used to screen for depression. Responses on the PHQ-4 are numerically represented as 0 ("not at all"), 1 ("several days"), 2 ("more than half the days"), and 3 ("nearly all the days") [17]. Scores range from normal (0–2), mild (3–5), moderate (6–8), to severe (9–12). Due to the small sample size in each of the categories, we merged the scores into normal/mild (0–5) and moderate/severe (6–12). The PHQ-4 has been validated in Arabic-speaking countries [18]. In our sample, the PHQ-4 demonstrated good reliability (Cronbach's alpha = 0.87).

   Burnout was assessed using the condensed version of the Malach-Pines Burnout Measure (BM). The BM is a 21-item self-report measure of burnout evaluated on 7-point frequency scales. In the 10-item short version of the BM, scores range from little or no burnout (0-2.4), risk for burnout (2.5–3.4), burnout (3.5 or higher), high burnout (4.5–5.4), to very high burnout (5.5 or higher) [19]. Due to the small sample size in each of the categories, scores on the BM were merged into little or no burnout/at risk for burnout (0-3.4), burnout (3.5 and < 4.5), and high/very high burnout (4.5+). Both the 21-item and short version of the BM have been validated in Arabic-speaking countries [19]. In our sample, the BM demonstrated excellent reliability (Cronbach's alpha = 0.90).

4. Section four asked for additional information. It included space for participants to add personal comments about how their well-being was affected by the situation in Lebanon. Supplemental questions such as whether the student has seen a mental health professional in the last three years were also posited.

### Statistical analyses

Data management and analysis were conducted using IBM SPSS version 28 (IBM, New York, NY, USA). Categorical variables were presented using count (%), while continuous variables were presented using mean ± standard deviation (SD). Associations between categorical exposures and categorical outcomes (burnout and symptoms of depression, anxiety) were assessed using the chi-square test or Fisher's exact test, as appropriate. Differences in continuous exposures between outcome groups were assessed using the Kruskal-Wallis test for burnout and the Mann Whitney U Test for symptoms of depression, anxiety as all continuous variables were not normally distributed ($p$-value of the Shapiro-Wilk test < 0.05). Statistically significant variables ($p < 0.20$) and clinically significant variables were entered in a stepwise multinomial logistic regression model to identify risk factors for burnout and in a stepwise multivariable logistic regression to identify risk factors for symptoms of

**Table 1** Associations between sociodemographic variables, burnout and symptoms of depression, anxiety

| Variables | | Burnout (*N* = 222) | | | | Symptoms of Depression, Anxiety (*N* = 238) | | |
|---|---|---|---|---|---|---|---|---|
| | | Little or no burnout /At risk for burnout (*N* = 41, 18.5%) | Burned out (*N* = 116, 52.3%) | High burnout /Very high burnout (*N* = 65, 29.3%) | *p*-value | Normal /Mild (*N* = 109, 45.8%) | Moderate /Severe (*N* = 129, 54.2%) | *p*-value |
| **Age** | **18–25** | 31 (75.6%) | 95 (81.9%) | 53 (81.5%) | 0.665 | 86 (78.9%) | 106 (82.2%) | 0.524 |
| | **> 25** | 10 (24.4%) | 21 (18.1%) | 12 (18.5%) | | 23 (21.1%) | 23 (17.8%) | |
| **Gender** | **Males** | 17 (43.6%) | 36 (32.7%) | 16 (25.8%) | 0.179 | 42 (40.0%) | 31 (25.6%) | **0.021** |
| | **Females** | 22 (56.4%) | 74 (67.3%) | 46 (74.2%) | | 63 (60.0%) | 90 (74.4%) | |
| **Current Class Standing** | **Undergraduate (compared to Graduate)** | 21 (51.2%) | 72 (62.1%) | 41 (64.1%) | 0.380 | 62 (56.9%) | 81 (63.3%) | 0.315 |
| **Major** | **Arts and Business** | 16 (40%) | 23 (21.7%) | 15 (23.8%) | **0.008** | 27 (26.7%) | 32 (26.2%) | 0.780 |
| | **Science/Engineering/Agriculture/Food Sciences** | 11 (27.5%) | 64 (60.4%) | 30 (47.6%) | | 48 (47.5%) | 63 (51.6%) | |
| | **Medicine/Nursing/Health Sciences/Medical-Related** | 13 (32.5%) | 19 (17.9%) | 18 (28.6%) | | 26 (25.7%) | 27 (22.1%) | |
| **Cumulative Grade Point Average (GPA)** | **< 3.00** | 5 (12.2%) | 14 (12.4%) | 11 (17.2%) | 0.568 | 15 (14.2%) | 18 (14.1%) | 0.603 |
| | **3.00-3.49** | 9 (22%) | 23 (20.4%) | 18 (28.1%) | | 20 (18.9%) | 31 (24.2%) | |
| | **3.50+** | 27 (65.9%) | 76 (67.3%) | 35 (54.7%) | | 71 (67%) | 79 (61.7%) | |
| **Living with parents** | | 27 (67.5%) | 71 (65.1%) | 46 (71.9%) | 0.658 | 77 (72.6%) | 80 (65.6%) | 0.250 |
| **If not, do you live on or off campus?** | **Off campus (Far from AUB)/ Off campus (Near AUB)** | 9 (69.2%) | 22 (57.9%) | 12 (70.6%) | 0.588 | 17 (58.6%) | 27 (65.9%) | 0.537 |
| **Approximately how many kilometers do you commute daily from home to university?** | **> 5 (compared to ≤ 5)** | 21 (56.8%) | 56 (52.8%) | 37 (61.7%) | 0.543 | 52 (52%) | 68 (58.1%) | 0.366 |
| **Do you work?** | | 15 (36.6%) | 36 (31%) | 21 (32.3%) | 0.808 | 36 (33%) | 41 (31.8%) | 0.838 |
| **Daily level of physical activity** | **Very low/Low** | 11 (26.8%) | 38 (32.8%) | 23 (35.4%) | 0.522 | 33 (30.3%) | 44 (34.1%) | 0.813 |
| | **Moderate** | 19 (46.3%) | 60 (51.7%) | 32 (49.2%) | | 57 (52.3%) | 63 (48.8%) | |
| | **High/Very high** | 11 (26.8%) | 18 (15.5%) | 10 (15.4%) | | 19 (17.4%) | 22 (17.1%) | |
| **Caffeine** | | 23 (56.1%) | 78 (67.2%) | 45 (69.2%) | 0.339 | 70 (64.2%) | 86 (66.7%) | 0.692 |
| **Nicotine** | | 8 (19.5%) | 19 (16.4%) | 15 (23.1%) | 0.541 | 12 (11%) | 31 (24%) | **0.009** |
| **Alcohol intake** | | 14 (34.1%) | 50 (43.1%) | 27 (41.5%) | 0.602 | 41 (37.6%) | 52 (40.3%) | 0.671 |
| **Parents' marital status** | **Married (compared to non-Married)** | 34 (85%) | 98 (85.2%) | 59 (92.2%) | 0.367 | 97 (89.8%) | 106 (84.1%) | 0.201 |
| **Number of siblings living at home** | **2 siblings or more (compared to 0–1 siblings)** | 17 (45.9%) | 57 (53.3%) | 29 (50.9%) | 0.743 | 59 (57.3%) | 51 (45.5%) | 0.085 |
| **Number of parents living at home** | **2 parents (compared to 0–1 parent)** | 27 (69.2%) | 85 (79.4%) | 46 (79.3%) | 0.393 | 84 (80.8%) | 86 (74.8%) | 0.288 |
| **Number of other family members (incl. helper) living at home** | **2 other family members (incl. helper) (compared to 0–1 other family members (incl. helper))** | 3 (16.7%) | 8 (16%) | 5 (17.2%) | 1.000 | 10 (21.3%) | 6 (10.7%) | 0.140 |

**Table 1** (continued)

| Variables | | Burnout (*N* = 222) | | | | Symptoms of Depression, Anxiety (*N* = 238) | | |
|---|---|---|---|---|---|---|---|---|
| | | Little or no burnout /At risk for burnout (*N* = 41, 18.5%) | Burned out (*N* = 116, 52.3%) | High burnout /Very high burnout (*N* = 65, 29.3%) | *p*-value | Normal /Mild (*N* = 109, 45.8%) | Moderate /Severe (*N* = 129, 54.2%) | *p*-value |
| **Mother Education** | **Bachelor's/Master's/PhD/MD (compared to High School and below)** | 22 (53.7%) | 67 (58.3%) | 41 (65.1%) | 0.481 | 65 (59.6%) | 74 (59.2%) | 0.946 |
| **Father Education** | **Bachelor's/Master's/PhD/MD (compared to High School and below)** | 22 (53.7%) | 65 (56%) | 42 (65.6%) | 0.364 | 66 (60.6%) | 72 (56.7%) | 0.549 |
| **One or more of the parents working** | **None** | 8 (21.6%) | 9 (8.6%) | 6 (10.9%) | 0.271 | 11 (11.2%) | 12 (11%) | 0.588 |
| | **At least one of them working** | 26 (70.3%) | 90 (85.7%) | 46 (83.6%) | | 78 (79.6%) | 91 (83.5%) | |
| | **Working in medicine** | 3 (8.1%) | 6 (5.7%) | 3 (5.5%) | | 9 (9.2%) | 6 (5.5%) | |
| **Any of parents is an MD** | | 3 (8.3%) | 6 (5.8%) | 3 (5.6%) | 0.849 | 9 (9.2%) | 6 (5.7%) | 0.335 |
| **Any work abroad** | **Not working** | 3 (8.3%) | 6 (5.6%) | 2 (3.5%) | 0.324 | 5 (5.1%) | 6 (5.3%) | **0.035** |
| | **Lebanon** | 26 (72.2%) | 82 (75.9%) | 37 (64.9%) | | 79 (80.6%) | 75 (65.8%) | |
| | **International source of income** | 7 (19.4%) | 20 (18.5%) | 18 (31.6%) | | 14 (14.3%) | 33 (28.9%) | |
| **Mother Income Change** | **≥50% (compared to < 50%)** | 7 (58.3%) | 29 (85.3%) | 12 (70.6%) | 0.146 | 22 (73.3%) | 28 (80%) | 0.525 |
| **Father Income Change** | **≥50% (compared to < 50%)** | 16 (80%) | 42 (76.4%) | 18 (60%) | 0.190 | 40 (75.5%) | 40 (67.8%) | 0.369 |
| **Currently benefiting from a scholarship** | | 20 (48.8%) | 49 (42.2%) | 23 (35.4%) | 0.382 | 47 (43.1%) | 50 (38.8%) | 0.495 |
| **Did you or someone in your household get hospitalized due to COVID-19?** | | 10 (24.4%) | 28 (24.1%) | 19 (29.2%) | 0.737 | 27 (24.8%) | 36 (27.9%) | 0.585 |
| **Did you lose anyone to COVID-19?** | | 11 (26.8%) | 13 (11.2%) | 17 (26.2%) | **0.014** | 17 (15.6%) | 30 (23.3%) | 0.139 |
| **Has your standard of living changed in the last three years?** | **No/Yes, negatively** | 31 (75.6%) | 89 (78.1%) | 57 (87.7%) | 0.203 | 83 (76.1%) | 107 (84.9%) | 0.088 |
| | **Yes, positively** | 10 (24.4%) | 25 (21.9%) | 8 (12.3%) | | 26 (23.9%) | 19 (15.1%) | |
| **Have you or a member of your family lost a job as a result of the economic crisis?** | **Other** | 4 (9.8%) | 20 (17.2%) | 21 (32.3%) | **0.010** | 17 (15.6%) | 33 (25.6%) | 0.060 |
| **Did you or someone you know get injured by the Beirut port explosion?** | **Yes, I did/Other** | 16 (39%) | 38 (32.8%) | 30 (46.2%) | 0.201 | 43 (39.4%) | 46 (35.7%) | 0.547 |
| **Did you lose anyone close to you in the Beirut port explosion?** | **Other** | 3 (7.3%) | 1 (0.9%) | 7 (10.8%) | **0.004** | 5 (4.6%) | 6 (4.7%) | 0.981 |
| **Was your home affected by the Beirut port explosion?** | | 11 (26.8%) | 28 (24.1%) | 27 (41.5%) | **0.044** | 34 (31.2%) | 40 (31%) | 0.976 |
| **Did you or your family make any substantial life plan changes due to any of the stressors?** | | 13 (31.7%) | 37 (31.9%) | 33 (50.8%) | **0.030** | 35 (32.1%) | 55 (42.6%) | 0.095 |
| **Number of semesters spent at AUB** | **≥4 (compared to < 4)** | 19 (47.5%) | 60 (52.6%) | 39 (60.9%) | 0.367 | 56 (52.3%) | 69 (55.2%) | 0.663 |
| **Number of online semesters spent at AUB** | **0** | 19 (48.7%) | 58 (50.4%) | 25 (39.1%) | 0.304 | 54 (50%) | 57 (45.6%) | 0.792 |
| | **1–2** | 12 (30.8%) | 22 (19.1%) | 17 (26.6%) | | 24 (22.2%) | 31 (24.8%) | |
| | **> 2** | 8 (20.5%) | 35 (30.4%) | 22 (34.4%) | | 30 (27.8%) | 37 (29.6%) | |
| **Number of hours of sleep at night** | **< 7 (compared to ≥7)** | 9 (22%) | 49 (44.1%) | 41 (63.1%) | **< 0.001** | 31 (30.4%) | 73 (58.4%) | **< 0.001** |

**Table 1** (continued)

| Variables | Burnout (*N* = 222) | | | | Symptoms of Depression, Anxiety (*N* = 238) | | |
|---|---|---|---|---|---|---|---|
| | Little or no burnout /At risk for burnout (*N* = 41, 18.5%) | Burned out (*N* = 116, 52.3%) | High burnout /Very high burnout (*N* = 65, 29.3%) | *p*-value | Normal /Mild (*N* = 109, 45.8%) | Moderate /Severe (*N* = 129, 54.2%) | *p*-value |
| **Have you seen any mental health professional in the last 3 years?** | 7 (17.1%) | 25 (21.6%) | 20 (30.8%) | 0.212 | 18 (16.5%) | 35 (27.1%) | **0.050** |
| **Have you been diagnosed with anxiety or depression?** | 3 (7.3%) | 26 (22.8%) | 21 (33.9%) | **0.007** | 12 (11.3%) | 42 (33.9%) | **< 0.001** |
| **Do you take any medication to cope with anxiety or depression?** | 0 (0%) | 8 (30.8%) | 11 (52.4%) | 0.117 | 4 (33.3%) | 18 (42.9%) | 0.742 |
| **Have you ever used recreational drugs (cannabis, cocaine, MDMA, LSD, others)?** | 2 (4.9%) | 10 (8.6%) | 4 (6.2%) | 0.830 | 7 (6.4%) | 9 (7%) | 0.865 |

depression, anxiety. A *p*-value threshold of 0.2 was used in the bivariate analysis to select variables for inclusion in the multivariate regression models, allowing for the identification of potentially important variables that may not initially appear significant but could contribute meaningfully when considered in the context of other variables. The four main exposures (COVID-19 pandemic exposure, financial collapse, Beirut port explosion, and political unrest) were imposed in the models regardless of their level of significance, and variables deemed clinically significant (age, gender, major, living with parents, physical activity, work abroad, scholarship, Beirut explosion injury, sleep, and seeing a mental health professional) were also included. Missing values were replaced by the mean for continuous variables and distributed across categories, proportionally to the distribution in the rest of the sample for categorical variables. Results of this analysis were presented as adjusted odds ratio (aOR) with 95% confidence interval (CI). Significance was set at a $p$-value < 0.05.

## Results

Our sample consisted of 240 participants who completed either one of the outcome scales: there were 222 responses to the burnout scale and 238 responses to the depression/anxiety scale. Out of 240 participants, 80.0% were between 18 and 25 years old. The majority were women (68.0%), undergraduates (59.8%), majoring in science, engineering, or agricultural and food sciences (49.3%), have a GPA ≥ 3.5 (64.4%), and 55.5% commute more than 5 km to university.

Table 1 presents the associations between sociodemographic variables, burnout, and symptoms of depression, anxiety. In our sample, 18.5% of participants ($N = 41$) experienced little or no burnout, 52.3% ($N = 116$) were burned out, and 29.3% ($N = 65$) reported high or very high burnout. Those who suffered from high/very high burnout were more likely to be majoring in science, engineering, agriculture, and food sciences (27.5% vs. 60.4% vs. 47.6%, $p = 0.008$), have lost a job as a result of the economic crisis (9.8% vs. 17.2% vs. 32.3%, $p = 0.01$), have had their home affected by the Beirut port explosion (26.8% vs. 24.1% vs. 41.5%, $p = 0.044$), and have made any substantial life plan changes due to any of the stressors (31.7% vs. 31.9% vs. 50.8%, $p = 0.03$). Similarly, those students were more likely to be sleeping less than 7 h at night (22.0% vs. 44.1% vs. 63.1%, $p < 0.001$) and have been diagnosed with anxiety or depression (7.3% vs. 22.8% vs. 33.9%, $p = 0.007$). In terms of losing someone to COVID-19, those who had little or no burnout/at risk for burnout (26.8%) and those who had high burnout/very high burnout (26.2%) were similar. However, they were different from the burned-out group (11.2%), $p = 0.014$.

Regarding mental health, 45.8% ($N=109$) had normal or mild depression/anxiety, while 54.2% ($N=129$) experienced moderate to severe depression/anxiety. Those who were at risk for moderate/severe symptoms of depression, anxiety were more likely to be women (74.4% vs. 60.0%, $p=0.021$), consume nicotine (24% vs. 11%, $p=0.009$), or have parents who earn an international source of income (28.9% vs. 14.3%, $p=0.035$). Similarly, those students were more likely to be sleeping less than 7 h at night (58.4% vs. 30.4%, $p<0.001$), have seen a mental health professional in the last 3 years (27.1% vs. 16.5%, $p=0.05$), and have been diagnosed with anxiety or depression (33.9% vs. 11.3%, $p<0.001$).

Table 2 presents the associations between exposures, burnout ($N=222$), and symptoms of depression, anxiety ($N=238$). There was a direct relationship in the association between burnout and symptoms of depression, anxiety with each of the four assessed exposures. Those who suffered from high/very high burnout were more likely to score above the median on COVID-19 pandemic (29.3% vs. 54.3% vs. 69.2%, $p<0.001$), financial collapse (29.3% vs. 56.9% vs. 75.4%, $p<0.001$), Beirut port explosion (41.5% vs. 48.3% vs. 66.2%, $p=0.021$), and political unrest (36.6% vs. 56.9% vs. 72.3%, $p=0.001$). Those who had moderate/severe symptoms of depression, anxiety were more likely to score above the median on COVID-19 pandemic (62% vs. 43.1%, $p=0.004$) and financial collapse (68.2% vs. 42.2%, $p<0.001$).

Table 3 presents multiple regression analyses for burnout and symptoms of depression, anxiety. Predictors of burnout included scoring above the median on financial collapse (aOR = 2.55, 95%CI = 1.02, 6.37), majoring in science, engineering, agriculture, and food sciences (aOR = 4.64, 95%CI = 1.77, 12.19), and sleeping less than 7 h at night (aOR = 2.97, 95%CI = 1.2, 7.36). Predictors of high/very high burnout included scoring above the median on COVID-19 pandemic (aOR = 3.21, 95%CI = 1.21, 8.56) and financial collapse (aOR = 4.21, 95%CI = 1.49, 11.91), majoring in science, engineering, agriculture, and food sciences (aOR = 3.65, 95%CI = 1.19, 11.19), sleeping less than 7 h at night (aOR = 6.78, 95%CI = 2.46, 18.71), and having seen any mental health professional in the last 3 years (aOR = 3.96, 95%CI = 1.25, 12.56).

Predictors of moderate/severe symptoms of depression, anxiety included scoring above the median on financial collapse (aOR = 2.67, 95%CI = 1.44, 4.97), sleeping less than 7 h at night (aOR = 2.84, 95%CI = 1.58, 5.11), and having seen any mental health professional in the last 3 years (aOR = 2.57, 95%CI = 1.24, 5.3).

## Discussion

This cross-sectional study investigated the impact of the COVID-19 pandemic, financial collapse, the Beirut port explosion, and political unrest on mental health outcomes in AUB students. Our study found several positive associations between exposure to such stressors and the development of the negative psychological outcomes of burnout and symptoms of depression, anxiety.

The results showed that women students are more vulnerable to developing moderate/severe symptoms of depression, anxiety, a finding congruent with available literature [20–23]. A study exploring the link between time spent on social media/news and depression/suicidal ideation among Lebanese adults during the pandemic and economic crisis reported a higher mean depression score in women than men [22]. A study on university students reported that women suffered poorer well-being and greater mental strain following the Beirut port explosion [14]. The higher rates of depression in women have

**Table 2** Associations between exposures and burnout and symptoms of depression, anxiety

| Variables* | Burnout ($N=222$) | | | | Symptoms of Depression, Anxiety ($N=238$) | | |
|---|---|---|---|---|---|---|---|
| | Little or no burnout/ at risk for burnout ($N=41$, 18.5%) | Burned out ($N=116$, 52.3%) | High burnout/ very high burnout ($N=65$, 29.3%) | *p*-value | Normal/ Mild ($N=109$, 45.8%) | Moderate/ Severe ($N=129$, 54.2%) | *p*-value |
| **COVID-19 Pandemic Exposure Score Percent** | 30.4 ± 21.4 | 44 ± 21.4 | 54.2 ± 22.1 | **< 0.001** | 38.9 ± 22.5 | 49 ± 22.5 | **0.001** |
| **≥ 45 (compared to < 45)** | 12 (29.3%) | 63 (54.3%) | 45 (69.2%) | **< 0.001** | 47 (43.1%) | 80 (62%) | **0.004** |
| **Financial Collapse Score Percent** | 56 ± 25 | 68.3 ± 20.9 | 79.1 ± 18.7 | **< 0.001** | 61.3 ± 22.4 | 75.2 ± 20.5 | **< 0.001** |
| **≥ 70 (compared to < 70)** | 12 (29.3%) | 66 (56.9%) | 49 (75.4%) | **< 0.001** | 46 (42.2%) | 88 (68.2%) | **< 0.001** |
| **Beirut Port Explosion Score Percent** | 41.2 ± 24.2 | 48.3 ± 22.6 | 55.5 ± 24.7 | **0.013** | 46.4 ± 22.7 | 50.7 ± 23.9 | 0.193 |
| **≥ 50 (compared to < 50)** | 17 (41.5%) | 56 (48.3%) | 43 (66.2%) | **0.021** | 52 (47.7%) | 71 (55%) | 0.259 |
| **Political Unrest Score Percent** | 43.7 ± 25.9 | 55 ± 23 | 64.6 ± 20.5 | **< 0.001** | 51.2 ± 24 | 58 ± 23.5 | **0.043** |
| **≥ 55 (compared to < 55)** | 15 (36.6%) | 66 (56.9%) | 47 (72.3%) | **0.001** | 55 (50.5%) | 76 (58.9%) | 0.191 |
| **Others Score Percent** | 48.4 ± 24.2 | 62.6 ± 23.2 | 78.8 ± 21.2 | **< 0.001** | 50.8 ± 24.4 | 77.7 ± 19 | **< 0.001** |
| **≥ 70 (compared to < 70)** | 6 (24%) | 21 (42.9%) | 34 (81%) | **< 0.001** | 14 (26.4%) | 51 (75%) | **< 0.001** |

* The scores were categorized according to the median

**Table 3** Multiple regression analyses for burnout (*N* = 222) and symptoms of depression, anxiety (*N* = 238)

| Variables | Burnout (Ref: Little or no burnout/ at risk for burnout) | | | | Moderate/Severe Symptoms of Depression, Anxiety (Ref: Normal/Mild) | |
|---|---|---|---|---|---|---|
| | Burned Out | | High/ Very High Burnout | | aOR (95% CI) | *p*-value |
| | aOR (95% CI) | *p*-value | aOR (95% CI) | *p*-value | | |
| **COVID-19 Pandemic Exposure Score Percent ≥ 45 (Ref: <45)** | 2.33 (0.99, 5.52) | 0.054 | 3.21 (1.21, 8.56) | **0.02** | 1.77 (0.97, 3.24) | 0.063 |
| **Financial Collapse Score Percent ≥ 70 (Ref: <70)** | 2.55 (1.02, 6.37) | **0.044** | 4.21 (1.49, 11.91) | **0.007** | 2.67 (1.44, 4.97) | **0.002** |
| **Beirut Port Explosion Score Percent ≥ 50 (Ref: <50)** | 0.73 (0.29, 1.85) | 0.508 | 1.12 (0.39, 3.21) | 0.828 | 0.84 (0.44, 1.57) | 0.577 |
| **Political Unrest Score Percent ≥ 55 (Ref: <55)** | 1.49 (0.6, 3.67) | 0.391 | 2.12 (0.75, 6.03) | 0.159 | 0.86 (0.45, 1.64) | 0.637 |
| **Major (Ref: Arts and Business)** | | | | | | |
| **Medicine/Nursing/Health Sciences/ Medical-Related** | 1.21 (0.44, 3.34) | 0.711 | 1.65 (0.51, 5.32) | 0.406 | – | – |
| **Science/Engineering/Agriculture/Food Sciences** | 4.64 (1.77, 12.19) | **0.002** | 3.65 (1.19, 11.19) | **0.023** | – | – |
| **Any work abroad (Ref: Not working)** | | | | | | |
| **Lebanon** | – | – | – | – | 0.76 (0.2, 2.83) | 0.681 |
| **International source of income** | – | – | – | – | 1.89 (0.45, 7.93) | 0.383 |
| **Number of hours of sleep at night < 7 (Ref: ≥ 7)** | 2.97 (1.2, 7.36) | **0.019** | 6.78 (2.46, 18.71) | **< 0.001** | 2.84 (1.58, 5.11) | **< 0.001** |
| **Having seen any mental health professional in the last 3 years (Ref: No)** | 2.07 (0.72, 5.96) | 0.177 | 3.96 (1.25, 12.56) | **0.02** | 2.57 (1.24, 5.3) | **0.011** |

1. Variables imposed in the model: COVID-19 Pandemic Exposure Score Percent ≥ 45, Financial Collapse Score Percent ≥ 70, Beirut Port Explosion Score Percent ≥ 50, and Political Unrest Score Percent ≥ 55

2. Variables selected based on significance and clinical importance: Age, Gender, Major, Living with parents, Daily level of physical activity, Any work abroad, Currently benefiting from a scholarship, Getting injured or knowing someone who got injured by the Beirut port explosion, Number of hours of sleep at night, and Having seen any mental health professional in the last 3 years

several implications for both individual well-being and broader societal contexts. For example, healthcare providers need to be aware of and responsive to the higher prevalence of depression in women. This may include screening protocols, tailored treatment approaches, and increased awareness of potential risk factors specific to women. Also, higher rates of depression, anxiety in women underscore the need for effective treatment and support systems that address these challenges comprehensively [24].

Our study also found a relationship with another social variable; nicotine consumption and symptoms of depression, anxiety which is paralleled by other studies [25]. There is a significant relationship between nicotine use and depression and anxiety, with a higher prevalence of nicotine use among people with moderate/severe depression and anxiety. Although a link between nicotine consumption and depression has been reported, the causality of this relationship remains unknown [25] and was not tested in our study.

Associations between exposure to stressors and our outcomes were investigated. The greatest positive association was between having less than 7 h of sleep at night and burnout. This may be because sleep is directly influenced by stressors and reflects their extent [26]. A 2019 cross-sectional study assessing sleep patterns in Lebanon found that insomnia was 44.5% prevalent and associated with a monthly family income of < 1,000$ and unemployment [27]. This supports the conclusion that the association between sleep and burnout may be the strongest because sleep compounds the influence of other stressors including financial stressors [28].

The association between poor sleep and symptoms of depression, anxiety follows regional and international trends. A cross-sectional survey conducted on 206 medical students in Saudi Arabia showed that poor sleep was significantly associated with depression, anxiety and stress, with high-achieving students (GPA ≥ 4.0) being the poorest sleepers [29]. Students may have been sacrificing sleep hours to achieve high grades at the expense of their mental health and well-being. Similarly, a Singaporean study demonstrated a strong association between burnout and poor sleep quality among a sample of 4,777 health care staff in a health care cluster [30].

Analysis further revealed an anticipated significant relationship between financial stressors and burnout and/or symptoms of depression, anxiety. These results parallel others such as a cross-sectional study conducted in Lebanon which found that individuals with lower income had higher levels of stress and anxiety while middle-upper class study participants experienced the lowest stress level [31]. Thus, family income impacts anxiety, depression and stress. Due to Lebanon's economic collapse, people's life savings are frozen in banks, and tuition fees and living expenses are intangibles, prompting anxiety and depression concerning the uncertainty of days to

come. To afford education, participants may have to work and study simultaneously while still maintaining grades high enough to compete for academic scholarships, further aggravating burnout risk. Economic instability is known to be associated with uncertainty and dependency. A meta-analysis by Fischer et al. (2011) also found that wealth influences individualism which in turn influences general well-being by satisfying personal goals thus providing a sense of fulfillment [32].

In our study, having parents who live in Lebanon was associated with reporting higher negative mental health outcomes on bivariate analysis, but on multi-variate analysis, having an international source of income did not significantly impact symptoms of depression, anxiety. This may partially be explained by the fact that not all jobs abroad are lucrative or provide enough to sustain a family in Lebanon given current inflation rates [33]. However, this relationship can be best understood when considering that Lebanon is recognized as a collectivist society where individuals often prioritize group harmony and familial relationships over personal goals. This cultural orientation fosters strong social bonds and interdependence among its members. Family networks play a crucial role in providing support and security, influencing decisions ranging from career choices to marriage partners. These communal ties contribute to a sense of belonging and solidarity, which are integral to the social fabric of Lebanese society [34]. Thus, in a collectivist society like Lebanon, a family member living abroad may impose other stressors such as fear for safety, feelings of loneliness, and forced independence. Therefore, even with greater economic stability, participants may have been exposed to greater social stress, neutralizing the effect of this variable. Such results clarify the misconception that the Lebanese crisis is one of pure economics.

High scores on COVID-19 pandemic exposure were linked to high burnout and symptoms of depression, anxiety which suggests how social isolation may impair psychological well-being. Though university ought to be a place of social exploration, lockdowns and forced isolation posed a period of great uncertainty [15]. Academic uncertainty rates peaked, as students relied on self-learning in the absence of practical experiences necessary for majors like nursing and chemistry. While there is extensive literature on how the pandemic lockdown propagated emotional effacement, and depression, anxiety [35–37], there are few studies investigating the specific impact of online learning on these outcomes. Because online learning is a product of the pandemic that contributed significantly to isolation, it is likely to influence the outcomes though more studies are needed to quantify this hypothesized influence.

In our data sample collected 3 years post the Beirut blast, exposure to the blast only impacted burnout on bivariate analysis. No significant association was found on multivariate analysis or with respect to symptoms of depression, anxiety. The same relationships exist between exposure to political stress and our outcomes. This indicates that the Beirut blast and political unrest impacted mental health outcomes in association with other stressors and not independently.

In a similar 2021 study looking at the psychological well-being of Lebanese people during COVID-19 and after the explosion, close to half of the participants reported feeling more stressed by the pandemic than by the explosion [38]. Although the psychological impact of the blast is predicted to last for years to come, such an event is more likely than the pandemic and economic crisis to produce an acute, transient effect on mental health. The pandemic, lasting more than two years, and the financial collapse which worsens daily, are considered chronic stressors, hence their significant association with poorer mental health outcomes.

Moreover, resilience and cumulative trauma amongst the Lebanese may explain the evident lesser effect of the explosion and political unrest on mental health [11]. Lebanon has a long history of conflict punctuated by a 15-year civil war, regional conflict and chronic political instability. In 2013, psychiatrist Dr. E. Karam noted how rates of mental illness in Lebanon are lower relative to what is expected for people who experienced a civil war among other conflicts [39]. “Resilience” has been used in discourse of loss and trauma to describe communities coping despite enduring excess hardship [40]. Although it embodies strength in the face of adversity, it may normalize suffering such that it becomes part of a nation’s identity. Consequently, attention is diverted away from serious mental health concerns imposed by experiencing and resisting adversity [41].

Of note is that the Lebanese society’s collectivist nature may pave the way for healing from the psychological effects of trauma; students were able to cope despite the stressors [11]. Another hypothesis is that Lebanon’s residents may have accepted their situation as dismal in a similar state to learned helplessness. Like the Beirut blast, political unrest may be part of a broader issue that impacts psychological wellbeing, like concern about safety. Future research should perhaps consider exposure to safety threats (political and disaster related) as an independent stressor and analyze its association with the outcomes.

Overall, our findings illustrate poor mental health outcomes among university students that will likely continue worsening as Lebanon falls deeper into crisis. Though the extent of mental health needs in Lebanon is speculate, a high treatment gap exists. In a 2016 study by Maalouf et al., though the 30-day prevalence of psychiatric disorders was 26.1%, only 6% reported seeking professional help

[42]. This is due to numerous barriers including perception of the severity of mental health, financial barriers, uncertainty surrounding how to seek treatment, and logistic problems [43]. Effective mental health campaigns should address aforementioned barriers, in addition to raising awareness on the importance of seeking early treatment [23]. One Lebanese study showed that 91% of respondents who ever sought mental healthcare did so within the health sector [43]. Thus, mental health interventions should target clinics and primary healthcare centers by way of increasing referrals from general medicine to mental health services for instance. Furthermore, mental health must be addressed taking into consideration Lebanon's collectivist society. The crisis in Lebanon caused collective trauma, prompting a shift from an individualized to a collective mental health approach incorporating community and societal factors [5].

## Limitations

One limitation of our cross-sectional study is that it did not assess temporality. For instance, the greatest association was found between sleep and burnout, but surveyed participants may have developed sleeplessness as a result of burnout. Burnout may precipitate sleeplessness, as burnt out individuals have higher frequencies of awakening during sleep and marked indicators of poor recovery during days off compared to normal controls [44]. The directionality of this association should be assessed in future studies. It may be worthwhile to explore the temporality of associations between burnout, sleep quality, and depression, anxiety, since participants with less than 7 h of sleep demonstrated both burnout and depression, anxiety.

It is also worth mentioning that our study did not test for PTSD as an outcome of the Beirut blast. Mhanna et al. (2022) reported significant rates of dissociative experiences among a sample of Lebanese university students, with co-occurrence of PTSD patterns related to the Beirut blast, pandemic and economic crisis [13]. While our study mirrors the association between the pandemic and economic collapse and negative psychological outcomes, our study did not account for PTSD, rates of which may have been elevated after the blast.

Furthermore, since our data was extracted from a survey, it is prone to both recall and self-report bias. Responses are individualized, and participants differ in their perception of the impact of stressors on their wellbeing. For example, two individuals whose mental health was affected similarly by the financial crisis may report its impact differently on the 5-point Likert scale in section two of the survey. Likewise, it is not possible to know whether answers on the PHQ-4 and Burnout Measure were valid. Although our questions were detailed and precise, the quality of the data is limited by the self-report nature of our survey which may not capture the true impact of stressors on wellbeing. Also, the presence of recall bias may decrease the accuracy of our data. Participants were asked about past events, like the COVID pandemic and financial crisis; thus, they may not entirely remember their impact, particularly at the beginning of the year 2020.

In general, associations between stressors and burnout were more numerous and greater in magnitude than associations with symptoms of depression, anxiety, which may be due to our small sample size and because the sample consisted entirely of students. Had we surveyed the broader population, the prevalence of burnout and depression, anxiety may have demonstrated a different trend. Furthermore, AUB is the most expensive university in Lebanon and one of the most expensive in the region. Students typically belong to more affluent backgrounds than the average Lebanese citizen, which undermines the generalizability of our results to the Lebanese population at large. Thus, if such outcomes were noted in this demographic, we suspect that even worse mental health outcomes exist among the general population. Although we did capture the influence of financial stressors on negative mental health outcomes, a broader data sample of other university students including public university students would undoubtably impact the magnitude of reported outcomes, and is suggested to be taken into account in future studies.

## Conclusion

Burnout and symptoms of depression, anxiety were found to be prevalent in a sample of 240 university students in Lebanon amid an ongoing financial and social crisis. While nicotine consumption and woman gender were positively associated with poorer mental health outcomes, there were no associations between caffeine or alcohol consumption and these outcomes. Burnout was most likely to be experienced by STEM students and positively associated with sleeplessness and high exposure to financial and COVID-19 pandemic related stress. Symptoms of depression, anxiety were also significantly associated with these exposures. No associations were found between our outcomes and political unrest, international sources of income or the Beirut blast.

Our results are in line with regional trends and anticipated outcomes. Findings point to a growing under-researched mental health epidemic that necessitates immediate intervention. The multi-fold crisis in Lebanon is uniquely under-researched, and the lack of official audits on the status of mental health in the country impedes a full picture of the situation. Positive findings illustrate the importance of studying specific mental health outcomes, and within the context of specific demographics as results may vary. AUB is a private

university, and students generally belong to wealthier backgrounds. Thus, if these outcomes were found among AUB students, we suspect them to be present to much greater extents in the wider population and due to the deficiency in national audits, there is no way to confirm this.

#### Author contributions

BRK, HT devised the project, the main conceptual ideas. ZMK, GHL participated in the study design, data collection and data entry. PG, FRT participated in preparing the questionnaire. HT provided statistical advice on study design and WGES analyzed the data. EOS prepared the LimeSurvey. ZMK, GHL undertook the literature review and drafted the manuscript. HT and BRK contributed substantially to its revision. All authors read and approved the final manuscript.

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#### Data availability

The data that support the findings of this study are available from the corresponding authors upon reasonable request.

## Declarations

#### Ethics approval and consent to participate

The proposal of this research was approved by the Institutional Review Board (IRB) of the American University of Beirut (IRB #: SBS-2022-0192). Informed consent was obtained from all participants. The first part of the electronic survey included a question to collect students' consent prior to their participation. Participants were informed of the purpose of the study before answering the questionnaire and were allowed to withdraw at any time. No question was mandatory, except for the question on age and class standing. Contact information of mental health services was provided to participants in the beginning of the survey and was listed again at the end. All information remained confidential and anonymous, as there were neither names nor identifiers on the questionnaire.

#### Consent for publication

Not applicable.

#### Competing interests

The authors declare no competing interests.

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