Coronavirus Pandemic

Relationship between emotional expressions and lifestyle changes among university students during COVID-19 lockdown in Lebanon

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Abstract

Introduction: Emotional expressivity plays an important role in terms of communication and interpersonal relationships in the context of society. Our research aims at assessing the perception of emotional expressivity and its association with lifestyle changes during COVID-19 lockdown among university students in Lebanon.

Methodology: A total of 742 participants completed an anonymous online questionnaire including socio-demographic characteristics, lifestyle habits, and emotional expression evaluated through the Berkeley Expressivity Questionnaire (BEQ). Participants also reported their perception of the relationship between emotional expressivity and lifestyle changes experienced during lockdown.

Results: The expression of positive emotions was decreased among students who have a weight loss from decreased eating during lockdown. Moreover, significantly lower negative emotions and increased positive emotions were found to be associated respectively with the increase in quality and quantity of distance learning, which emphasizes the psychological investment in education. In terms of extensive time spent on TV and social media, results point towards increased emotional expressivity, particularly positive emotions and impulse facets. Finally, changes in social interaction during this period impacted all facets of emotional expressivity.

Conclusions: In the context of lockdown due to the pandemic, emotional aspects were associated by university students with lifestyle changes. Our research highlights the beneficial role of social networking, distance learning, physical activity, and well-balanced nutrition on emotional regulation in this particularly stressful situation, thus the importance of a global approach to emotional expressivity including the social aspects and biological ones.

Introduction

A novel coronavirus strain was identified in January 2020 as the causal agent for cases of pneumonia of unknown origin reported in humans, in Wuhan city, China, in December 2019. Cases related to this virus were later on found outside of China. The number of cases increased as well as the number of affected countries. Hence, in March 2020, the World Health Organization (WHO) assessed the situation characterizing COVID-19 (coronavirus disease 2019) as a pandemic. COVID-19 can affect individuals in different ways. Symptoms associated with the infection may range from mild or moderate to severe illness. The period of incubation varies between 2-14 days after exposure to the virus. Individuals presenting with COVID-19 may manifest fever or chills, cough, fatigue, sore throat, difficulty breathing, as well as other symptoms including vomiting, diarrhea, and smell or taste loss [1].

The sanitary situation in relation to the COVID-19 pandemic has led to lockdown measures followed by progressive deconfinement worldwide. This exceptional situation has enforced individuals to adapt in terms of communication and lifestyle. Indeed, daily routine seemed modified whether in the work field, learning modalities, grocery shopping, or other activities such as physical exercise which sometimes changed in frequency or type. Moreover, interpersonal communication found alternative routes in distance video conferences. Sleep patterns and eating habits have been also notably mentioned as being altered by the corresponding stressful state [2,3].

Besides modifications pertaining to the context of various activities, the COVID-19 pandemic generated various emotional aspects, such as fear, anxiety, and depression, among individuals. In fact, various reports discuss the importance of considering psychological implications in this particular situation [4]. Among psychological dimensions, emotional expressivity has been linked to emotional regulation. Indeed, the expression of diverse emotions relies on both verbal and non-verbal components and is associated with

personality traits. It entails the display of emotions in view of specific situations [5,6]. Isolation and anxiety during the sanitary situation including quarantine may affect emotional processing. A Chinese national research explored particularly negative emotions and their expression during the early COVID-19 epidemic. It discussed the role of negative expressivity and impulse strength as predictors of negative emotions in this particular context [7].

From the perspective of university students in various fields, the COVID-19 pandemic had an impact on their learning experiences [8–10]. Students across the world, and more particularly in Lebanon, have been facing challenges and difficulties in adapting to the new learning online system, including live-streaming classes or voice-over narration. The number of assignments increased and evaluations were conducted via the internet. Moreover, the sanitary situation was associated with difficulties in internship programs in which students are usually highly interested in the creation of their career path [11]. In addition, universities are perceived by students as a social environment, hence playing a major role in their growth and the discovery of new skills, cultures, and experiences. In this regard, innovative ways of socialization through group online meetings have been adopted during the lockdown periods. Such lifestyle modifications may have a psychological and emotional impact on a student's well-being.

Hence, our study aims at focusing on changes in lifestyle factors, particularly among university students in Lebanon in the situation of quarantine related to the pandemic. From an additional point of view, our research assesses emotional expressivity and its three facets, impulse strength, negative expressivity, and positive expressivity, among this specific population. Furthermore, this study explores the link between emotions and behavioral modifications such as nutrition, tobacco smoking, alcohol consumption, physical activity, social interaction, and quality of sleep during quarantine. Therefore, our research contributes to a better understanding of psychological dimensions, in other terms emotional regulation and their relationship with lifestyle factors during the COVID-19 pandemic.

Methodology
Study design and population
The study was conducted according to the Declaration of Helsinki and approved by the Ethical Committee of the Lebanese German University. It was carried out during the COVID-19 pandemic lockdown period between March and July 2020. Subjects enrolled in the research were Lebanese university students, aged 18 years and above. The sampling frame was designed to include students from various universities in Lebanon to have a good representation of individuals of different ages, regions, educational levels, and specialties.

The survey was sent to approximately 1,000 students randomly selected from 10 Lebanese universities over the entire period of the research. A total of 744 individuals responded and accepted to participate in the research. Two subjects were removed from the study for not meeting the inclusion criteria (age less than 18 years old), hence making the final number of participants 742.

Questionnaire
Data were collected through an online structured questionnaire using google forms, appended to it the study information and consent form. The link to the questionnaire was sent by e-mail or WhatsApp message. After reading the objectives of the study, participants were asked to give their explicit consent by indicating that they understand the nature and objectives of the study and they agree to participate voluntarily in the research project. They were then invited to fill out the self-reported questionnaire consisting of five sections: (1) socio-demographic characteristics, (2) the Berkeley Expressivity Questionnaire (BEQ), (3) students' lifestyle behaviors, (4) assessment of lifestyle changes during the lockdown, and (5) students' perception in terms of the association between lifestyle changes and emotional expression during lockdown period.

BEQ is a 16-item self-report scale developed by Gross and John to measure the strength of emotional response tendencies and the extent to which emotions are expressed as observable behaviors; these behaviors are not limited to specific channels of expressions (e.g. gestural, facial, or vocal) or emotions (e.g. anger, amusement, or sadness) [12]. The questionnaire was proposed in both the English and French versions to participants [12,13]. BEQ evaluates three facets of emotional expressivity, namely Negative Expressivity, Positive Expressivity, and Impulse Strength. Each item is answered on a 7-point Likert-type ranging from 1 (strongly disagree) to 7 (strongly agree). Scores were calculated for each of the three facets, and a total score was then generated to reflect the overall emotional expressivity among university students.

Students' lifestyle included behaviors related to tobacco and alcohol consumption, nutritional intake,

sleep pattern, physical activity, working hours, and time spent on Television (TV), video games, and social media. The rate of lifestyle changes during quarantine was assessed using a 5-point Likert scale ranging from "extremely decreased" to "extremely increased". Finally, participants were asked to answer how likely do they feel that lifestyle changes during quarantine are associated to their emotional expressivity by completing a 5-point Likert scale ranging from "extremely unlikely" to "extremely likely".

Data confidentiality

Information collected to meet our research objectives were kept anonymous and did not include personal data such as name, telephone number and address. Survey responses were directly exported to a study-specific excel sheet in which data were coded, saved and secured through the use of password protected files to prevent unauthorized access or use of information. Moreover, passwords were appropriately

Table 1. Socio-demographic characteristics and lifestyle habits of participants.

Variable	N (%)
Gender	
Men	219 (29.5)
Women	523 (70.5)
Marital status	
Single	690 (93.0)
Married	29 (3.9)
Separated	2 (0.3)
Divorced	1 (0.1)
Other	20 (2.7)
Region of residence	
Urban	500 (67.4)
Rural	242 (32.6)
Current level of education	
Undergraduate	552 (74.4)
Master's	160 (21.6)
PhD/MD	22 (2.9)
Other	8 (1.1)
Field of specialty at university	
Medicine	37 (4.9)
Paramedical sciences	346 (46.7)
Business sciences	67 (9.0)
Engineering	102 (13.7)
Law and political sciences	42 (5.7)
Education	44 (5.9)
Arts	42 (5.7)
Psychology	20 (2.7)
Other	42 (5.7)
Current tobacco consumption	
No	539 (72.6)
Yes	203 (27.4)
Tobacco consumption frequency	
Occasionally	45 (22.2)
Monthly	2 (1.0)
Weekly	38 (18.7)
Daily	118 (58.1)

Table 1 (continued). Socio-demographic characteristics and lifestyle habits of participants.

Variable	N (%)
Number of cigarettes per day	
1-3	38 (32.2)
4-6	29 (24.6)
7-10	11 (9.3)
> 10	40 (33.9)
Current alcohol consumption	
No	440 (59.3)
Yes	302 (40.7)
Alcohol consumption frequency	
Occasionally	187 (62.0)
Monthly	27 (8.9)
Weekly	75 (24.8)
Daily	13 (4.3)
Number of meals per day	
1	34 (4.6)
2	152 (20.5)
3	432 (58.2)
> 3	124 (16.7)
Number of snack per day	
0	36 (4.9)
1-2	490 (66.0)
≥ 3	216 (29.1)
Quantity of fluids per day (in Liter)	
< 0.5	82 (11.0)
0.5-1	235 (31.7)
1-1.5	216 (29.1)
> 1.5	209 (28.2)
Hours of sleep	
< 6	99 (13.4)
6-7	254 (34.2)
8-9	302 (40.7)
> 9	87 (11.7)
Difficulty in falling asleep	
No	384 (51.8)
Yes	358 (48.2)
Waking up multiple times	
No	401 (54.0)
Yes	341 (46.0)
Waking up early in the morning	
No	451 (60.8)
Yes	291 (39.2)
Sleeping in excess	
No	469 (63.2)
Yes	273 (36.8)
Physical activity	
No	318 (42.9)
Yes	424 (57.1)
Daily physical activity duration	
≤ 30 mins	243 (57.3)
> 30 mins	181 (42.7)
Current work status	
No	537 (72.4)
Yes	205 (27.6)
Working hours	
10-20	92 (44.9)
20-34	44 (21.5)
> 34	69 (33.6)
Hours on TV and social media (per day)	
< 5	333 (44.9)
6-10	307 (41.4)
> 10	102 (13.7)

protected and data were only accessible by the principal investigator if needed. Information related to data protection measures was stated in the informed consent in a clear and understandable manner.

Statistical Analysis

Study data were analyzed using the GraphPad Prism software version 6 (GraphPad Software, Inc., USA). Descriptive statistics were performed for all variables using means, standard deviations, range, and frequency analysis. The unpaired t-test with Welch's correction was used to compare means between two groups. Differences among multiple groups were analyzed using nonparametric One-Way ANOVA test followed by Tukey's post hoc test. The relationship between continuous variables was analyzed using the Pearson correlation test. Chi-square and Fisher's exact tests were applied to find the association between two categorical variables by comparing frequencies between groups. For all analyses, a 95% confidence level was used, and a *p* value < 0.05 was considered statistically significant.

Results

Socio-demographic characteristics and lifestyle habits

A total of 742 subjects were included in this study with the majority being women (70.5%). The mean age of participants was 22.09 years ± 4.25 and their BMI 23.44 kg/m^2 ± 4.40. No significant difference was found between men and women with regard to age (21.85 years ± 3.49 vs 22.20 years ± 4.54; *p* = 0.2507). In contrast, a significantly higher body mass index (BMI) was found in men as compared to women (25.72 kg/m^2 ± 4.73 vs 22.55 kg/m^2 ± 3.77; *p* < 0.0001). Participants were predominantly single (93.0%), 67.4% were residents of urban areas, and nearly three-quarters (74.4%) were undergraduate students. The field of paramedical sciences accounted for the largest percentage (46.7%) of our sample, followed by engineering (13.7%) and business students (9.0%).

As for participants' lifestyle habits, the majority (72.6%) does not smoke tobacco and more than half (59.3%) do not drink alcohol. Moreover, the highest proportion of our sample reported to usually consume 3 meals, 1 to 2 snacks and 0.5-1.5 liters of water per day. The assessment of the sleeping pattern revealed that 40.7% of our students sleep between 8 and 9 hours, and approximately half of them have difficulty in falling asleep (48.2%) or wake up multiple times during sleep (46.0%). In addition, 39.2% of subjects wake up very early in the morning and have difficulty in falling back asleep, while 36.8% feel that they are sleeping in

excess. Finally, more than half of the participants (57.1%) do some type of physical activity (moderate intensity walking, biking, etc.) with a frequency up to 30 minutes per day in 57.3% of cases, the majority (72.4%) do not currently work, and a non-negligible number of students (13.7%) spend more than 10 hours per day on TV, videogames, and social media. Details related to the socio-demographic characteristics and lifestyle habits of the participants are presented in Table 1.

Emotional expressivity

In order to evaluate the overall emotional expressivity among our sample of university students, the mean BEQ total and subscale scores were generated and assessed with regard to socio-demographic characteristics and lifestyle habits of participants (Tables 2 and 3). Our results showed significantly higher scores in women as compared to men (*p* < 0.0001). Moreover, significant differences were found with regard to the education level and region of residence. Indeed, students in the fields of paramedical sciences, arts and psychology registered increased emotional expressivity compared with engineering students (*p* = 0.0033), particularly in the impulse strength facet (*p* = 0.0023). In addition, significant higher scores in the total BEQ scale (*p* = 0.0133), as well as in the negative expressivity (*p* = 0.0436) and positive expressivity (*p* = 0.0482) subscales, were found in students residing in urban areas as compared to those living in rural zones (Table 2).

On the other hand, students who do not smoke tobacco and those having difficulty to fall asleep or wake up multiple times during sleep scored higher on the total and impulse strength scales as compared to their counterparts, whereas significant higher negative expressivity scores were found in participants consuming snacks, drinking 0.5 to 1 liter of water per day or not practicing a physical activity (Table 3).

Self-perception of lifestyle changes during lockdown

As shown in Table 4, several lifestyle behaviors were affected by the lockdown period. The most common one was time spent on TV, video games, and social media reported by 66.4% of participants as being increased during this specific period of time. Hours and quality of sleep and the daily consumption of meals and snacks were also found to be increased in 46.5%, 41.7%, and 48.9% of cases, respectively. In contrast, habits that have been reduced during the lockdown included social interaction, quantity and quality of learning, and working hours as stated by 61.0%, 41.8%,

50.2%, and 44.1% of students. The percentages of the study population declaring an increase (34.1%) or a decrease (39.8%) in physical activity and body weight were relatively comparable; similarly for perceived body weight changes in terms of increase and decrease (32.6% and 27.2% respectively). Finally, only tobacco and alcohol consumption remained unchanged during this specific period of time according to more than half of the participants.

Self-perceived association between emotional expressivity and lifestyle changes during lockdown

In order to explore the possibility of an association between changes in lifestyle habits during lockdown and emotional expressivity among university students, we first compared the BEQ total and subscales scores between participants depending on their answers in terms of lifestyle modifications (Figure 1), and we then analyzed the extent to which they feel that these lifestyle changes are likely to be associated to their current emotional expressivity (Tables 5 and 6).

Our findings revealed significantly lower positive expressivity in subjects experiencing a decrease in snack consumption (16.64 ± 6.69) as compared to those reporting no change (19.54 ± 5.86) or an extreme increase in consumption (20.07 ± 5.33) (Figure 1D). Similar results were detected in subjects who lost weight (16.27 ± 7.14) as compared to those maintaining the same weight (19.31 ± 5.94) or those reporting a

weight increase (19.55 ± 5.77) (Figure 1G). Changes in the quantity and quality of learning were also associated with students' emotional expressivity. Indeed, participants who felt an increase in the quantity of learning during lockdown expressed higher positive emotions (20.25 ± 5.54) than those reporting an extreme decrease in the learning quantity (18.13 ± 6.31), and a higher impulse strength in comparison to those reporting no change (28.10 ± 8.07 vs 25.64 ± 9.14) (Figure 1I). In addition, significantly lower negative emotions were registered in participants with an increased learning quality during lockdown as compared to the other groups (Figure 1J). Finally, as expected the most significant differences in emotional expressions were noted with changes related to social interaction (Figure 1H) and time spent on TV, video games, and social media (Figure 1L). In fact, students with reduced social interaction during confinement had an overall higher emotional expressivity as compared to those with no social interaction modification. Furthermore, subjects who stated spending more time than usual on TV and social media during lockdown had the highest scores on the total BEQ scale as well as on the positive expressivity and impulse strength subscales.

Table 2. BEQ total and subscale scores with regard to socio-demographic characteristics of participants.

	Total BEQ score	*p* value	Negative expressivity	*p* value	Positive expressivity	*p* value	Impulse strength	*p* value
Gender								
Men	61.97 ± 14.78	< 0.0001 ****	20.51 ± 6.66	< 0.0001 ****	18.68 ± 5.48	0.1203 ns	22.78 ± 7.53	< 0.0001 ****
Women	70.52 ± 16.33		22.70 ± 6.49		19.43 ± 6.09		28.39 ± 8.71	
Education level								
Undergraduate	67.97 ± 15.82	0.2815 ns	21.83 ± 6.55	0.1039 ns	19.24 ± 5.75	0.4683 ns	26.90 ± 8.59	0.1896 ns
Master's	68.69 ± 16.16		22.42 ± 5.77		19.27 ± 6.49		26.99 ± 8.65	
PhD/MD	68.28 ± 20.79		24.86 ± 9.75		18.82 ± 6.20		24.55 ± 9.32	
Education field								
Medicine	65.28 ± 13.00		20.11 ± 6.14		19.22 ± 5.47		25.94 ± 6.89	
Paramedical Sciences	68.93 ± 16.33		22.58 ± 6.54		19.13 ± 5.93		27.23 ± 8.72	
Business	70.18 ± 15.58		21.80 ± 7.19		20.73 ± 5.89		27.65 ± 8.41	
Engineering	62.31 ± 15.83	0.0033 **	20.50 ± 6.54	0.0133 *	18.03 ± 6.15	0.0263 *	23.78 ± 8.75	0.0023 *
Law	69.00 ± 17.85		22.50 ± 6.22		20.10 ± 5.84		26.40 ± 9.71	
Education	68.91 ± 15.24		23.98 ± 5.38		18.02 ± 6.81		26.91 ± 7.95	
Arts	73.78 ± 17.76		22.58 ± 6.32		21.10 ± 5.45		30.10 ± 9.49	
Psychology	73.10 ± 16.60		24.35 ± 7.75		18.15 ± 6.36		30.60 ± 7.10	
Other	68.20 ± 15.14		21.34 ± 6.51		20.51 ± 4.31		26.34 ± 7.92	
Civil status								
Single	68.21 ± 16.01	0.6375 ns	22.06 ± 6.49	0.7019 ns	19.26 ± 5.86	0.4904 ns	26.88 ± 8.63	0.4457 ns
Married	66.31 ± 21.22		22.66 ± 8.17		18.24 ± 7.80		25.41 ± 10.06	
Region of residence								
Urban	69.37 ± 16.22	0.0133 *	22.50 ± 6.49	0.0436 *	19.59 ± 5.98	0.0482 *	27.27 ± 8.68	0.0814 ns
Rural	66.16 ± 15.89		21.43 ± 6.74		18.66 ± 5.70		26.07 ± 8.48	

Table 3. BEQ total and subscale scores in terms of lifestyle habits of participants.

	Total BEQ score	*p* value	Negative expressivity	*p* value	Positive expressivity	*p* value	Impulse strength	*p* value
Tobacco consumption								
No	68.90 ± 15.75	0.0484*	22.26 ± 6.42	0.3309	19.43 ± 5.75	0.1234	27.21 ± 8.60	0.0440*
Yes	66.23 ± 17.33		21.73 ± 6.95	ns	18.67 ± 6.41	ns	25.75 ± 8.81	
Tobacco consumption frequency								
Occasionally	65.64 ± 16.46		21.30 ± 7.47		18.73 ± 5.90		25.61 ± 8.40	
Monthly	73.33 ± 15.83	0.7769	27.67 ± 4.68	0.1271	19.83 ± 5.19	0.9731	25.83 ± 7.49	0.9934
Weekly	65.55 ± 18.93	ns	21.68 ± 5.80	ns	18.63 ± 6.95	ns	25.24 ± 10.08	ns
Daily	65.71 ± 17.75		21.40 ± 7.21		18.57 ± 6.49		25.73 ± 9.18	
Number of cigarettes consumed								
1-3	65.62 ± 14.42		20.94 ± 6.53		18.53 ± 6.81		26.44 ± 7.68	
4-6	59.93 ± 18.42	0.2075	20.70 ± 7.19	0.5041	17.56 ± 6.94	0.3591	21.68 ± 8.57	0.0626
7-10	71.18 ± 19.73	ns	24.45 ± 5.72	ns	19.45 ± 8.03	ns	27.27 ± 12.06	ns
> 10	68.13 ± 19.13		21.45 ± 8.18		19.08 ± 5.51		27.50 ± 9.47	
Alcohol consumption								
No	68.10 ± 16.54	0.8837	22.40 ± 6.59	0.1579	18.80 ± 5.96	0.0688	26.81 ± 8.81	0.9219
Yes	68.28 ± 15.77	ns	21.70 ± 6.51	ns	19.71 ± 5.87	ns	26.87 ± 8.47	ns
Alcohol consumption frequency								
Occasionally	67.63 ± 16.79		21.80 ± 6.70		19.48 ± 6.10		26.27 ± 9.25	
Monthly	69.04 ± 11.57	0.4716	21.30 ± 4.50	0.5871	20.44 ± 5.11	0.4407	27.30 ± 7.04	0.3224
Weekly	70.67 ± 13.28	ns	21.86 ± 6.51	ns	20.35 ±5.49	ns	28.46 ± 6.44	ns
Daily	62.77 ± 20.17		19.08 ± 7.31		18.00 ± 5.89		25.69 ± 9.05	
Number of meals consumed								
1	66.09 ± 15.71		22.27 ± 8.14		17.48 ± 6.87		26.33 ± 9.03	
2	67.80 ± 17.34	0.5587	21.77 ± 7.38	0.2890	19.03 ± 5.57	0.2007	27.00 ± 8.90	0.1736
3	68.04 ± 16.11	ns	22.43 ± 6.20	ns	19.23 ± 5.97	ns	26.39 ± 8.69	ns
> 3	69.67 ± 15.38		21.40 ± 6.27		19.92 ± 5.95		28.35 ± 8.16	
Number of snacks consumed								
0	65.82 ± 16.06	0.1191	19.23 ± 6.27		19.38 ± 5.48	0.6400	26.85 ± 9.20	0.0534
1-2	67.59 ± 16.88	ns	22.17 ± 6.81	0.0248*	19.10 ± 6.07	ns	26.32 ± 8.83	ns
≥ 3	70.08 ± 14.51		22.47 ± 6.00		19.56 ± 5.68		28.05 ± 8.18	
Quantity of fluids consumed (in Liter)								
< 0.5	71.65 ± 14.64		23.13 ± 6.54		19.55 ± 5.36		28.98 ± 8.09	
0.5-1	68.86 ± 16.02	0.1372	22.77 ± 6.52	0.0256*	18.99 ± 5.97	0.6365	27.10 ± 8.46	0.0864
1-1.5	67.24 ± 17.06	ns	22.02 ± 7.00		19.04 ± 6.22	ns	26.19 ± 9.06	ns
> 1.5	67.20 ± 15.96		21.08 ± 6.09		19.62 ± 5.77		26.50 ± 8.57	
Hours of sleeping								
< 6	67.91 ± 18.08		21.26 ± 7.66		18.74 ± 6.33		27.91 ± 9.45	
6-7	68.86 ± 16.23	0.2363	22.40 ± 6.70	0.1327	19.48 ± 5.80	0.3886	26.98 ± 6.54	0.0997
7-9	68.65 ± 15.44	ns	22.55 ± 6.00	ns	19.15 ± 6.01	ns	26.95 ± 8.31	ns
> 9	64.91 ± 16.54		20.79 ± 6.56		19.29 ± 5.68		24.83 ± 9.25	
Difficulty of falling asleep								
No	66.74 ± 15.36	0.0156	21.91 ± 6.41	0.4136	19.16 ± 5.77	0.8128	25.66 ± 8.16	0.0002
Yes	69.64 ± 16.93	*	22.31 ± 6.72	ns	19.27 ± 6.12	ns	28.06 ± 9.04	***
Waking up multiple times								
No	67.06 ± 14.94	0.0458	21.98 ± 5.75	0.5689	19.17 ± 5.61	0.8010	25.90 ± 8.42	0.0015
Yes	69.50 ± 17.55	*	22.27 ± 7.42	ns	19.29 ± 6.32	ns	27.94 ±8.86	**
Waking up early								
No	67.38 ± 16.36	0.1006	21.94 ± 6.61	0.355	19.23 ± 5.83	0.9816	26.22 ± 8.74	0.0170
Yes	69.41 ± 15.99	ns	22.40 ± 6.51	ns	19.22 ± 6.13	ns	27.80 ± 8.52	*
Sleeping in excess								
No	68.18 ± 15.84	0.9042	22.11 ± 6.69	0.9116	19.16 ± 5.84	0.7013	26.92 ± 8.57	0.6871
Yes	68.03 ± 16.82	ns	22.06 ± 6.35	ns	19.33 ± 6.08	ns	26.65 ± 8.85	ns
Physical activity practice								
No	69.19 ± 15.78	0.1090	22.75 ± 6.75	0.0212	19.14 ± 5.86	0.8156	27.30 ± 8.45	0.1595
Yes	67.25 ± 16.44	ns	21.62 ± 6.41	*	19.24 ± 5.98	ns	26.39 ± 8.79	ns
Physical activity frequency								
≤ 30 mins	67.84 ± 15.67	0.4078	22.11 ± 6.15	0.0859	19.23 ± 5.81	0.9473	26.51 ± 8.34	0.7353
> 30 mins	66.49 ± 17.42	ns	21.02 ± 6.75	ns	19.26 ± 6.18	ns	26.21 ± 9.41	ns
Work status								
No	68.51 ± 16.10	0.2969	22.18 ± 6.47	0.5931	19.17 ± 6.01	0.7165	27.16 ± 8.63	0.0723
Yes	67.10 ± 16.76	ns	21.89 ± 6.93	ns	19.35 ± 5.79	ns	25.87 ± 8.82	ns
Working hours								
10-20	64.69 ± 18.41		21.02 ± 7.09		18.85 ± 6.16		24.82 ± 9.92	
21-34	68.75 ± 16.79	0.2089	22.41 ± 7.19	0.2335	19.98 ± 5.42	0.5511	26.36 ± 8.53	0.3805
> 34	69.04 ± 14.30	ns	22.84 ± 6.36	ns	19.51 ± 5.69	ns	26.69 ± 7.54	ns
Hours on TV and social media								
< 5	67.60 ± 16.47		22.00 ± 6.61		19.05 ± 6.01		26.56 ± 8.82	
6-10	68.71 ± 15.35	0.3805	22.06 ± 6.77	0.4964	19.53 ± 5.64	0.5803	27.12 ± 8.22	0.4394
> 10	70.09 ± 17.85	ns	22.89 ± 6.14	ns	19.44 ± 6.55	ns	27.77 ± 9.51	ns

Table 4. Changes distribution in lifestyle habits of participants during the lockdown period.

Lifestyle habits	Extremely increased N (%)	Increased N (%)	Neither N (%)	Decreased N (%)	Extremely decreased N (%)
Tobacco consumption	50 (6.7)	84 (11.3)	424 (57.2)	64 (8.6)	120 (16.2)
Alcohol consumption	22 (2.9)	73 (9.8)	462 (62.2)	77 (10.5)	108 (14.6)
Quantity of meals per day	85 (11.5)	224 (30.2)	266 (35.8)	132 (17.8)	35 (4.7)
Quantity of snacks per day	120 (16.2)	243 (32.7)	235 (31.7)	103 (13.9)	41 (5.5)
Hours and quality of sleep	89 (12.0)	256 (34.5)	187 (25.2)	133 (17.9)	77 (10.4)
Physical activity	60 (8.1)	193 (26.0)	196 (26.4)	180 (24.3)	113 (15.2)
Body weight	42 (5.6)	200 (27.0)	298 (40.2)	167 (22.5)	35 (4.7)
Social interaction	27 (3.6)	82 (11.1)	180 (24.3)	282 (38.0)	171 (23.0)
Quantity of learning	70 (9.4)	175 (23.6)	187 (25.2)	203 (27.4)	107 (14.4)
Quality of learning	49 (6.7)	128 (17.3)	192 (25.8)	223 (30.0)	150 (20.2)
Hours of work	45 (6.0)	95 (12.8)	275 (37.1)	154 (20.8)	173 (23.3)
Hours on TV and social media	227 (30.6)	263 (35.5)	162 (21.8)	61 (8.2)	29 (3.9)

Figure 1. BEQ total score (White) and subscale scores (Light Grey: negative emotions; Dark Grey: positive emotions and Black: impulsive emotions) with regard to changes in participants' lifestyle behaviors during the lockdown period: (A) Tobacco consumption, (B) Alcohol consumption, (C) Meals consumption, (D) Snacks consumption, (E) Quality of sleep, (F) Physical activity, (G) Body Mass Index, (H) Social interaction, (I) Quantity of learning, (J) Quality of learning, (K) Working hours, (L) Hours on TV and social media. Data are represented as mean ± Standard Deviation (SD). Differences among groups were evaluated using the non-parametric One Way ANOVA test further tested by Tukey test for post hoc pairwise comparisons. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.
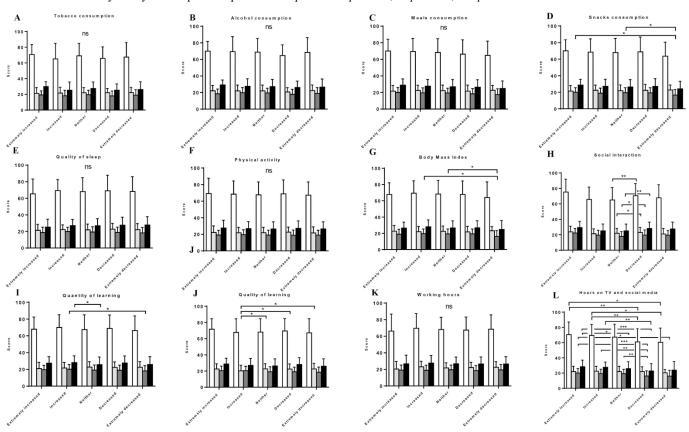
Table 5. Perception of students in terms of relationship between lifestyle changes and emotional expression during the lockdown period.

Changes in lifestyle habits	Extremely likely N (%)	Likely N(%)	Neutral N (%)	Unlikely N (%)	Extremely unlikely N (%)
Tobacco consumption	110 (14.8)	160 (21.6)	359 (48.3)	30 (4.1)	83 (11.2)
Alcohol consumption	84 (11.3)	162 (21.8)	382 (51.5)	34 (4.6)	80 (10.8)
Quantity of meals per day	166 (22.4)	267 (36.0)	227 (30.6)	50 (6.7)	32 (4.3)
Quantity of snacks per day	162 (21.8)	271 (36.5)	224 (30.2)	49 (6.6)	36 (4.9)
Hours and quality of sleep	241 (32.5)	262 (35.3)	175 (23.6)	31 (4.2)	33 (4.4)
Physical activity	193 (26.0)	222 (29.9)	228 (30.7)	55 (7.4)	44 (6.0)
Body weight	186 (25.1)	213 (28.7)	254 (34.2)	55 (7.4)	34 (4.6)
Social interaction	232 (31.3)	220 (29.6)	201 (27.1)	52 (7.0)	37 (5.0%)
Quality of learning	216 (29.1)	223 (30.0)	202 (27.2)	60 (8.1)	41 (5.6)
Hours of work	192 (25.9)	179 (24.1)	283 (38.1)	49 (6.6)	39 (5.3)
Hours on TV and social media	251 (33.8)	203 (27.4)	201 (27.1)	52 (7.0)	35 (4.7)

These results were further supported by the fact that more than half of participants felt that changes in quality of sleep (67.8%), time spent on TV and social media (61.2%), and social interaction (60.9%) are extremely likely/likely to be associated with emotional expression during lockdown (Table 5). Similarly, quality of learning (59.1%), meals and snacks consumption (58.4% and 58.3% respectively), physical activity (55.9%), and body weight (53.8%) were perceived as linked to emotional expression during this period. Interestingly, the analysis of frequency distribution in Table 6 showed that participants who experienced changes in lifestyle habits during confinement were more likely to link these modifications to their emotional expression as compared to those who did not report any change, hence highlighting the significant difference in students' perception towards such a relationship.

Discussion

Our study aims at assessing the self-perceived association between emotional expressivity and lifestyle modifications during the context of lockdown due to the COVID-19 pandemic in Lebanon specifically among university students. The expressivity of emotions is related to personality traits and thus to individual experiences as well as environmental factors. It translates into the behavioral communication of feelings and emotions, and as such affects social interactions and bonds [5,12]. Emotions can also have

Table 6. Frequency analysis of students' perception in terms of lifestyle changes and association with emotional expression during lockdown.

Changes in lifestyle behaviors		Association with emotional expression during lockdown				
		Extremely likely /Likely N (%)	Neutral N (%)	Unlikely /Extremely unlikely N (%)	χ^2	*p* value
Tobacco consumption	Yes	181 (56.9)	73 (23.0)	64 (20.1)	147.6	< 0.0001(****)
	No	89 (20.9)	286 (67.5)	49 (11.6)		
Alcohol consumption	Yes	138 (49.3)	83 (29.6)	59 (21.1)	86.5	< 0.0001 (****)
	No	108 (23.4)	299 (64.7)	55 (11.9)		
Meals consumption	Yes	345 (72.4)	75 (10.1)	56 (7.5)	141.5	< 0.0001 (****)
	No	88 (33.1)	152 (57.1)	26 (9.8)		
Snacks consumption	Yes	358 (70.6)	92 (18.2)	57 (11.2)	118.2	< 0.0001 (****)
	No	75 (31.9)	132 (56.2)	28 (11.9)		
Hours and quality of sleep	Yes	425 (76.6)	81 (14.6)	49 (8.8)	100.7	< 0.0001 (****)
	No	78 (41.8)	94 (50.2)	15 (8.0)		
Physical activity	Yes	336 (61.9)	130 (23.9)	77 (14.2)	47.1	< 0.0001 (****)
	No	79 (39.7)	98 (49.2)	22 (11.1)		
Body Mass Index	Yes	296 (66.7)	84 (18.9)	64 (14.4)	115.3	< 0.0001 (****)
	No	103 (34.6)	170 (57.0)	25 (8.4)		
Social interaction	Yes	382 (67.9)	101 (18.0)	79 (14.1)	98.2	< 0.0001 (****)
	No	70 (38.9)	100 (55.6)	10 (5.5)		
Quality of learning	Yes	366 (66.6)	102 (18.5)	82 (14.9)	81.0	< 0.0001 (****)
	No	73 (38.0)	100 (52.1)	19 (9.9)		
Working hours	Yes	300 (64.2)	100 (21.5)	67 (14.3)	150.1	< 0.0001 (****)
	No	71 (25.8)	183 (66.5)	21 (7.7)		
Hours on TV and social media	Yes	401 (69.1)	108 (18.7)	71 (12.2)	98.4	< 0.0001 (****)
	No	53 (32.7)	93 (57.4)	16 (9.9)		

an impact on academic performances along with behaviors in relation to lifestyle including for example the practice of a physical activity [14].

A Chinese national research documented the role of negative expressivity and impulse strength as predictors of negative emotions during early COVID-19 epidemic [7]. This finding consolidates the importance of assessing emotional expressivity during this exceptional situation. However, these aspects have not yet been investigated in the context of lockdown among university students, hence the originality of this work. In addition, our study explores the self-perceived relationship between emotional expressivity and lifestyle changes during this specific period of time.

Our research registered significantly higher emotional expressivity, in particular negative expressivity and impulse strength, in women as compared to men. In fact, in an article published in 2015, Chaplin explores gender differences in emotional expressions through a bio-psycho-social model reviewing women's more increased expressivity specifically in terms of positive emotions but also sadness. The absence of a significant difference in positive expressivity with respect to gender in our study might be related to the exceptional situation of lockdown and anxiety and stress-related to the pandemic [15].

The comparison of emotional expressivity in regards to the various academic fields revealed that students majoring in arts and psychology had the highest BEQ scores. Indeed, arts characterize a route for emotional expression, and students develop a particular sensibility to feelings. As for psychology students, they undergo training in relation to introspection and the elaboration of emotions in various situations which could explain emotional expressivity in relation to the context of lockdown. Regarding students specializing in medicine and paramedical sciences, they registered total BEQ scores of 65.28 ± 13.00 and 68.93 ± 16.00, respectively. Through their intensive training, students in these fields develop strategies related to the regulation of emotions. The average found in our research is lower than that detected in a recent study among nursing students in a Turkish public university, where the total BEQ score was found to be on average 79.45 ± 10.11 [16]. This is in part related to the fact that participants in our study majoring in paramedical sciences include not only nurses but also physiotherapists, laboratory and biomedical imaging technicians as well as nutritionists.

Furthermore, our findings showed a significant increase in emotional expressivity among students residing in urban regions than in rural ones. This could be due to the limited possibilities of outdoor activities in urban regions as compared to rural areas; strain and stress from the lockdown and associated anxieties could be overwhelming in urban regions. In accordance, a previous study exploring the impact of being outdoor on the emotional well-being during the COVID-19 lockdown in Austria revealed that being outdoors rather than indoors was associated with higher emotional well-being [17].

As for changes in eating habits during lockdown, more than 58% of university students linked them to emotional expression. Indeed, positive emotions were found to be significantly less expressed by students who had a loss of weight from decreased eating during lockdown. Food and eating patterns are generally related to individual differences. Research has developed the reciprocal effects between the nutritional status and psychological states including emotional dimensions and even more notably during stressful situations. Emotional expressivity has been viewed as part of aspects of emotional regulation questioned in eating disorders such as binge-eating, bulimia, and anorexia. In current literature, recent emphasis was brought towards the role of positive emotions in the regulation of weight in eating disorders particularly anorexia [18].

Sleep patterns changes were also reported to be associated with emotional dimensions for up to 68%. In the literature, anxiety, and depression have been discussed in relation to sleep patterns in excess or as disrupted. Mood disorders have been mainly explored in regard to sleep patterns. Reactive or situational mood and anxieties may in part explain sleep changes during this exceptional situation. Other interferences on sleep patterns could be attributed to overall changes in lifestyle such as the modification of activities. Likewise, more than 50% of students perceived a link between physical activity changes during lockdown and emotional expressions. According to a Spanish study conducted by Román-Mata and his colleagues on a sample of 1,095 university students from southern Spain, beneficial physical activity is related to greater resilience and emotional management, and a lower rate of psychological distress [19]. On the other hand, emotions have been found to play a mediating role in the motivation behind physical exercise among men and women [20,21].

An association between the quality of learning and emotional expression during lockdown was reported by 59.1% of participants, with 50.2% of overall students stating a decreased-extremely decreased quality of

learning. A review of the relationship between virtual learning and university students' emotions in the 21st century showed that the evaluation mostly considers the concept of satisfaction [22]. Virtual learning is viewed as a tool to communicate information related to courses and to participate in learning activities with specific objectives. Cognitive dimensions are associated with emotional components in the learning experience via the internet [23]. Interestingly, findings from our research revealed a significant association between the perceived quantity of learning and higher positive emotions being expressed by students. Furthermore, the quality of learning was related to lower negative emotions being expressed by students. The investment in education in terms of quantity and quality of learning seems to be linked to emotional regulation.

In terms of extensive time spent on TV and social media, our results found them to be significantly associated with increased emotional expressivity scores. Furthermore, among students from various fields, 61.2% perceived a likely-extremely likely relationship between hours spent on TV/social media and emotional expression, particularly during lockdown. In agreement, findings from a recent study exploring the role of emotion in excessive use of Twitter during COVID-19 imposed lockdown in India revealed that emotions affected the social media usage pattern of individuals during this particular situation [24]. Consistently, in 2019, Nie *et al.* focus on the mediating role of emotional expressivity in the presentation of an addiction to social network sites [25].

Finally, 60.9% of students reported an association between social interaction and emotion expressions during lockdown. Indeed, emotional expressivity scores were found to be significantly increased among students who had decreased social interaction during confinement. Emotional expression is an important part of communication and interpersonal relationships. It refers to dynamic processes deriving from the interaction between an individual and his environment. Interestingly, a previous study conducted by Rogers *et al.* in 2021 evaluated the perceived socio-emotional impact of the pandemic among adolescents in the United States. Participants reported changes in their friendships which included a lack of in-person interaction with friends, reduced time spent with their peers, and a decrease in emotional connection and friend support [26].

Some limitations of the present study should be noted. The cross-sectional nature of the research did not allow us to explain the causal relationship between lifestyle changes and emotional expressivity among university students. Furthermore, we were not able to explore changes in emotion expression throughout the different events and periods of time of the COVID-19 pandemic. Finally, the evaluation of several variables, specifically lifestyle factors, was based on self-reported information.

Conclusions

In the context of lockdown due to the pandemic, emotional aspects were associated by university students to daily modifications. Furthermore, the experience of distance learning seems to have contributed to more increased emotional expressivity in terms of positive emotions. It has also been associated with decreased negative emotions, hence the importance of distance learning in this particularly stressful context. Finally, our research emphasizes the role of social networking, regular physical activity and well-balanced nutrition, and the implementation of relaxation techniques from the perspective of their benefits on emotional regulation.

Authors' Contributions

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