COVID-19 pandemic lockdown and problematic eating behaviors in a student population

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ABSTRACT

Background and aims: Since mid-March 2020, over 3 billion people have been confined as a result of the COVID-19 pandemic. Problematic eating behaviors are likely to be impacted by the pandemic through multiple pathways. This study examined the relationships between stress related to lockdown measures and binge eating and dietary restriction in a population of French students during the first week of confinement. *Methods:* A sample of undergraduate students ($N = 5,738$) completed an online questionnaire 7 days after lockdown measures were introduced. The survey comprised variables related to lockdown measures and the COVID-19-pandemic, mood, stress, body image, binge eating and dietary restriction during the past 7 days, as well as intent to binge eat and restrict in the following 15 days. *Results:* Stress related to the lockdown was associated with greater likelihood of binge eating and dietary restriction over the past week and intentions to binge eat and restrict over the next 15 days. Greater exposure to COVID-19-related media was associated with increased eating restriction over the past week. Binge eating and restriction (past and intentions) were associated with established risk factors, including female gender, low impulse regulation, high body dissatisfaction, and having a concurrent

probable eating disorder. *Discussion and conclusion:* The higher the stress related to the first week of confinement, the higher the risk of problematic eating behaviors among students, particularly those characterized by eating-related concerns. Screening for risk factors and providing targeted interventions might help decrease problematic eating behaviors among those who are most vulnerable.

INTRODUCTION

All over the world, the coronavirus disease 2019 (COVID-19) outbreak has led public authorities to call for individuals to stay home and avoid physical contact with each other in order to curb the pandemic. However, these measures may result in major psychological negative consequences such as post-traumatic stress symptoms, negative affect, and anger (Brooks et al., 2020). Moreover, individuals with pre-existing mental health disorders are especially likely to experience negative mental health effects of stressful circumstances such as lockdown measures during epidemics (Wang et al., 2020).

To date, the effects of lockdown measures and the COVID-19 pandemic on problematic eating behaviors and eating disorder have not been evaluated. Problematic eating behaviors are likely to be impacted by the pandemic through multiple pathways, and individuals with pre-existing eating disorders might be particularly vulnerable (Rodgers et al., 2020; Weissman, Bauer, & Thomas, 2020). A first pathway involves the emotional impact of the restrictions. Higher social isolation and loneliness, boredom, and decreased physical and social activities due to the lockdown might increase stress and negative affect, which are documented as precipitating or maintaining factors in eating disorders (Levine, 2012; Stice, Ng, & Shaw, 2010). Negative mood is also known to increase food intake and to trigger eating disorder symptoms such as binge eating episodes and subsequent purging behaviors in individuals with and without eating disorders (Cardi, Leppanen, & Treasure, 2015; Evers, Dingemans, Junghans, & Boevé, 2018).

In addition to emotional aspects, the increased use of the Internet and social media may play a role. Disruptions to work routines and the increased reliance on video calls for work and social activities might also heighten body awareness and increase self-criticism about one's own body (Melioli, Rodgers, Rodrigues, & Chabrol, 2015). This effect might be particularly problematic for individuals with pre-existing preoccupations related to body shape and weight. Furthermore, increased time spent using traditional and social media and the toxic influence of the thin ideal and widespread media objectification is likely to increase the risk

for problematic eating behaviors (Holland & Tiggemann, 2016; Rodgers & Melioli, 2016). Moreover, increased media consumption may also be associated with greater exposure to food advertising, which has been shown to promote eating-related urges and cravings, uncontrolled eating, and greater weight and shape concerns (Boswell & Kober, 2016). Finally, exposure to media coverage of stressful and traumatic world events has been associated with increased problematic eating behaviors (Rodgers, Franko, Brunet, Herbert, & Bui, 2012).

Thus, multiple theoretical pathways predict a detrimental impact of the COVID-19 pandemic and resulting lockdown measures on problematic eating behaviors, highlighting this as an important area for investigation (Weissman et al., 2020). Furthermore, pre-existing eating concerns may predispose individuals to be particularly vulnerable to these effects. Indeed, across the world, health care professionals working in the field of eating disorders highlight the vulnerability of these individuals in the context of the COVID-19 lockdown, and preliminary clinical evidence suggests an increase in symptoms in this population (Fernández-Aranda et al., 2020).

Notably, since the pandemic began, most universities have closed their facilities and shifted to online teaching, and the economy has slowed down worldwide, resulting in students facing an unexpected and potentially anxiety-producing and threatening situation. Furthermore, young adults and students are particularly at risk of problematic eating behaviors and eating disorders (Tavolacci et al., 2015; Volpe et al., 2016). In such a context, the present study aims to explore the associations between experiences of the COVID-19 lockdown and problematic eating behaviors in a sample of French undergraduate university students. We hypothesized that increased stress related to the COVID-19 pandemic and the resulting lockdown would be associated with an increase in problematic eating behaviors (binge eating and dietary restriction).

METHODS

Participants and procedure

The present study is an ancillary project drawn from a larger database; other results from this database will be presented elsewhere. An online questionnaire was sent to students of four French universities (University Clermont Auvergne, University of Picardie Jules Verne, University Paris Nanterre, and University Grenoble-Alpes) and distributed over a single 2-day period, from March 26 to 27, 2020, indicating that the data were collected approximately 10 days after the start of the lockdown in France, on March 17, 2020. The undergraduate students were contacted via the digital work environment of the University Clermont Auvergne (37,367 students) and the University of Picardie Jules Verne (30,288 students), and psychology students were contacted at the University Paris Nanterre (500 students). The survey was

also shared on the Facebook page "University of Grenoble Alpes" (4,626 views). We estimate that 72,781 students were potentially reached by this survey. All participants responded anonymously.

Measures

Participants were invited to complete an online questionnaire that sought the following information.

Demographics and personal characteristics. Participants were asked details about their age, gender, body mass index (BMI) (from self-reported height and weight) and categorized as presenting underweight (BMI <18,5), normal weight (BMI <25), overweight (BMI <35) or obesity (BMI >or equal 35), scholarship status (as a proxy of lower socio-economic status), university, and estimates of their material and affective resources (10-item Social Provision Scale [SPS-10] scores; Cutrona & Russell, 1987).

Stress- and mood-related characteristics. Depression and anxiety were assessed with the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) and perceived stress (the degree to which an individual has perceived life as unpredictable, uncontrollable, and overloading) with the 10-item Perceived Stress Scale (PSS-10; Cohen, Kamarck, & Mermelstein, 1983).

Problematic eating behaviors and related factors. Participants completed the body dissatisfaction and impulse regulation subscales of the Eating Disorder Inventory, 2nd edition (EDI-2; Garner, 1991), an eating disorder screening tool (Sick, Control, One, Fat, Food [SCOFF]; Garcia et al., 2010), and the Ideal Body Stereotype Scale (IBSS; Stice & Agras, 1998). Consistent with the validated cutoff, participants with a score of 2 or higher on the SCOFF were considered at risk of presenting eating disorder symptoms (Garcia et al., 2010). Two additional self-reported indices of problematic eating behaviors were assessed: binge eating and dietary restriction during the past 7 days through two questions: "In the past week, have you experienced any episodes of binge eating (large food intake over a short period of time)?" and "In the past week, have you voluntarily restricted food intake due to weight or body shape concerns?" Intent to binge and restrict during the next 15 days was assessed with two questions: "Do you plan, in the next 15 days, to stockpile food for possible binge eating?" and "Do you plan, in the next 15 days, to voluntarily restrict eating for weight or body shape concerns?" For these four questions, participants responded on a 4-point Likert scale: 1 (none), 2 (less than once a week), 3 (two to three times a week), and 4 (almost every day).

Lockdown conditions. Participants responded to several questions regarding COVID-19, their experience of lockdown, and media exposure to COVID-19 and health-related information. All of these questions are available in the supplementary material. Three scores were computed:

1. Lockdown-related stress was assessed through the sum of the scores for 13 questions related to the new lifestyle imposed by the lockdown (work from home, impact on daily income, impact on social activities, etc.).
2. COVID-19-related stress was assessed through two questions regarding the risk of (themselves or a close relative) being infected, hospitalized, or even dying from COVID-19.
3. Media exposure to COVID-19 was assessed through five questions that assessed how much individuals paid attention to COVID-19-related information on the television, radio, and Internet and in newspapers and magazines (Romantan, Hornik, Price, Cappella, & Viswanath, 2008). Responses were scored on a 4-point scale ranging from 1 (not at all) to 4 (a lot).

The internal reliability of all scales was acceptable and can be found in Table 1.

Statistical analyses and measures

The two questions relative to binge eating (i.e., during the last week and intention for the next 15 days) and dietary restriction (during the last week and intention for the next 15 days) were transformed into dichotomous outcome variables (no binging or restricting behavior vs. at least one occurrence of these behaviors). Four distinct multilevel mixed-effects logistic regressions were thus conducted to estimate the effects of sociodemographic variables (age, gender, university, scholarship status); perceived stress (PSS-10); social, material, and affective resources (SPS-10); depression and anxiety symptoms (HADS); COVID-19-related media exposure; stress related to the lockdown; stress related to COVID-19; ideal body stereotypes (IBSS); eating disorder symptoms (SCOFF); and the body dissatisfaction and impulse regulation subscales of the EDI-2. All four models included a random university effect (i.e., random intercept) to control for unobserved university heterogeneity. Participant data was considered at level 1 and University level data was considered at level 2. At level 1, all four models included a fixed effect with random intercept for universities. Statistical significance was set to 0.05. All missing data were handled by using a listwise method (i.e., all the data for a specific participant were removed if data were missing on one of the variables). Two-hundred thirty-five observations were removed from the analyses. To render the effects comparable, we standardized all measures by transforming them into z-scores before entering them into the models. Robust standard error and confidence intervals for estimates were computed. All analyses were conducted with R 4.0.0 with lme4 and LmerTest packages and Jamovi 1.2.22. We tested the variance inflation factor (VIF) using the performance package available on R. We did not observe a VIF >10 (all the VIFs for the four models were between 1 and 2.15).

Ethics

The study was approved by the Ethics Committee of the University of Clermont Auvergne and all participants provided informed consent.

RESULTS

Of the 72,781 students contacted, 5,738 (women = 74.6%; mean age = 21.2, SD = 4.50; mean BMI = 22.6, SD = 4.46) took part in this study (response rate: 7.9%). The characteristics of the sample are reported in Table 1.

Multilevel mixed-effects logistic regression analysis to identify variables associated with binge eating and dietary restriction in the past 7 days (Table 2)

Binge eating behavior. Regarding sociodemographic factors, binge eating episodes during the last 7 days were significantly higher for women than for men (Odds-Ratios (OR) = 1.40, 95% confidence interval [CI] [1.20, 1.63], $P < 0.001$). Regarding BMI, those with underweight reported fewer binge eating episodes in the past 7 days than students with normal weight (OR = 0.81, 95% CI [0.66–0.99], $P = 0.040$), whereas students with overweight (OR = 1.26, 95% CI [1.08, 1.49], $P = 0.004$), and students with obesity (OR = 1.43, 95% CI [0.89–2.31], $P = 0.002$) reported more binge eating episodes in the past 7 days.

Regarding the influence of stress, greater perceived stress as assessed by the PSS-10 (OR = 1.24, 95% CI [1.14, 1.35], $P < 0.001$) and higher levels of stress related to the lockdown (OR = 1.12, 95% CI [1.04, 1.21], $P < 0.004$) were associated with a higher likelihood of reporting binge eating over the past 7 days.

Regarding the influence of mood, a greater level of anxiety (OR = 1.09, 95% CI [1.00, 1.18], $P = 0.049$) and depression (OR = 1.14, 95% CI [1.06, 1.23], $P < 0.001$) was associated with a higher likelihood of reporting binge eating over the past 7 days.

Regarding eating behaviors, participants whose scores indicated a probable eating disorder (SCOFF score ≥2) were more likely to report higher severity of binge eating (OR = 2.82, 95% CI [2.48, 3.20], $P < 0.001$). Higher body dissatisfaction (OR = 1.08, 95% CI [1.01, 1.15], $P = 0.029$) and low impulse regulation (OR = 1.10, 95% CI [1.02, 1.18], $P = 0.009$) were also associated with a higher likelihood of reporting binge eating over the past 7 days.

Dietary restriction. Dietary restriction during the last 7 days was significantly higher for women (OR = 1.79, 95% CI [1.53, 2.09], $P < 0.001$) and for younger students (OR = 0.93, 95% CI [0.87, 0.99], $P = 0.036$). Regarding BMI, compared to normal weight students, students with underweight (OR = 0.38, 95% CI [0.30–0.47], $P < 0.001$) and students with obesity (OR = 0.45, 95% CI [0.28–0.73], $P = 0.001$) reported more restriction during the past 7 days. Having a scholarship was associated with less dietary restriction (OR = 0.77, 95% CI [0.68, 0.88], $P < 0.001$).

Table 1. Descriptive statistics for study variables and sociodemographic characteristics

	N	Mean	SD	Minimum	Maximum	Cronbach's α
Age	5,606	21.2	4.50	17	77	
HADS Depression subscale	5,671	5.6	3.56	0	21	0.72
HADS Anxiety subscale	5,671	8.97	4.35	0	21	0.80
SPS-10	5,671	3.38	0.482	1.00	4.00	0.89
PSS-10	5,671	51.5	21.0	0.400	100	0.88
Stressors: related to lockdown	5,671	3.32	1.03	0	6	0.76
Stressors: related to COVID-19	5,671	3.73	1.39	0	6	0.91
Media exposure to COVID-19	5,671	2.10	0.611	1.00	4.00	0.69
IBSS	5,671	3.19	0.716	1.00	5.00	0.81
EDI-2: Body dissatisfaction	5,670	9.21	7.03	0	27	0.87
EDI-2: Impulse control	5,671	6.45	4.61	0	33	0.74
	N			Percentage		
Gender (female)	4,210			74.6%		
Participant's university						
University Clermont Auvergne	3,082			54.4%		
University of Picardie Jules Verne	1,982			35%		
University Paris Nanterre	315			5.6%		
University Grenoble-Alpes	289			5.1%		
Scholarship	2,766			48.8%		
BMI						
Underweight	609			10,9%		
Normal	3,802			68%		
Overweight	857			15,3%		
Obesity	322			5.8%		
SCOFF: At risk for ED symptoms	2,171			38.3%		

Note. Results expressed in count and percentage. BMI: body mass index in kg/m2; HADS: Hospital Anxiety and Depression Scale; SPS-10: 10-item Social Provision Scale; PSS-10: 10-item Perceived Stress Scale; COVID-19: coronavirus disease 2019; IBSS: Ideal Body Stereotype Scale; EDI-2: Eating Disorder Inventory, 2nd edition; SCOFF: Sick, Control, One, Fat, Food eating disorder screening tool; ED: eating disorder.
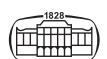
Table 2. Multilevel mixed-effects logistic regression analysis to identify variables associated with binge eating and dietary restriction in the past 7 days

Last 7 days binge eating			Predictors	Last 7 days dietary restriction		
OR	CI	P		OR	CI	P
1.35	1.25–1.45	<0.001	(Intercept)	0.53	0.43–0.65	<0.001
1.01	0.95–1.08	0.707	Age	0.93	0.87–0.99	0.036
1.40	1.20–1.63	<0.001	Gender (women =2, men = 1)	1.79	1.53–2.09	<0.001
			BMI			
0.81	0.66–0.99	0.040	*Underweight – Normal*	0.38	0.30–0.47	<0.001
1.26	1.08–1.49	0.004	*Overweight – Normal*	1.07	0.91–1.26	0.426
1.43	0.89–2.31	0.141	*Obesity – Normal*	0.45	0.28–0.73	0.001
0.98	0.87–1.11	0.789	Scholarship	0.77	0.68–0.88	<0.001
0.98	0.92–1.05	0.530	SPS-10	1.04	0.97–1.11	0.306
1.14	1.06–1.23	<0.001	HADS Depression subscale	0.94	0.87–1.02	0.123
1.09	1.00–1.18	0.049	HADS Anxiety subscale	1.11	1.02–1.21	0.018
1.24	1.14–1.35	<0.001	PSS-10	1.02	−0.94–1.12	0.608
1.12	1.04–1.21	0.004	Stressors: related to lockdown	1.17	1.08–1.26	<0.001
1.01	0.96–1.08	0.667	Stressors: related to COVID-19	1.00	0.93–1.08	0.893
1.02	0.96–1.08	0.548	Media exposure to COVID-19	1.05	0.98–1.12	0.153
2.82	2.48–3.20	<0.001	SCOFF: At risk for ED symptoms	2.65	2.32–3.02	<0.001
1.05	0.99–1.12	0.109	IBSS	1.16	1.09–1.24	<0.001
1.08	1.01–1.15	**0.029**	EDI-2: Body dissatisfaction	1.80	1.66–1.94	<0.001
1.10	1.02–1.18	**0.009**	EDI-2: Impulse control	1.04	0.97–1.11	0.259

OR = Odds ratios; CI: 95% confidence interval; BMI: body mass index in kg/m^2; SPS-10: 10-item Social Provision Scale; HADS: Hospital Anxiety and Depression Scale; PSS-10: 10-item Perceived Stress Scale; COVID-19: coronavirus disease 2019; SCOFF: Sick, Control, One, Fat, Food eating disorder screening tool; ED: eating disorder; IBSS: Ideal Body Stereotype Scale; EDI-2: Eating Disorder Inventory, 2nd edition.

Higher stress related to the lockdown (OR = 1.17, 95% CI [1.08, 1.26], P < 0.001) was also associated with a higher likelihood of dietary restriction over the past 7 days.

Regarding the influence of mood, a greater level of anxiety (OR = 1.11, 95% CI [1.02, 1.21], P = 0.018) was associated with a higher likelihood of dietary restriction over the past 7 days.

Participants with a higher eating disorder risk were more likely to report higher severity of dietary restriction (OR = 2.65, 95% CI [2.32, 3.02], P < 0.001). Higher body dissatisfaction (OR = 1.80, 95% CI [1.66, 1.94], P < 0.001) and greater endorsement of appearance ideals (IBSS) (OR = 1.16, 95% CI [1.09, 1.24], P < 0.001) were also associated with a higher likelihood of dietary restriction over the past 7 days.

Multilevel mixed-effects logistic regression analysis to identify variables associated with anticipated binge eating and dietary restrictive behavior in the next 15 days (Table 3)[1]

Anticipated binge eating behavior. Regarding sociodemographic factors, higher age (OR = 1.15, 95% CI [1.06, 1.25],

P = 0.001) was associated with a higher likelihood of binge eating intention over the course of the next 2 weeks. Compared to those with normal weight, those with underweight reported more intention to engage in binge eating (OR = 1.31, 95% CI [1.00, 1.71], P = 0.050).

Higher scores on the HADS depression subscale were associated with a higher likelihood of binge eating intentions over the course of the next 2 weeks (OR = 1.40, 95% CI [1.26, 1.54], P < 0.001). Moreover, higher levels of stress related to the lockdown (OR = 1.33, 95% CI [1.19, 1.48], P < 0.001) and greater COVID-19-related media exposure (OR= 1.20, 95% CI [1.11, 1.31], P < 0.001) were also associated with a higher likelihood of binge eating intentions over the course of the next 2 weeks.

Participants considered at risk for eating disorders (SCOFF score ≥2) were more likely to report higher binge eating intentions over the course of the next 2 weeks (OR = 2.11, 95% CI [1.75, 2.54], P < 0.001). Low impulse regulation (OR = 1.23, 95% CI [1.13, 1.33], P < 0.001) and lower body dissatisfaction (OR = 0.84, 95% CI [0.76, 0.93], P < 0.001) were also associated with a higher likelihood of binge eating intentions over the course of the next 2 weeks.

Anticipated dietary restriction. Intention to engage in dietary restriction over the next 2 weeks was significantly higher for women (OR = 1.48, 95% CI [1.27–1.73], P < 0.001), younger age (OR = 0.93, 95% CI [0.87–0.99], P = 0.0427). Regarding BMI, compared to with normal weight students, those with underweight (OR = 0.29, 95% CI [0.23–0.38], P < 0.001), or with obesity (OR = 0.31, 95% CI [0.19–1.01], P < 0.001) were more likely to report intention to

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[1]Sensitivity analyses conducted solely among women revealed no difference concerning the impact of pandemic-related variables on binge eating or restrictive behaviors. Sensitivity analyses were also conducted among participants from the two universities that represented the majority of the sample. Findings revealed that the patterns of relationships were overall identical, although anxiety and age were no longer significant predictors of binge eating and restriction over the past 7 days (additional analyses available on request).

Table 3. Multilevel mixed-effects logistic regression analysis to identify variables associated with anticipated binge eating and dietary restrictive behavior in next 15 days

Binge eating intentions			Predictors	Dietary restriction intentions		
OR	CI	P		OR	CI	P
0.16	0.12–0.21	<0.001	(Intercept)	0.51	0.44–0.59	<0.001
1.15	1.06–1.25	0.001	Age	0.93	0.87–0.99	0.027
1.09	0.88–1.36	0.434	Gender	1.48	1.27–1.73	<0.001
			BMI			
1.31	1.00–1.71	0.050	*Underweight- Normal*	0.29	0.23–0.38	<0.001
1.19	0.95–1.49	0.124	*Overweight - Normal*	1.04	0.88–1.23	0.647
1.62	0.91–2.87	0.101	*Obesity –- Normal*	0.31	0.19–0.50	<0.001
1.13	0.95–1.35	0.157	Scholarship	0.89	0.79–1.01	0.081
0.96	0.88–1.05	0.428	SPS-10	1.02	0.96–1.10	0.495
1.40	1.26–1.54	<0.001	HADS Depression subscale	0.95	0.88–1.03	0.242
0.95	0.85–1.07	0.420	HADS Anxiety subscale	1.04	0.95–1.13	0.437
1.03	0.91–1.17	0.619	PSS-10	1.06	−0.97–1.16	0.190
1.33	1.19–1.48	<0.001	Stressors: related to lockdown	1.12	1.03–1.21	0.005
1.04	0.94–1.15	0.446	Stressors: related to COVID-19	1.04	0.97–1.12	0.241
1.20	1.11–1.31	<0.001	Media Exposure to COVID-19	1.00	0.93–1.06	0.918
2.11	1.75–2.54	<0.001	SCOFF: At risk for ED symptoms	2.58	2.26–2.95	<0.001
1.08	0.99–1.18	0.077	IBSS	1.19	1.11–1.26	<0.001
0.84	0.76–0.93	<0.001	EDI-2: Body dissatisfaction	2.05	1.89–2.22	<0.001
1.23	1.13–1.34	<0.001	EDI-2: Impulse control	1.12	1.04–1.20	0.002

OR = Odds Ratios; CI: 95% confidence interval; BMI: body mass index in kg/m^2; SPS-10: 10-item Social Provision Scale; HADS: Hospital Anxiety and Depression Scale; PSS-10: 10-item Perceived Stress Scale; COVID-19: coronavirus disease 2019; SCOFF: Sick, Control, One, Fat, Food eating disorder screening tool; ED: eating disorder; IBSS: Ideal Body Stereotype Scale; EDI-2: Eating Disorder Inventory, 2nd edition.

restrict. Similar to the pattern of findings for engaging in restriction over the past 7 days, higher levels of stress related to the lockdown were associated with higher intentions to engage in dietary restriction over the next 2 weeks (OR = 1.12, 95% CI [1.03, 1.21], P = 0.005).

Participants considered at risk for eating disorders (SCOFF score ≥2) were more likely to report higher severity of intended dietary restriction (OR = 2.58, 95% CI [2.26, 2.95], P < 0.001). Higher levels of body dissatisfaction EDI-2 (OR = 2.05, 95% CI [1.89, 2.25], P < 0.001), low impulse regulation (OR = 1.12, 95% CI [1.04, 1.20], P = 0.002), and endorsement of appearance ideals (OR = 1.19, 95% CI [1.11, 1.26], P < 0.001) were associated with higher intentions to engage in dietary restriction over the next 2 weeks.

DISCUSSION AND CONCLUSIONS

The aim of this study was to explore the relationships between perceived stress related to the COVID-19 pandemic and resulting lockdown and problematic eating behaviors among undergraduate students in France. Our results showed a strong relationship between problematic eating behaviors and stress related to lockdown, a relationship that was associated with exposure to COVID-19-related media coverage. Yet, concerns related to the COVID-19 pandemic itself were not associated with problematic eating behaviors.

Our results suggest, first, that stress related to the lockdown and spatial distancing was associated with a greater likelihood of reporting both binge eating and dietary restriction during the past week, which corresponds to the first week of the implementation of the strict lockdown measures in France. This stress was also associated with intentions to engage in binge eating and dietary restriction over the course of the next 2 weeks. Notably, this period of time was particularly stressful, as it corresponds to the moment of incertitude regarding the potential length of the lockdown period and the time needed to reach the peak of the pandemic. Our measure of stress related to the lockdown and spatial distancing included elements related to both social and relational factors, as well as to disruptions in daily routines and habits and work circumstances. Given this broad conceptualization, a variety of factors possibly account for this relationship. The reduced social contact and disruptions to daily routines might increase negative affect, such as the stress due to the need to reorganize work and familial commitments. Alternatively, these changes might promote a wide range of negative affect (e.g., boredom, frustration), which are liable to promote problematic eating behaviors (Braden, Musher-Eizenman, Watford, & Emley, 2018). Similarly, we found that financial concerns were also associated with higher levels of problematic eating behaviors, suggesting that these concrete economic aspects may play a pivotal role in the onset of psychopathological symptoms, including problematic eating behaviors. The feelings of loneliness likely resulting from spatial distancing policies are also likely to promote problematic eating patterns, as loneliness was found in previous studies to increase problematic eating behaviors, especially among women (Constant et al., 2018) and individuals high in emotion-focused coping
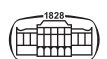
(Deckx, Van Den Akker, Buntinx, & Van Driel, 2018). Encouraging individuals to find alternative ways to connect with their interpersonal networks online may help to mitigate these effects. Disseminating information about mental health service options that are available during periods of lockdown and social isolation may also be useful.

Second, our results revealed that media exposure to COVID-19-related information is significantly associated with intent to engage in binge eating, but not with restrictive behavior. These results differ from previous work that showed that exposure to media coverage of the 2011 Japanese earthquake was associated with increased dieting among English- and French-speaking adults, but not increased bulimic-type behaviors (Rodgers et al., 2012). The present sample (composed of undergraduate students) and the assessment instrument used might, however, help explain these discrepancies. Further work is required to explore the mechanisms through which exposure to anxiety-provoking media content is associated with problematic eating behaviors.

Interestingly, concerns related to the COVID-19 pandemic itself were not associated with problematic eating behavior outcomes in the present study. Fear of contagion from COVID-19 may lead individuals to experience concerns related to food and eating that were not captured by the measures here, such as increased concerns regarding the quality of food or its capacity to be a vehicle of contagion. Exploring the role of concerns related to the pandemic in other types of problematic eating behaviors or food-related concerns would be an interesting direction for further research. Two other factors emerged as consistent predictors of the higher likelihood of engaging in problematic eating behaviors in our findings: body dissatisfaction and poor emotion regulation. Body dissatisfaction is a well-documented risk factor for problematic eating behaviors (Stice, Marti, & Durant, 2011). Here, exacerbated body dissatisfaction may also represent a potential mediator of the relationship between stress related to the lockdown and spatial distancing and problematic eating behaviors. Thus, the restrictions placed on individuals' access to regular physical activity is liable to promote shape and weight concerns and related problematic eating behaviors (Haines, Kleinman, Rifas-Shiman, Field, & Austin, 2010). Although body dissatisfaction was associated with problematic eating behaviors in our study, the internalization of appearance standards related to thinness (as measured by the IBSS) emerged only as related to the intention to engage with problematic eating behaviors over the next 2 weeks, not with past-week problematic eating behaviors. This result suggests that body dissatisfaction and adoption of the thin ideal play different roles in the onset and perpetuation of problematic eating patterns.

In addition, and consistent with previous studies (Tavolacci et al., 2015), the strongest predictor of dietary restriction and/or a binge eating episode (in the last 7 days or intention for the next 2 weeks) was concurrent symptoms of eating disorders (as defined by a SCOFF score of ≥2).

Thus, unsurprisingly, individuals with pre-existing eating concerns are at increased risk for developing problematic eating behaviors during an adverse event, such as the COVID-19 pandemic. From a public health perspective, this finding supports the need to screen and identify individuals with existing concerns, as well as to target resources and intervention efforts toward these vulnerable groups during circumstances such as the COVID-19 pandemic. Potentially effective strategies in such a context include disseminating information about available treatment options and online-based diagnostic and psychological interventions (Fernández-Aranda et al., 2020; Weissman et al., 2020). This type of intervention is recommended, as early screening and intervention has been shown to mitigate eating disorder symptoms and improve long-term prognosis (Fitzsimmons-Craft, Karam, Monterubio, Taylor, & Wilfley, 2019). Notably, in the current study, we identified a large proportion of individuals at risk for eating disorder symptoms (38.3% of the sample). This effect is due to one item in particular on the scale that received a positive response rate of 61.3% ("Would you say that food is something that is important in your life?"). This response rate reflects that the particular context and the associated stress and negative affect probably promote a heightened preoccupation with eating. In the same vein, we also noted that weight status was associated with problematic eating behavior. Problematic eating behavior was more pronounced among the groups at either end of the weight spectrum compared to those whose BMI lay towards the middle of the distribution. This is consistent with the literature (see for example Johnson, Pratt, & Wardle, 2012; Nightingale & Cassin, 2019).

Our study has several limitations. First, the cross-sectional nature of the data limits the extent to which causal inferences may be made. Second, our main outcomes (the four questions regarding problematic eating behaviors) were assessed by using single items developed in the context of the current study. Third, potentially important confounding variables such as restriction of physical activities due to the lockdown were not assessed. Fourth, even though our study includes a large sample, it consists of self-selected participants and is thus not necessarily representative of the undergraduate student population in France. In particular, women are over-represented in our sample (74.6% female), as average proportion of women in the female student population is around 55% (Kabla-Langlois, 2020).

Despite these limitations, the findings from the present study, obtained during the first phase of the lockdown, offer unique data about the relations between the COVID-19 pandemic and problematic eating behaviors. Our findings suggest that stress related to the lockdown and social isolation might increase the risk of problematic eating behaviors and that this might be particularly the case for those with pre-existing eating disorder symptoms and concerns. Screening for high-risk individuals and providing targeted intervention and counseling related to the environmental stressors created by the COVID-19 pandemic and lockdown would help to mitigate the negative impact on problematic eating behaviors.

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APPENDIX
SELF-REPORTED QUESTIONNAIRES RELATED TO COVID 19 STRESSORS

Environmental stressors

Instructions: We're going to ask you about a few things that can be stressful during lockdown. Again, there is no right or wrong answer, we are only interested in your sincere answer.

Participants had to answer on a scale from 1 (*strongly agree*) to 7 (strongly disagree).

1. My daily income
2. Being able to do my job well enough
3. Future employment prospects
4. Access to basic necessities such as food
5. Not being able to participate in group social activities
6. Dealing with the behavior of adults with whom I isolate myself
7. Dealing with the behavior of children with whom I isolate myself
8. The national economy
9. The risk that I or others I know will catch COVID-19
10. The risk of myself or others I know of being hospitalized or dying because of COVID-19
11. Adapting my work to digital platforms
12. Having to adapt my social life to digital platforms
13. Being ashamed to act differently from others (e.g., at work, shopping)

Media exposure

1. How much attention do you pay to information about COVID-19 or medical topics on television?
   ° A lot
   ° Often
   ° A little
   ° Not at all

2. How much attention do you pay to information about COVID-19 or medical topics on the radio?
   ° A lot
   ° Often
   ° A little
   ° Not at all

3. How much attention do you pay to information about COVID-19 or medical topics in the newspapers?
   ° A lot
   ° Often
   ° A little
   ° Not at all

4. How much attention do you pay to information about COVID-19 or medical topics in magazines?
   ° A lot
   ° Often
   ° A little
   ° Not at all

5. How much attention do you pay to information about COVID-19 or medical topics on the Internet?
   ° A lot
   ° Often
   ° A little
   ° Not at all