

The Impact of COVID-19 on Psychiatric Traits of Eating Disorders Among Young Adults

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ABSTRACT

Stress and anxiety are known to increase the likelihood of eating disorders. Because everyone was in lockdown, COVID19 was a big stress-inducer. Using this information, we collected data on the participant's feelings before and after COVID19. We used R and Excel to perform correlations between the GAD-7 (Generalized Anxiety Disorder-7) results from the data and found a significant increase in being concerned about weight after COVID19, feeling guilty after eating good food after COVID19, and feeling uncertain about the participant's future after COVID19. These were all relative to feelings of anxiety the participants felt before COVID19. Using R, we constructed a multiple regression model with the data, which showed a statistically significant increase. Our multiple regression model also showed that the significant predictors were both after COVID19, demonstrating a negative impact of COVID19 on eating disorders.

Introduction

Eating disorders represent one group of debilitating diseases that cause severe disturbance to eating behaviors, which leads to serious and sometime fatal consequences.^{1,2} These disorders normally start to occur in teenagers and young adults, with a doubled frequency in females compared to males. Based on the behavioral eating defects, eating disorders can be categorized into 3 distinct subtypes. Bulimia nervosa is characterized by eating large amounts of food in a short time followed by a purging behavior or fasting and excessive exercise to compensate for the ingested food during bingeing episode, which is largely driven to the guilt associated with bingeing. Binge eating disorder is characterized by recurrent binge eating episodes during which a person feels a loss of control and marked distress over his or her eating. Unlike bulimia nervosa, binge eating episodes are not followed by purging, excessive exercise or fasting². As a result, people with binge eating disorder often are overweight or obese. Anorexia nervosa is characterized by a preoccupation on body weight control with a significant and persistent reduction in food intake leading to extremely low body weight and sometime life-threatening starvation^{3,4}. These patients experience a distortion of body image, intense fear of gaining weight and a relentless pursuit of thinness.

One common feature of eating disorders is the co-morbidity associated with mental illness. Patients diagnosed with eating disorders normally exhibit a usually high level of anxiety and depression⁴. One of key symptoms of anorexia nervosa is overwhelming worry on body weight gain, which reaches to such an extent that it apparently effectively overrides the need to feed in fasting states for survival^{5,6}. The purging behavior in Bulimia nervosa also reflects the guilt from episodes of bingeing eating with an insurmountable level of fear for body weight gain. Importantly, eating disorders are usually triggered by a stressful and traumatic event, especially occurring during the teenager and young adult ages⁷. Although eating disorders are relatively rare with a life prevalence of 2.7%, these disorders impose a significant impact on the life of patients, family and society as a result of the severity in health consequences¹. However, there is no effective cure against eating disorders and the brain mechanisms underlying these disorders remain largely unknown.

The COVID19 epidemic has unfortunately caused a dramatic change to lifestyle of people around the world. The lockdown policy that aimed to minimize the spread of the virus has enforced unprecedented closures of almost all routine activities of the society, including schools and extracurricular activities for students. Since teenagers and young adults normally experience extensive interactions with their peers and teachers for social development and school activities have become an integral part of their lives, COVID19 imposed lockdown has caused a disproportional stress and anxiety to them. In this sense, the social isolation and associated with uncertainty for future likely represents a stressful and traumatic event to these students. Therefore, this project explores the impact of COVID-19 on anxiety and eating-related emotions in young adults.

Methods

Survey questions. Our approach was to use a questionnaire to survey a total of 41 questions from 111 young adults. This project asks the question of if COVID19 has a potential impact on young adults' anxiety levels and associated eating habits. The hypothesis is that COVID19 caused an increase in anxiety and potentially exacerbate the development of eating disorders in young adults. I provided the Sample Informed Consent Form in the survey, but because it was online, I had the participants check boxes that signify their consent for both their parents and themselves. This avoided actual to ensure the anonymity of the participants. I will store and protect the participant information on an Excel sheet that will not be shared to anyone. I will not collect any personal data besides their gender, grade level, and ethnicity. Everything else is anonymous.

Table 1: Questionnaire related to food intake

Questions	Before Covid19	After Covid19
Body image	How much did you think about your body image before COVID?	How much do you think about your body image now?
Weight concern	How much did weight gain concern you before COVID?	How much does weight gain concern you now?
Guilt after enjoying food	How much guilt did you feel after enjoying good food before COVID?	How much guilt do you feel after enjoying good food now?
Uncertainty about future	How much did you feel uncertain about your future before COVID?	How much do you care about others' opinions on your body now?
Picky on food	How picky were you to food before COVID?	How picky are you now?

Survey population. The participants were recruited by social media using apps like Instagram and WeChat. The participants' ages ranged from 15-22. 19.8% of the participants were male, 76.9% of the participants were female, and 2.8% of the participants were either non-binary or genderfluid. 93.7% of the participants were Asian American Pacific Islander (AAPI), 4.5% of the participants were White, and 2.7% of the participants were Hispanic. 11.7% of the participants were minors. The economic background of the participants are unknown.

Table 2: GAD-7 Questionnaire related to general anxiety

GAD-7 Assessment Questionnaire	Feeling nervous, anxious, or on edge
	Not being able to stop or control worrying
	Worrying too much about different things
	Trouble relaxing
	Being so restless that it is hard to sit still
	Becoming easily annoyed or irritable
	Feeling afraid as if something awful might happen

Data analysis. The data I analyzed came from the results of the survey I distributed. I first compared the difference between various measures before and after COVID19 using Excel. Then, I correlated the differences between the measures of other traits to identify other contributing factors and derive the traits in anxiety, emotional behaviors, eating habits, and GAD-7 Assessment Scores, in which I used R and Google Sheets. The statistical significance level was defined by p less than 0.05. The data was plotted using R and Prism.

We correlated the data we received from the participants and proved our hypothesis, which was that COVID19 caused an increase in anxiety and potentially exacerbated the development of eating disorders in young adults.

Results

The GAD-7 anxiety survey is an international standard questionnaire to assess the general level of anxiety⁸. It consists of 7 questions with a score range of 0-3. A total score from all 7 questions will be calculated. Scores of 5, 10, and 15 from represent the places where participants feel mild, moderate, and severe anxiety, respectively⁸.

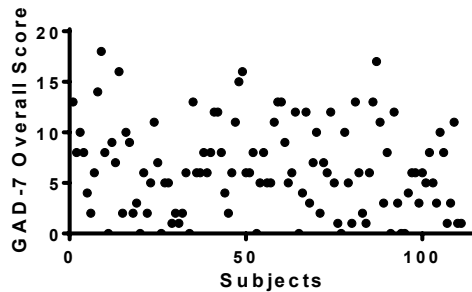


Figure 1. The overall GAD-7 scores in all subjects responded to the survey. The x-axis contains the individual subjects, and the y-axis contains the overall score from GAD-7 survey.

Participants with the score of 10 and above are usually recommended to have further evaluation. To assess the general anxiety score distribution across all participants, we plotted individual scores with the participants on the X axis and the scores on the Y axis (Fig. 1). It is evident that rough 1/3 of the participants with a score of above 10, 1/3 between 5 and 10, and the remaining 1/3 below 5. Thus, it appears that a significant portion of young adults have a moderate level of anxiety. Notably, about 10 participants (about 10%) had a score above 15, suggesting a severe anxiety. The average score is 7.8, which appears to be within then range in other studies with participates with a similar age⁸, indicating the validity of the current survey results.

Among all questions asked in the survey, we paid special attention to the changes before and after COVID19. When the uncertainty score was compared between pre-COVID19 and post-COVID19, we found that it is significantly

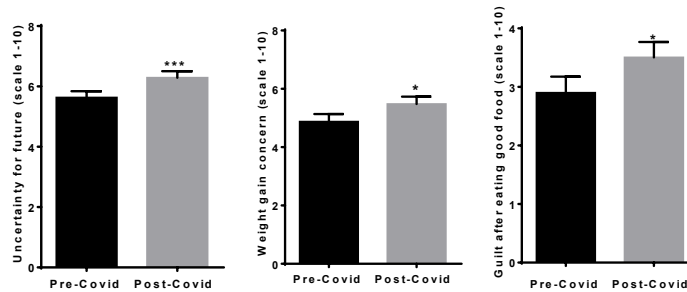


Figure 2. Comparison in scores of uncertainties for future (A), of concern on weight gain (B), and guilt after eating good food (C) between Pre-Covid and Post-Covid among individuals surveyed. The questionnaire rating was on a 1-10 scale with 10 being the worst.

increased in post-COVID19 (Fig. 2A), suggesting that the impact of COVID19 including the lockdown caused an increase in the uncertainty feeling among youth.

One of the hallmarks of eating disorders is the concern of body weight gain. When the score on the concern of body weight gain was compared between pre-COVID19 and post-COVID19, we found that it is also significantly increased in the post-COVID19 group (Fig. 2B), suggesting that the lockdown caused by COVID19 and associated inability to exercise caused an increase on the concern of body weight gain.

Another hallmark of eating disorders in the guilt after eating food. The guilt is thought to be the main driver of the purging behavior in the Bulimia patients. We also compared the guilt score before and after the COVID19 and found that it was significantly increased in the post-COVID19 (Fig. 2C), suggesting a feeling of less satisfaction after meal.

To assess the validity of our survey results on concerns in weight gain, uncertainty on future and guilt after eating, we correlated the scores of these traits with the GAD-7 scores. Specifically, we correlated the GAD-7 scores with individual scores of Pre-COVID19 and Post-COVID19 in each of the 3 categories (Table 3). While we didn't find a significant correlation between GAD-7 scores with the scores of uncertainties feeling, we found that GAD-7 scores was significantly correlated with those of the guilt after eating in both pre and post-COVID19 periods. While there was a weak correlation between the GAD-7 scores and body weight concerns in pre-COVID19, the correlation between the GAD-7 scores and post-COVID19 was highly significant. Since GAD-7 is a well-accepted questionnaire, the significant correlation suggests that our survey questionnaire on the psychiatric traits on eating disorders is effective.

Table 3. Analysis of correlation between subject survey scores and GAD-7 general scores. Correlation analysis was performed on the total GAD-7 score against uncertainty feeling about future in both pre-Covid19 (PreUncertain) and post-Covid19 (PostUncertain) periods, guilt after eating good food in both pre-Covid19 (PreGuilt) and post-Covid19 (postGuilt) periods, and body weight concerns in both pre-Covid19 (PreConcernWeight) and post-Covid19 (postConcernWeight) periods. The significance levels of correlation are represented by the asterisks. Df = Degrees of freedom. Sum of sq = Sum of squares. RSS = Residual sum of squares. AIC = Akaike information criterion. F Value = The F critical value. Pr(>F) = The p-value for the F statistic.

Gad-7 vs	Df	Sum of Sq	RSS	AIC	F Value	Pr(>F)
PreUncertain	1	0.05	2780.8	361.53	0.0019	0.965049
PostUncertain	1	76.27	2704.5	358.44	3.0741	0.082362
PreGuilt	1	367.17	2413.6	345.81	16.5812	8.86e-05***
PostGuilt	1	483.33	2297.5	340.33	22.9305	5.323e-06***
PreConcernWeight	1	95.76	2685.1	357.64	3.8872	0.051190
PostConcernWeight	1	186.17	2594.6	353.84	7.8211	0.006106**

Correlation analysis between GAD-7 overall scores with the indicated survey scores. **p<0.01 and ***p<0.001.

Discussion

The COVID19 pandemic has imposed an unprecedented challenge to the whole society. In particular, the lockdown policy aiming to prevent the spread of the virus has forced closure of school and all related extramural activities. As school students, especially those young adults, are in a normal physiological stage of their lives to actively engage in social activities, develop their social skills and improve their mental resilience, it is conceivable that they are particularly sensitive to social isolation associated with the lockdown. Here we showed that young adults exhibited significant increases in the scores in uncertainty for future, concern on body weight gain and guilt after eating after COVID19 compared to pre-COVID19. To validate our self-designed questionnaire, we also surveyed GAD-7, a standard questionnaire for anxiety levels. Since eating disorders are known to be associated with an increased level of anxiety⁹, the GAD-7 questionnaire will also provide an independent measure to confirm the trait for eating disorder. We found that there was a significant correlation in the surveyed individuals between scores in GAD-7 and those in both uncertainty for future and guilt after eating of post-COVID19, suggesting a general correlation between anxiety levels and psychiatric traits for eating disorder. This was a result of running our R linear model, which showed a p-value below 0.05. We think these predictors are significant because of the social and psychological isolation young adults and teenagers experienced during COVID19. Interestingly, there was no or mild correlation between scores in GAD-7 and those in uncertainty for future and guilt after eating of pre-COVID19, suggesting that COVID19 caused a significant impact of these individuals in psychiatric traits in uncertainty for future and guild after eating.

Our results have important implications on the perspective of eating disorders. As all of these psychiatric traits are known to be core features of eating disorders, our results suggest that the COVID19 will likely cause an increase in clinics with eating disorders. Our experiment concluded that COVID19 had a significant impact on young adults' anxiety and eating-related emotions, which could potentially lead to eating disorders. These observations are supported by recent results showing that COVID19 worsened the symptoms of the existing patients with eating disorders and also increased the anxiety feeling in the general human population¹⁰⁻¹². Together, these results call for

measures from government and society for early detection and preventive actions against eating disorders among young adults.

Our current study has a few limitations. First, our survey participants were largely recruited from social media, which may cause a preferable selection from those young adults that are active on social media. Second, most of our participants are Asian, which may also cause a distortion in psychiatric traits that may more or less affected by religion, tradition and living habits associated with cultural differences in Asian. Third, our survey participant size is relatively small, which may not capture the difference in a precise way. Thus, a similar study with a larger population will be required to assess a precise impact of COVID19 on eating disorders.

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