The Effects of the COVID-19 pandemic and pandemic-related restriction on Emotional eating in College students

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Abstract

Background: During this past two years, COVID-19 has had an immense impact on the way we live our daily lives. Previous studies have established that eating behaviors are often modulated by disinhibition of eating restraints and body image dissatisfaction, often rooting from social media. This study was designed to track changes in emotional eating in college students during the pandemic.

Methods*:* 328 participants, 111 male and 217 female, across the Spring 2021, Fall 2021, and Spring 2022 semester completed the online Eating Habits Questionnaire for the study through the Vanderbilt Psychology department's SONA system to measure Emotional eating, Weight dissatisfaction, COVID-19 Poor eating, COVID-19 Negative Emotions, Dietary restraint, Change in weight, and Body image.

Results*:* More than half of the participants indicated that Emotional eating was a moderate or large problem for them. There was a significant temporal trend found for COVID-19 Poor eating and COVID-19 Negative emotions, with lower numbers during the Fall 2021 semester. COVID-19 Poor eating and Body image were significant predictors of Emotional eating.

Conclusion: With the COVID-19 and emotional eating relationship established, there will need to be further studies regarding this matter for colleges to implement measures to help students improve their relationship with food.

Keywords: Emotion, eating, eating behaviors, COVID-19, college students, disinhibition, dietary restraint, body image.

Introduction

In today's world, food is often used as a coping mechanism for stressful emotions for many people, leading to stress eating and emotional eating (Thompson, 1987). The relationship between humans and food is influenced by social media displays of body image, healthy food diet, and social implications of how a person eats (Qutteina, 2019). These additional meanings embedded in food have led to a general increase over the past decade in eating disorders, weight concerns, and the usage of food to cope with stressful emotions (Schmidt, 2018). With the onset of COVID-19, there has been an increase in stress and depression in individuals (First, 2020). The proposed study will examine the relationship between stress and eating in college students and further investigate how the COVID-19 pandemic has influenced the frequency and intensity of emotional eating.

Many studies have investigated the effect of general moods on eating. For example, Schneider (2012) studied the impact of anger and anxious moods on eating behavior and found that participants with a higher anger and anxious score consumed an average of 128.29 more calories compared to participants with neutral moods. Macht (1999) also adds to the idea that anger and joy cause higher levels of hunger and impulses to eat in subjects, as anger and joy are more frequently experienced by humans in comparison to sadness and fear. In a social context, Patel and Schlundt (2001) found that when individuals were eating with other people, healthier meals were more frequently consumed than meals eaten alone.

The Dietary Restraint Hypothesis, originally developed by Herman and Mack (1975), theorizes that disinhibitors are present, people who chronically restrict their food intake will lose control of their eating. In this study, the disinhibitors were categorized as alcohol, stress, or the idea of thinking to have overeaten. Canetti (2002) also solidified the restraint hypothesis in 2002

stating that there is a strong relationship between the increase in stress and emotions modulating the increase in unhealthy eating behaviors. Striegel-Moore (1995) and Stice (1998b) also show that dietary restraints are triggered by feelings of body dissatisfaction and thin ideals, which could cause stress in an individual.

Disinhibition, body dissatisfaction, and dietary restraints are all closely related to emotional eating and increased abnormal eating behaviors. In a study conducted by Ganley (1988), it was determined that disinhibition is a more successful predictor of eating behaviors, such as depression-related weight gain than dietary restraints, under stressful conditions. Higher levels of body dissatisfaction and dietary restraints were determined to be associated with higher levels of disordered eating, eating behavior deviating from normal eating behaviors such as alternating between diet and overeating, excessive dieting, or periodic binge eating.

The dietary restraint theory itself is modulated by the presence of disinhibitors such as body dissatisfaction, as shown in Figure 1. For individuals who have been restraining their eating, these disinhibitors play a large role in disinhibiting their restrained eating, causing them to overeat or increase abnormal eating behaviors such as emotional eating. With this clear connection established, the effect of disinhibitors may be larger in college students experiencing high stress or pressure on their body image, such as cheerleaders and athletes (Thompson, n.d.).

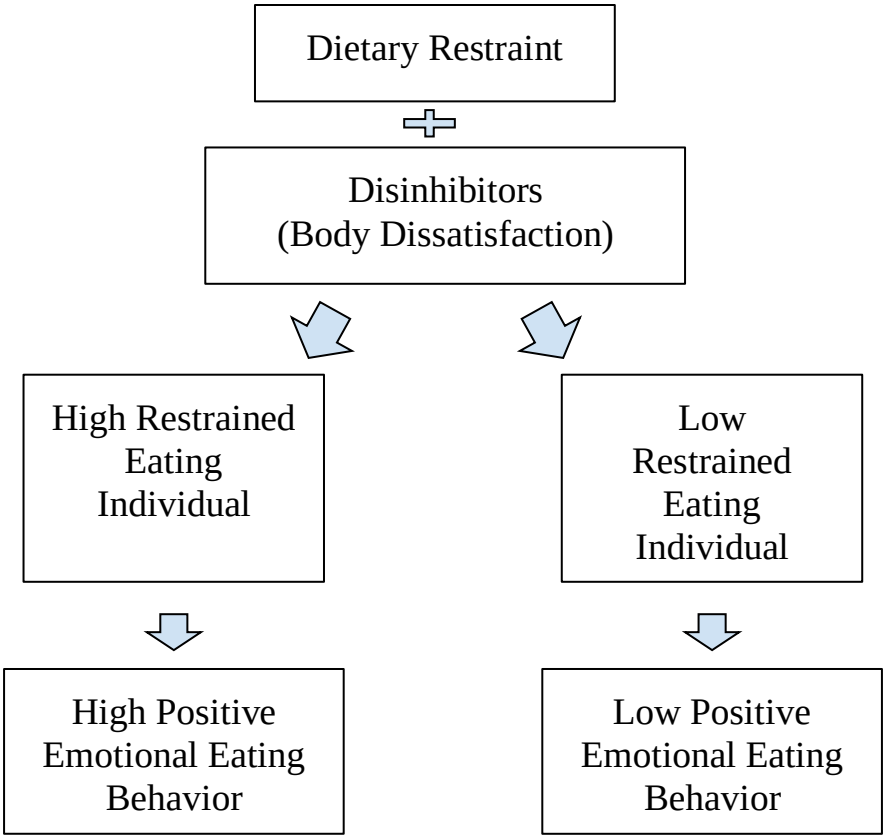

Figure 1. This figure describes the Dietary Restraint Hypothesis in a diagram form indicating that, in the presence of disinhibitors, high restrained eating individuals will experience high emotional eating behaviors, whereas the low restrained eating individual will also experience increased emotional eating behaviors but less than the high restrained eating individual.

With COVID-19 being such an eminent issue in our current world, multiple studies have shown that COVID-19 exposure had direct and indirect effects on stress and depression through media use and interpersonal communication (First, 2020; Park, 2020; Son, 2020). The lack of interpersonal relationships and the necessity of social distancing generates stress and decreased mental well-being for individuals around the world.

Recent studies have also found a clear relationship between increased eating behaviors related to the COVID-19 pandemic. An online survey study conducted by Cinzia, et al. (2021) found that there was an increase in emotional eating during the COVID 2019 period predicted by higher depression and anxiety, while higher stress predicted binge eating behaviors. Moreover,

both emotional eating and binge eating was associated with higher BMI scores, which relates to the body dissatisfaction studies mentioned above. Another study conducted by McAtamney, et al. (2021) also found that participants generally had a change in their eating behaviors and experienced greater depression during the COVID-19 pandemic. Additionally, the study found emotion dysregulation, when participants are unable to fully control their emotions, to be an indirect predictor of emotional eating. These studies show that BMI, mood changes, behavior changes could all be significant predictors of emotional eating.

The purpose of this study was to examine the relationship between body image, dietary restraint, and emotional eating in college students at three points in time during the pandemic. The hypothesis was that emotional eating would decrease over time as pandemic-related restrictions decreased.

Method

Participants

Participants were recruited through the Psychology Department SONA course credit system, the Psychology Department's web-based research sign-up system, during the Spring 2021, Fall 2021, and Spring 2022 semester. Vanderbilt students taking certain Psychology courses are required to complete the questionnaire for SONA credits for their courses, making it easier and providing them with a reason to complete the questionnaire. When students register or log in to the SONA system with their credentials, they have choices of studies they can register to participate in which researchers have put up. Once the student has decided which study to register for, they are able to click on the title of the study and sign up for a timeslot for the study. The study can either be online or in-person. As this study was conducted online, the students

were led to the RedCap survey link once they were ready to begin the Eating Habits Questionnaire.

Apparatus or Measures

One questionnaire was used to conduct this fully online study, called the Eating Habits Questionnaire. The questionnaire is composed of 64 questions mainly comprising demographic information, Emotional Eating questions, body-image questions, anxiety and depression questions, Dietary Restraint questions, and COVID-19 related questions (Schlundt, Hargreaves, Buchowski, 2003; Stunkard and Messick, 1985). The questionnaire took approximately 10-15 minutes for participants to complete, and all the questions are optional to accommodate for the sensitive nature of some questions. The full questionnaire can be found in appendix A.

The emotional eating questions were taken from the Eating Behavior Patterns Questionnaire by Schlundt, Hargreaves, and Buchowski (2003) and the Three-Factor Eating Questionnaire by Stunkard and Messick (1985). The body image questions were taken from the Eating Behavior Patterns & Dietary Intake Assessment by Schlundt, Hargreaves, and Buchowski (2003), the Three-Factor Eating Questionnaire by Stunkard and Messick (1985), and some of my own questions. The Anxiety and Depression questions were taken from the Three-Factor Eating Questionnaire by Stunkard and Messick (1985) and my own questions. The Dietary Restraint questions were taken from the Eating Behavior Patterns & Dietary Intake Assessment by Schlundt, Hargreaves, and Buchowski (2003) and the Three-Factor Eating Questionnaire by Stunkard and Messick (1985). All the COVID-19 related questions were novel questions. All these questions were collated together into one survey questionnaire through the REDCap system as a completely online study.

Design

The design of this online study is a repeated cross-sectional study across 3 semesters. A combined Emotional Eating Questionnaire was used to obtain data on participants throughout each semester. Each semester a different sample of students was recruited to complete the questionnaire.

Results

There were a total number of 328 participants, 111 male and 217 female, across the Spring 2021, Fall 2021, and Spring 2022 semester. The gender of the participants was inferred from their first names using Google search, as this data was missing from the data collection instrument. Table 1 presents the demographic characteristics and compares males to females. The age of the participants ranged from 17 years old to 23 years old with 19 years old being the highest percentage for both male and female [$p = 0.036$]. The female participants were younger than the male participants in the study. For class standing, first-year students were the highest percentage for both male and female with 51.4% and 57.4% respectively [$p = 0.141$]. Around half of the participants for both males and females indicated that they were eligible for financial aid [$p = 0.265$]. For both mother and father education, Masters and bachelor's degrees recorded the highest percentage for both males and females for the participants [$p = 0.917; p = 0.394$]. Lastly, 85.6% of the males indicated that they have been vaccinated for COVID-19 and 88.5% of females indicated that they have been vaccinated for COVID-19, with 5 participants indicating "unknown" for vaccination status [$p = 0.754$].

Since this online study was originally distinguished between the cohorts of Spring 2021, Fall 2021, and Spring 2022 semester, the cohort differences for the demographic variables were also investigated and are presented in Table 2. The cohort differences for each of the

demographic variables were analyzed through crosstabs and chi-squared tests. The cohort differences between all variables were all found to be not significant except for the Vaccinated demographic variable [$p < 0.001$] Significantly more participants indicated that they were vaccinated in the Fall 2021 and Spring 2022 semester compared to Spring 2021, with Spring 2022 having a higher percentage of participants vaccinated in comparison to Fall 2021, which aligned with the mandatory vaccination guidelines for Vanderbilt University students.

Dependent Variables

The dependent variables measured through the Eating Habits Questionnaires were 1) Emotional Eating, 2) COVID-19 Poor eating, 3) COVID-19 Negative emotion, 4) Change in Weight, Body Image, 5) Weight dissatisfaction, and 6) Dietary Restraint. All questions on the questionnaire were optional, participants could opt out of answering any questions and the scoring made adjustments for the missing data. After the computation of the dependent variables, the differences in the dependent variables by cohort were examined through a one-way ANOVA test and are presented in Table 3.

Emotional Eating. The Emotional eating variable was computed by adding up all the Eating Behaviors Patterns Questionnaire & Dietary Intake Assessment questions with the Three factor Eating Questionnaire (Schlundt, Hargreaves, Buchowski, 2003; Stunkard and Messick, 1985). The Eating Behaviors Patterns Questionnaire & Dietary Intake Assessment (EBPQ) questions consisted of items 11-22 in the Eating Habits Questionnaire (Schlundt, Hargreaves, and Buchowski, 2003). The Three factor Eating Questionnaire consisted of items 33-38 in the Eating Habits Questionnaire (Stunkard and Messick, 1985). When deciding if the COVID-19 emotional eating questions (Poor eating and Negative emotion) would be included in the

Emotional Eating variable along with the EBPQ questions and Three factor Eating Questionnaire, the Cronbach's Alpha, also known as the coefficient alpha, was calculated through reliability statistics. The Cronbach's Alpha was lower [$\alpha = 0.706$] with the COVID-19 emotional eating questions compared to when it was separated as its own variable for the Emotional Eating variable [$\alpha = 0.813$]. Then, item 38 from the Eating Habits Questionnaire, which is a part of the Three factor Eating Questionnaire, was excluded due to the negative inter-item correlation it was presented compared to the other items which produced a coefficient alpha of [$\alpha = 0.841$] for the Emotional Eating variable. The Emotional Eating variable is calculated by numbering the answer choices of participants from '1' to '5'. '1' correlated with 'Strongly Agree' and '5' correlated with 'Strongly Disagree'. Since the majority of the questions asked if the variables made them eat more, the question scoring was reversed by doing '6' minus the score entered by the participants. This made sure that a higher number choice correlated with more dysregulated eating.

Table 4 presents how much of a problem each dependent variable was according to the Eating Habits Questionnaire. For rating scales, the average score was computed and whole numbers were used for the cutoffs (1-1.999 no problem, 2-2.999 slight problem, 3-3.999 moderate problem, and 4-5 large problem). For Emotional eating, 51.5% of the participants were categorized as having a moderate problem and 11.30% of the participants were categorized as having a large problem. The results are indicative of how severe Emotional eating is amongst the Vanderbilt undergraduate population.

The one-way ANOVA test showed that there was no significant difference in the Emotional eating variable by cohort [$p = 0.936$]

COVID-19 Poor Eating. After the COVID-19 emotional eating questions were separated from the Emotional eating variable, it was split into two separate variables. The two variables were COVID-19 Poor eating and COVID-19 Negative emotions. The COVID-19 poor eating computed was computed through items 60, 61, and 63 from the Eating Habits Questionnaire. Item 62 was excluded from this computation due to lowering the reliability analysis and coefficient alpha. The COVID-19 Poor eating variables focused on questions regarding change in eating habits during the COVID-19 pandemic. The COVID-19 Poor eating questions were also calculated and measured the same way as the Emotional eating variable from '1' to '5' with the coefficient alpha of [$\alpha = 0.697$].

The COVID-19 Poor Eating variable also showed 39.3% of participants to have a moderate problem and 20.40% with large problem, accounting for more than half of the participants to having a problem with poor eating during the COVID-19 pandemic.

The one-way ANOVA test showed that there was a significant difference in the COVID-19 Poor eating variable by cohort [$p = 0.013$]. There was a significantly lower number in the Fall 2021 semester in comparison to Spring 2021 and Spring 2022 semester, meaning more participants experienced less emotional eating during the Fall 2021 semester than in the other two semesters.

COVID-19 Negative Emotion. The COVID-19 Negative emotion variable was computed through items 57-59 from the Eating Habits Questionnaire. These questions targeted asking participants how they felt (blue, anxious, and lonely) during the COVID-19 pandemic. The COVID-19 Negative emotion questions were also calculated and measured the same way as the Emotional eating variable from '1' to '5' with the coefficient alpha of [$\alpha = 0.849$].

The COVID-19 Negative emotion variable showed 31.7% of the participants to have moderate problems and 53% of the participants to have large problems. 84.7% of the participants showed to have problems with experiencing negative emotions during the COVID-19 pandemic, showing the need for attention in the Vanderbilt undergraduate population.

The one-way ANOVA test showed that there was a significant difference in the COVID-19 Negative emotion variable against each cohort [$p < 0.001$]. There was also a significantly lower number in the Fall 2021 semester in comparison to Spring 2021 and Spring 2022 semester.

Change in Weight. The change in weight variable was calculated through item 29 in the Eating Habits Questionnaire which required the participants to tick how many behaviors they were using to control their weight. No problem was 0-4 behaviors, slight problem was 5-8 behavior, moderate problem was 9-13, large was 14 and above.

For the Change in weight variable, 59.5% of the participants indicated having no problem and 27.1% of the participants indicated to have a slight problem. This result showed that less than 14% of the participants used these behaviors to manage their weight.

The scores were calculated by adding up how many boxes they ticked with the coefficient alpha of [$\alpha = 0.792$]. The one-way ANOVA test showed that there was no significant difference in the Change in weight variable against each cohort [$p = 0.257$].

Body Image. The Body image variable was computed using items 31 and 32 on the Eating Habits Questionnaire along with item 26. The score included the difference between items 31 and 32 plus ratings on item 26. The participants were presented with a Body Image Silhouette photo and were asked to pick what body image best correlated with their actual body and ideal

body type. The Body Image variable was calculated by calculating ‘actual body image’ minus ‘ideal body type’. This meant that if the calculated number was negative participants wanted to gain more weight and if the calculated number was positive the participants wanted to lose more weight.

Body image was divided into ranges using item 26 which is self-rated weight from very underweight to very overweight. For the Body image variable, 53.7% of the participants indicated having a moderate problem with their body image and 31.10% indicated having a large problem with their body image. This result showed that the majority of the participants were dissatisfied with the way their bodies look.

The one-way ANOVA test showed that there was no significant difference in the Body image variable against each cohort [$p = 0.101$].

Weight Dissatisfaction. The Weight dissatisfaction variable was calculated through items 23-25 in the Eating Habits Questionnaire. These items asked the participant’s actual weight and ideal weight. Weight dissatisfaction was calculated by conducting ‘actual weight in lbs’ minus ‘ideal weight in lbs’. Again, this meant that if the calculated number was negative, participants wanted to gain weight and if the calculated number was positive the participants wanted to lose weight.

For the Weight dissatisfaction variable in Table 4, the degree of problem was calculated by computing the No problem column as wanting to lose or gain less than 5 pounds, the slight problem as wanting to lose 5 to less than 10 pounds, the moderate problem as wanting to lose 10 to less than 20 pounds, and the large problem as wanting to lose 20 to 140 pounds, which was the highest weight indicated by the participants. For the Weight dissatisfaction variable, 44.3% of

the participants indicated having no problem with their weight and 48.90% indicated having slight problems with their weight. Less than 10% indicated having a severe problem with their weight with a small percentage wanting to gain or lose weight excessively.

The one-way ANOVA test showed that there was no significant difference in the Weight dissatisfaction variable against each cohort [$p = 0.086$].

Dietary Restraint. The Dietary Restraint variable was calculated through items 53, 54, and 55 from the Eating Habits Questionnaire. These items aimed to measure how much the participants were restricting their eating to control their weight. The Dietary restraint questions were also calculated and measured the same way as the Emotional eating variable from '1' to '5' with the coefficient alpha of [$\alpha = 0.690$].

For the Dietary restraint variable, 34.10% of the participants indicated having a slight problem, 29.3% with moderate problems, and 24.4% with large problems. The results showed a moderately balanced proportion of participants indicating different problem levels with restraining their diet.

The one-way ANOVA test showed that there was no significant difference in the Body image variable against each cohort [$p = 0.948$].

Correlation

A correlation matrix was also created for the 7 variables and is shown in Table 5. The correlation matrix showed some interesting relationships between the variables with the Emotional Eating variable being extremely weakly correlated to the variables Dietary restraint, Change in weight, COVID-19 Poor eating, and Weight dissatisfaction. The Emotional eating

variable was also moderately correlated to the COVID-19 poor eating variable and weakly correlated to the Body image variable.

The Weight dissatisfaction variable also showed an extremely weak correlation with COVID-19 negative eating and a weak correlation with Dietary restraint, COVID-19 Poor eating, and Emotional eating. The Weight dissatisfaction variable, however, showed a strong correlation with Body image and a moderate correlation with Change in weight.

The COVID-19 Poor eating variable showed an extremely weak correlation with Dietary restraint, Change in weight, and Weight dissatisfaction, meanwhile showing a weak correlation with Body image and moderate correlation with COVID-19 Negative emotions and Emotional eating.

The Change in Weight variable showed a strong correlation with Dietary restraint, a moderate correlation with Body image, a weak correlation with Weight dissatisfaction, and an extremely weak correlation with COVID-19 poor eating and Emotional eating.

The Body image variable resulted to be weakly correlated with COVID-19 poor eating and Emotional eating and Emotional eating, moderately correlated with Dietary restraint and Change in weight, and strongly correlated with Weight dissatisfaction.

The Dietary restraint variable resulted to be extremely weakly correlated to Emotional eating and COVID-19 poor eating, weakly correlated to Wight dissatisfaction, and moderately correlated to Body image and Change in weight.

Lastly, The COVID-19 negative emotions resulted to be extremely weakly correlated to Emotional eating and Weight dissatisfaction and weakly correlated with COVID-19 poor eating.

Interestingly, COVID-19 negative emotion also showed non-significant extremely weak negative correlations with Dietary restraint and Change in weight, as well as a non-significant extremely weak correlation with Body image.

Multiple Linear Regression

A Regression model was used to predict Emotional Eating for all the participants without cohorts which is shown in Table 6. Two regression models were conducted to predict Emotional Eating. The first model was controlled for BMI, age, and gender and resulted in $[R^2 = 0.006]$, which was insignificant. The second model controlled for BMI, age, and gender, but included all the other variables as predictors and resulted in $[R^2 = 0.286]$, which was significant.

Table 7 shows the regression coefficient which shows which variables contribute to the prediction of Emotional eating. COVID-19 Poor eating $[p < 0.001]$ and Body image $[p = 0.005]$ showed to be the only two variables predicting for Emotional eating.

Discussion

Despite Emotional Eating being prominent in college undergraduates, the effects and relationships to the COVID-19 pandemic seem unclear (Macht, 2000; Murphy, 2009; Schmidt, 2018; Thompson, 1987; Wilson, 2015). To investigate this recently emerged relationship, this online experiment aimed to examine the relationship between stress and eating in college students and further investigate how the COVID-19 pandemic has influenced the frequency and intensity of emotional eating. Selecting the method of a self-reported online questionnaire made it easier to reach the intended participants which were Vanderbilt undergraduates. The cross-

sectional aspect of the study aimed to measure the differences and changes in emotional eating across the three semesters (Spring 2021, Fall 2021, Spring 2022).

First, there was a significant relationship between the vaccination status of the participant with cohort differences across the three semesters. This is most likely due to the fact that Vanderbilt University required students to be COVID-19 vaccinated if they wished to attend school in person in the Fall 2021 and Spring 2022 semester. During the Spring 2021 semester, vaccination was not required and depended on the student's own discretion. The results also showed that there were no significant trends found across the three cohorts for emotional eating. However, there was a significant trend and difference found in both the variables COVID-19 Poor eating and COVID-19 Negative emotion across the three cohorts. Interestingly, both these variables had a lower number in the Fall 2021 semester in comparison to the Spring 2021 or Spring 2022 semester. This suggests that more participants indicated that they experienced less emotional eating during the Fall 2021 semester. Possible reasons for this dip in trend could be due to the Fall 2021 semester being resumed for in-person classes which could have caused students to become less stressed, related to less isolation compared to hybrid/online classes in the Spring 2021 semester. However, this questions why the numbers went back up in the Spring 2022 semester as classes were also in person. Perhaps this could be explained by the rise in the Omicron COVID-19 cases in the U.S. and around the world and an increase in pandemic-related distress.

Data presented in Table 4 also showed that a large percentage of participants were struggling with their Body image. This closely aligns with the literature discussed in the introduction as college students experience high stress when attempting to control their weight to mold their body image into an ideal (Thompson, 2004). The results indicated a large percentage

of participants to also be struggling with Emotional eating, once again raising attention to the need for interventions to aid college students to develop healthier relationships with food. Once again, this result also aligns with the literature discussed above.

Despite the Emotional Eating variable being significantly correlated to all of the other variables, the results did not show a significant trend in the cohort differences. Despite the lack of significance in the cohort differences in relation to COVID-19 for emotional eating, almost half of the participants indicated that they were experiencing emotional eating behaviors in the study conducted. This presents a clear relationship aligned with the literature discussed in the introduction section.

The regression model also showed a significant R-squared value which modestly predicts Emotional eating without the specific cohorts with no effect for gender and BMI. The regression model showed that COVID-19 Poor eating and Body image were the only significant predictor of Emotional eating when controlled for gender, age, and BMI. This result was interesting as the hypothesis predicted that the Dietary restraint variable would predict for Emotional eating. However, the Dietary restraint variable showed to be non-significant in the regression model.

Limitations

The cross-sectional aspect of the study followed 3 different cohorts of participants each semester. The most ideal way to have conducted the study would have been to follow up with the exact same participants each semester to track their changes across each semester. However, this method would have been extremely difficult to execute due to the nature of students registered for courses, the changes in requirements for students to complete the online study each semester when taking a different course each semester, and to keep track of which students have

completed the first questionnaire and ask them to complete the second and third questionnaire as students years can vary. The gender demographic variable is also limited and unclear, as it was inferred from the first names of the participants using Google search. The Eating Habits Questionnaire open for participants was missing an item asking the participants their gender, which is an important demographic variable that should have been included in the questionnaire.

In terms of internal validity, Spring 2021 and Fall 2021 had 280 participants who completed the questionnaire, which provided a substantial amount of data for analysis and comparison. However, the Spring 2022 semester only had 48 participants complete the questionnaire in comparison to the Spring 2021 and Fall 2021 semester, which could pose questions for the internal validity of the study comparison during the three cohorts. However, due to time limitations and the nature of the Honors Thesis timeline, it was impossible to extend the questionnaire window for the Spring 2022 semester. Additionally, the Eating Habits Questionnaire only took approximately 5-15 minutes for participants to complete which ensured they were focused and completed the questionnaire to their full potential.

In terms of external validity and generalizability, this study would most likely only be generalizable for the rest of the Vanderbilt undergraduate population who were not involved in the study. More specifically, this study would be most generalizable to Vanderbilt undergraduate students who have, are, and will be taking Psychology courses, due to the SONA platform being most heavily utilized by Psychology courses at Vanderbilt University. With a stretch, this study could also be generalizable to other college undergraduates attending colleges who also had similar COVID-19 guidelines and regulations during the pandemic and who experience similar academic stress levels, acknowledging that academic is stress might not be the only stressor affecting the students.

Future implications/directions

Through the gathering of data on if COVID-19 has increased disinhibitory for people and, thus, impacted their eating behaviors in college students, universities can aim to put measures in place to help these students who are struggling with their relationships with food. With the results from this study, it is apparent that numerous students are struggling with their relationships with food, despite the cause of it might not be related to the COVID-19 pandemic. This study is a start to exploring other stressors and disinhibitors that could potentially affect college students' relationships with food and eating habits.

Additionally, the body image aspect of this study poses a serious question and brings attention to how social media displays body image, healthy food diet, and social implications of how a person eats (Qutteina, 2019). The results from this study of only 13.8% of the participants are satisfied with their weight and the other 86.2% of the participants want to either lose or gain weight sheds light on how unhappy students are with their weights. This prompts investigations on how social media is affecting students' relationship with eating and body image and what interventions can improve this situation or help students achieve their desired weight in a healthy and productive manner.

Conclusion

The clear relationships established between the COVID-19 pandemic and its effect on Emotional eating rejected the initial hypothesis of the study by showing that Dietary restraint was not a significant predictor of Emotional eating. However, the study did find that poor eating behaviors due to COVID-19 and body image concerns in participants were significant predictors of Emotional eating, which aligns with the literature discussed in the introduction. As mentioned

above, this provides a solid background for further research and investigation to develop measures for college students who are struggling with their relationship with food.

Table 1

Summary of Demographic Variables against Gender

Table 1:

		Male		Female		
Variable	Category missing	Frequency	Percent	Frequency	Percent	p-value
Age		0	0.0%	1	0.5%	0.036
	17	0	0.0%	2	0.9%	
	18	29	26.1%	79	36.4%	
	19	42	37.8%	68	31.3%	
	20	17	15.3%	42	19.4%	
	21	15	13.5%	22	10.1%	
	22	5	4.5%	3	1.4%	
	23	3	2.7%	0	0.0%	
	Total	111		217		
Year	Freshman	57	51.4%	125	57.6%	0.141
	Sophomore	31	27.9%	50	23.0%	
	Junior	9	8.1%	29	13.4%	
	Senior	11	9.9%	10	4.6%	
	Other	3	2.7%	3	1.4%	
	Total	111		217		
Financial Aid	Yes	56	50.5%	91	41.9%	0.265
	No	52	46.8%	122	56.2%	
	unknown	3	2.7%	4	1.8%	
	Total	111		217		
Mother Education	Doctoral	16	14.4%	25	11.5%	0.917
	Masters	33	29.7%	70	32.3%	
	Bachelors	43	38.7%	87	40.1%	
	High School	11	9.9%	24	11.1%	
	Other	7	6.3%	9	4.1%	
	Unknown	1	0.9%	2	0.9%	
	Total	111		217		
Father Education	Doctoral	25	22.5%	45	20.7%	0.394
	Masters	38	34.2%	67	30.9%	
	Bachelors	25	22.5%	73	33.6%	
	High School	16	14.4%	23	10.6%	
	Other	6	5.4%	7	3.2%	
	Unknown	1	0.9%	2	0.9%	
	Total	111		217		
Vaccinated	Yes	95	85.6%	192	88.5%	0.754
	No	14	12.6%	22	10.1%	
	Unknown	2	1.8%	3	1.4%	
	Total	111		217		

Table 2

Summary of Demographic Variables against Cohort through Crosstabs

Table 2:								
		Spring 2021		Fall 2021		Spring 2022		
		Frequency	Percent	Frequency	Percent	Frequency	Percent	p-value
Gender								0.222
	Male	43	36.13%	57	35.40%	11	22.92%	
	Female	76	63.87%	104	64.60%	37	77.08%	
	Total	119		161		48		
Year								0.455
	Freshman	71	59.66%	82	50.93%	29	60.42%	
	Sophomore	26	21.85%	45	27.95%	10	20.83%	
	Junior	15	12.61%	16	9.94%	7	14.58%	
	Senior	6	5.04%	13	8.07%	2	4.17%	
	Other	1	0.84%	5	3.11%	0	0.00%	
	Total	119		161		48		
Age								0.291
	missing	0	0.00%	1	0.62%	0	0.00%	
	17	0	0.00%	2	1.24%	0	0.00%	
	18	32	26.89%	62	38.51%	14	29.17%	
	19	42	35.29%	49	30.43%	19	39.58%	
	20	29	24.37%	20	12.42%	10	20.83%	
	21	14	11.76%	19	11.80%	4	8.33%	
	22	1	0.84%	6	3.73%	1	2.08%	
	23	1	0.84%	2	1.24%	0	0.00%	
	Total	119		161		48		
Financial Aid								0.17
	Yes	58	48.74%	65	40.37%	24	50.00%	
	No	61	51.26%	90	55.90%	23	47.92%	
	unknown	0	0.00%	6	3.73%	1	2.08%	
	Total	119		161		48		
Mother Education								0.31
	Doctoral	16	13.45%	20	12.42%	5	10.42%	
	Masters	31	26.05%	58	36.02%	14	29.17%	
	Bachelors	52	43.70%	60	37.27%	18	37.50%	
	High School	11	9.24%	18	11.18%	6	12.50%	
	Other	9	7.56%	3	1.86%	4	8.33%	
	Unknown	0	0.00%	2	1.24%	1	2.08%	
	Total	119		161		48		
Father Education								0.535
	Doctoral	31	26.05%	29	18.01%	10	20.83%	
	Masters	31	26.05%	57	35.40%	17	35.42%	
	Bachelors	34	28.57%	50	31.06%	14	29.17%	
	High School	17	14.29%	17	10.56%	5	10.42%	
	Other	6	5.04%	5	3.11%	2	4.17%	
	Unknown	0	0.00%	3	1.86%	0	0.00%	
	Total	119		161		48		
Vaccinated								<0.001
	Yes	86	72.27%	154	95.65%	47	97.92%	
	No	32	26.89%	4	2.48%	0	0.00%	
	Unknown	1	0.84%	3	1.86%	1	2.08%	
	Total	119		161		48		

Table 3

Summary of Dependent Variables against Cohort through One-Way ANOVA

Table 3:

Variable	Spring 2021			Fall 2021			Spring 2022			p-value
	N	Mean	Std. Deviation	N	Mean	Std. Deviation	N	Mean	Std. Deviation	
Emotional eating	119	48.3949	10.18483	161	48.1206	9.45106	48	48.6563	8.96308	0.936
Covid poor eating	119	9.6218	2.68389	161	8.7484	2.29001	48	8.8438	2.77557	0.013
Covid negative eating	119	11.9412	2.58842	161	10.441	2.72281	48	11.3333	3.0059	<0.001
Change weight	119	4.7059	3.75602	161	4.0062	3.23361	48	4.3333	3.73217	0.257
Body image	118	4.0932	2.37144	161	3.6646	1.61997	48	3.5	1.73818	0.101
Weight dissatisfaction	119	7.9403	20.45325	161	3.8516	10.51976	47	5.9681	13.52148	0.086
Dietary Restraint	119	12.1765	4.12238	161	12.0435	3.82156	48	12.2083	4.12547	0.948

Table 4

Degree of Problem for each Dependent Variable

Table 4:

Variable	No Problem	Slight Problem	Moderate Problem	Large Problem
Emotional Eating	2.7%	34.5%	51.5%	11.3%
COVID-19 Negative Emotions	3.0%	12.2%	31.7%	53.0%
COVID-19 Poor Eating	7.0%	33.2%	39.3%	20.4%
Change in Weight	59.5%	27.1%	10.4%	3.0%
Body Image	0.3%	14.9%	53.7%	31.1%
Weight Dissatisfaction	25.3%	25.3%	37.0%	12.2%
Dietary Restraint	12.2%	34.1%	29.3%	24.4%

Table 5

Dependent Variable Correlation Matrix

Table 5: Correlations

		Dietary restraint	Body image	Change weight	Covid poor eating	Covid negative emotions	Emotional eating	Weight dissatisfaction
Dietary restraint	Pearson Correlation	1	.406**	.547**	.133*	-0.064	.157**	.266**
Body image	Pearson Correlation	.406**	1	.414**	.286**	0.105	.311**	.719**
Change weight	Pearson Correlation	.547**	.414**	1	.135*	-0.057	.158**	.327**
Covid poor eating	Pearson Correlation	.133*	.286**	.135*	1	.396**	.496**	.247**
Covid negative emotions	Pearson Correlation	-0.064	0.105	-0.057	.396**	1	.197**	.141*
Emotional eating	Pearson Correlation	.157**	.311**	.158**	.496**	.197**	1	.225**
Weight dissatisfaction	Pearson Correlation	.266**	.719**	.327**	.247**	.141*	.225**	1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 6

Multiple Linear Regression Model predicting Emotional Eating

Table 6:

Model	R Square	Change Statistics		
		R Square Change	F Change	Sig. F Change
1	0.006	0.006	0.595	0.619
2	0.292	0.286	21.211	<0.001

a Predictors: (Constant), bmi, What is your age?, Gender inferred from name

b Predictors: (Constant), bmi, What is your age?, Gender inferred from name, change_weight, covid_pooreating, covid_negativeemotions, dietary_restraint, bodyimage, weight_dissatisfaction

Table 7

Regression Coefficient predicting Emotional Eating

Table 7:

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	51.729	7.791		6.64	<0.001
	Gender	1.062	1.166	0.052	0.911	0.363
	Age	-0.29	0.373	-0.044	-0.777	0.438
	BMI	0.063	0.116	0.031	0.544	0.587
2	(Constant)	39.24	7.178		5.467	<0.001
	Gender	0.323	1.07	0.016	0.302	0.763
	Age	-0.342	0.323	-0.052	-1.06	0.29
	BMI	-0.215	0.12	-0.105	-1.796	0.073
	weight_dissatisfaction	0.002	0.048	0.003	0.04	0.968
	covid_negativeemotions	0.042	0.184	0.012	0.227	0.82
	covid_pooreating	1.7	0.209	0.442	8.148	<0.001
	dietary_restraint	0.03	0.143	0.013	0.213	0.831
	bodyimage	1.024	0.365	0.207	2.81	0.005
	change_weight	0.035	0.162	0.013	0.218	0.827

a Dependent Variable: emotional. eating

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Appendix A

Eating Habits Questionnaire

Please complete the survey below.

Thank you! We would like to learn more about your eating behaviors. Please answer the following questions about your eating behaviors. Your answers will be used in a Psychology Honors study conducted by Yurim Hong and mentor Dr. David Schlundt. It will take about 5-10 minutes to answer all these questions. Please answer each question honestly and to your best ability. Some of the questions may be sensitive, and you can choose not to answer. There are no right or wrong answers to any of the questions. It would be greatly appreciated if you could answer as many questions as you can. All answers will be kept anonymous and confidential. Your privacy is important to us. The identification information is only being collected for correct SONA credit allocations.

1) Time Questionnaire was started

_____

2) Name

_____

3) VUnet ID

_____

4) Email

_____

5) What year are you in?

Freshman, Sophomore, Junior, Senior, Other

6) What is your age?

_____

7) Are you eligible for need-based financial aid?

Yes, No

8) What is your mother's highest level of education? Doctoral

Doctoral, Masters, Bachelors, High School, Other

9) What is your father's highest level of education?

Doctoral, Masters, Bachelors, High School, Other

10) Have you been COVID-19 vaccinated?

Yes, No

11) My emotions affect what and how much I eat.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

12) I eat when I am upset.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

13) I eat for comfort.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

14) When I am in a bad mood, I eat whatever I feel like eating.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

15) If I am bored, I will snack more.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

16) I sometimes snack even when I am not hungry.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

17) I am a snacker.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

18) I snack more at night.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

19) When I buy snack foods, I eat until I have finished the whole package.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

20) When I am upset, I tend to stop eating.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

21) During the past 3 months, how often did you react to Never negative feelings like sadness, boredom, or stress by 1/month or less eating?

2-3/ months, 1/week, 2-3/week, 4-6/week, 1/day, 2-3/day

22) During the past 3 months, how often did you react to Never positive feelings like happiness or celebration by 1/month or less Eating?

2-3/ months, 1/week, 2-3/week, 4-6/week, 1/day, 2-3/day

23) How tall are you without shoes? (Inches and feet: e.g/5'4)

_____

24) How much do you weigh without shoes? (Pounds: e.g/183)

_____

25) What is your ideal weight (what would you like to weigh)? (Pounds: e.g/ 183)

_____

26) What do you think of yourself?

Very Underweight, Slightly Underweight, About the right weight, Slightly Overweight, Very Overweight

27) Are you now trying to lose weight?

Yes, No, Don't know / Not sure, Refuse to answer

28) Are you now trying to maintain your weight?

Yes, No, Don't know / Not sure, Refuse to answer

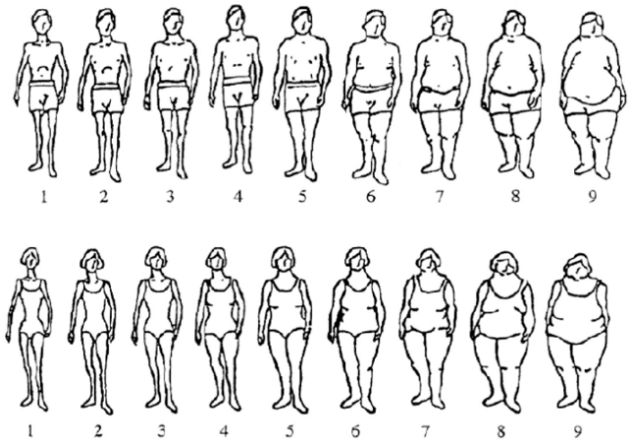
29) What have you changed or done during the past 12 I have made no changes months to lose weight, or keep from gaining weight?

Eat less food, Eat fewer calories, Use artificial sweeteners, Eat less fat, Eat less carbohydrate, Reduce salt intake, Increase fruits and vegetables, Skip meals, Give up certain foods, Stop snacking, Give up desserts, Don't eat in the evening, Join a weight loss program, Drink more water, Increase whole grains, Eat healthier, Reduce portion sizes, Exercise more, Other _____, Don't know/not sure, Refuse to answer

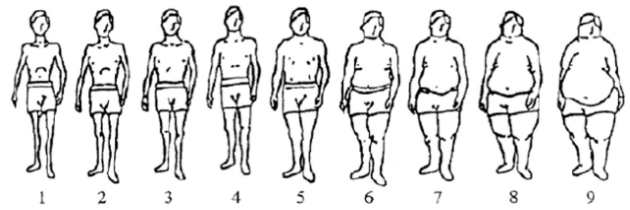
30) During the past 3 months, did you vomit or take laxatives to lose weight or to keep from gaining weight?

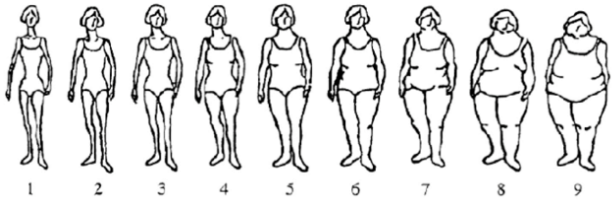
Yes, No, Don't know / Not sure, Refuse to answer

31) Using the images above which are numbered 1 through 9, select the number that best describes your ideal body type.



32) Using the images above which are numbered 1 through 9, select the number of the image that best describes your actual appearance.





33) When I feel anxious, I find myself eating.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

34) When I feel blue, I often overeat.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

35) When I feel lonely, I console myself by eating.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

36) When I feel stressed, I find myself eating.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

37) When I am drinking alcohol, I am more likely to eat more.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree, I never drink alcohol

38) When I am smoking, I am more likely to eat more.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree, I never smoke

39) In the past 7 days, I felt fearful.

Never, Rarely, Sometimes, Often, Always

40) In the past 7 days, I found it hard to focus on anything other than my anxiety.

Never, Rarely, Sometimes, Often, Always

41) In the past 7 days, my worries overwhelmed me.

Never, Rarely, Sometimes, Often, Always

42) In the past 7 days, I felt uneasy.

Never, Rarely, Sometimes, Often, Always

43) In the past 7 days, I felt worthless.

Never, Rarely, Sometimes, Often, Always

44) In the past 7 days, I felt helpless.

Never, Rarely, Sometimes, Often, Always

45) In the past 7 days, I felt depressed.

Never, Rarely, Sometimes, Often, Always

46) In the past 7 days, I felt hopeless.

Never, Rarely, Sometimes, Often, Always

47) I feel left out.

Never, Rarely, Sometimes, Often, Always

48) I feel that people barely know me.

Never, Rarely, Sometimes, Often, Always

Always

49) I feel isolated from others.

Never, Rarely, Sometimes, Often, Always

50) I feel that people are around me but not with me.

Never, Rarely, Sometimes, Often, Always

51) Based on your understanding of healthy eating, how would you describe your diet?

Almost always healthy, Healthy more often than unhealthy, Healthy about half the time,

Unhealthy more often than healthy, Almost always unhealthy

52) I deliberately take small helpings as a means of controlling my weight.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

53) I consciously hold back at meals in order to not gain weight.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

54) I do not eat some foods because they make me fat.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

55) How frequently do you avoid "stocking up" on tempting foods?

Never, Rarely, Sometimes, Often, Always

56) On a scale of 1 to 8, where 1 means no restraint in eating (eating whatever you want) and 8 means total restraint (constantly limiting food intake and never "giving in"), what number would you give yourself?

1-8

57) The COVID-19 pandemic has made me feel more blue.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

58) The COVID-19 pandemic has made me feel more anxious.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

59) The COVID-19 pandemic made me feel more lonely.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

60) My eating habits have changed during the COVID-19 pandemic.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

61) I have been overeating more often during the COVID-19 pandemic.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

62) I have been eating more healthy foods due to the COVID-19 pandemic.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

63) I have been eating more unhealthy foods due to the COVID-19 pandemic.

Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree

64) What else has been different for you during the COVID-19 pandemic?