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FOOD SCIENCE & TECHNOLOGY | RESEARCH ARTICLE

Consumption and emotions among college students toward chocolate product

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Abstract: This study examined college students' consumption frequency of different amounts of chocolate. It measured emotions related to consumption including guilt, craving, hunger, mindfulness and investigated how these are related to demographics including age, race, education, body mass index, and exercise frequency. A total of 89 college students complete a 53-item questionnaire. The survey was administered online through Qualtrics Survey Software. Of the 89 participants, ages ranged from 18–64, 72 participants (82%) were white. The mean (SD) mindfulness score was 36.3 (13.2), craving score was 25.0 (7.1), guilt score 28.4 (18.8) and hunger score 8.1 (2.4). There was a significant association between age and guilt ($p = 0.012$) and age ($p = 0.002$) and education ($p = 0.006$) and hunger. In conclusion, age was found to be the most significant factor related to chocolate consumption and the emotions associated including hunger and guilt.

Subjects: Food Science & Technology; Behavioral Sciences; Health and Social Care; Medicine, Dentistry, Nursing & Allied Health

Keywords: chocolate consumption; college students; emotions; nutrition counseling

1. Introduction

The 2003–2006 National Health and Nutrition Examination Survey (NHANES) reported that half of the United States population consumes an average of 4.8 grams of candy per day (Shumow, Barraj,

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Carla Velarde graduated from Saint Louis University in 2016 where she obtained her Bachelor of Science in Nutrition and Dietetics with an Emphasis in Food Innovations and Entrepreneurship. She obtained her Master of Science in Medical Dietetics and completed her Dietetics Internship in 2017, when she also became a Registered Dietitian Nutritionist. Her passion for combining culinary arts and nutrition is what led her to research factors that influence chocolate consumption.

PUBLIC INTEREST STATEMENT

Chocolate is a worldwide popular candy that can be presented in various shapes, colors, and tastes. This study aims to analyze how different factors influence chocolate consumption in college students as well as the emotions associated with it. These factors include age, race, education, body mass index, exercise frequency, among others. In addition, the emotions considered include guilt, cravings, hunger and mindfulness. This study concluded that age may influence the consumption of chocolate. The results suggest that younger college students tend to feel guiltier about eating chocolate and are hungry more frequently than older students. Understanding what factors influence the consumption of different popular foods, like chocolate, may aid professionals in the development of health promotion tools including nutrition educations and teach college students to eat mindfully to avoid hunger and guilt when consuming chocolate.

Murphy, Bi, & Bodor, 2012). This amount is equivalent to one-half of a fun size bar (Hornick, Duyff, Murphy, & Shumow, 2014). Chocolate is a popular candy not only in the US but consumed around the world. The purpose of this study is to analyze the chocolate consumption of college students on a college campus in the United States, the amounts they regularly eat compared to their sensations including cravings, mindfulness, guilt and hunger. In addition, it will investigate a link between body mass index, age, physical activity level or school and profession.

Chocolate consumption may be influenced by different aspects including its perceived health benefits, holiday season, consumer gender and background, among others. Chocolate tends to be associated with happiness or improved mood changes, which may be a reason why consumers eat it. Research has shown that when eating a piece of chocolate compared to crackers, either mindfully or non-mindfully, chocolate improved positive moods, especially when eaten mindfully (Meier, Noll, & Molokwu, 2016). Mindfulness refers to the awareness of internal and external experiences in the moment. Studies have shown that mindful eating might be associated with consumption quantity as well as emotional and external eating (O'Reilly, Cook, Spruijt-Metz, & Black, 2014). Mindfulness may influence healthier eating habits, as a state of mindfulness can lead to reduced calorie consumption. Mindful eating can inspire healthier eating practices (Jordan, Wang, Donatoni, & Meier, 2014). Participants high in mindfulness chose fruits, the healthier snack option, more often than the unhealthy snack options with men being more likely to be higher in mindfulness than females.

College students are a population known to experience high levels of stress. Chocolate has been linked to cravings during stress as cocoa polyphenols are believed to help reduce stress. A study on sixty medical students concluded that consuming dark and milk chocolate daily is an effective way to reduce stress. These results were more often seen in females (Al Sunni & Latif, 2014).

Besides the perceived health benefits of certain chocolates, reasons that might influence chocolate consumption or avoidance are cravings and guilt, respectively. Food cravings may play an important role in food consumption. High food cravings are associated with higher habitual consumption of the craved food (Chao, Grilo, White, & Sinha, 2014) with chocolate being the most frequently craved food (Rogers & Smit, 2000). Furthermore, a higher body mass index (BMI) has been positively associated with frequency of food craving, nevertheless, BMI and craving did not have a significant connection to food intake (Chao et al., 2014).

Although chocolate has been found to boost mood, it has been noted that it may also lead to negative feelings such as guilt (Rogers & Smit, 2000) since it is often perceived as an unhealthy treat due to its sugar and fat content. Negative feelings including boredom, depression and tiredness have been linked to food cravings (Benton, Greenfield, & Morgan, 1998). Chocolate craving is a multifaceted occurrence (Cartwright & Stritzke, 2008), usually measured with self-report questionnaires. Food cravings may lead to unrestrained eating and perceived unsuccessful dieting, nevertheless a relationship between increased food cravings and higher BMI was not found (Meule, Richard, & Platte, 2017).

There is still inconclusive data related to chocolate cravings and its relation to consumption and feelings of guilt. Mindfulness practices are thought to connect individuals to internal experiences including hunger (Kristeller & Wolever, 2011). Furthermore, research has shown a decrease in food craving, emotional eating and external eating after exposure to mindfulness interventions (Alberts, Thewissen, & Raes, 2012), and a reduction of body mass index in overweight individuals (Tapper et al., 2009). This may suggest mindful eating as a beneficial nutrition counseling practice to help reduce factors that influence problematic eating behaviors that college students, a population known to be under high levels of pressure and stress, commonly experience. Due to this and to chocolate's popularity, its perceived health benefits and minuses, this study will aim to analyze the emotions college students feel related to their chocolate consumption or avoidance. The emotions and how they relate to intake analyzed in this study include guilt, craving, hunger and mindfulness.

2. Data and methodology

2.1. Study design

The study was approved by the Saint Louis University Institutional Review Board. Study participants consisted of college students ages 18–45. Participants responded to a 53-item questionnaire survey that was based on previously validated surveys, the Chocolate version of the Food Cravings Questionnaire-Trait-reduced (FCQ-T-r) and Chocolate version of the Food Cravings Questionnaire-State (FCQ-S) (Meule & Hormes, 2015). Permission was granted by author for questionnaire use. The questionnaire was administered using Qualtrics Survey Software, an online software that allows data collection and analysis. It was an anonymous and voluntary survey that on average took 10 min to complete. Questions elicited demographic information (13 items), chocolate consumption frequency (3), mindfulness (15), chocolate cravings (10), guilt (9), and hunger (3).

Participants were recruited through the university's daily news email, that contained a link for access to the survey. Participants were also recruited by advertising at student organizations and by approaching potential enrollees with bite size chocolate samples and explaining the purpose of the study, the length and anonymous nature of the study. The data collected represents a sample of 89 participants.

2.2. Measures

2.2.1. Independent variables

The independent variables were demographic factors including age, ethnicity, weight and height (to calculate body mass index, BMI), education level, school, dietary restrictions, exercise frequency, if they enjoy eating chocolate, watch what they eat and if they consider chocolate as part of a balanced diet. Each variable was categorized as follows: age (18–24, 25–34, 35+) ethnicity (white, other [combined due to low frequency responses]), BMI (underweight/normal [combined due to low frequency responses], overweight, obese), education level (undergraduate, masters, PhD), school (humanities, health degree, other schools [combined due to low frequency responses]), chocolate enjoyment (definitely yes, probably yes), exercise (never, 1–2 times/week, 3–4 times/week, 4+ times/week), if they watch what they eat (strongly disagree/disagree, neutral, agree, strongly agree), and if chocolate can be a part of a balanced diet (strongly disagree/disagree, neutral, agree, strongly agree).

2.2.2. Mindfulness score

Fifteen questions from the Chocolate version of the Food Cravings Questionnaire Trait Reduced (FCQT-r) were incorporated and responses were scored on a six-point scale (1 = never/not applicable, 2 = rarely, 3 = sometimes, 4 = often, 5 = usually, 6 = always). All responses were added to produce a mindfulness score, which could range from 15–90 with reverse coding used for the mindfulness coding with a higher score representing less mindfulness.

2.2.3. Craving and hunger scores

Questions from the Chocolate version of the Food Cravings Questionnaire-State (FCQ-S) were incorporated into Section 4 of the survey to produce a craving and hunger score. Questions 1–10 were summed to produce a chocolate craving score and questions 11–13 were added for a hunger score. Responses were scored from 1–5 (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). Craving scores could range from 10–50 and hunger score from 3–15). Craving and hunger scores were directly related to participants' level of chocolate craving and general hunger.

2.2.4. Guilt score

Ten Questions from the Attitudes to Chocolate Questionnaire (Benton et al., 1998) were used to produce a guilt score, to assess negative feelings associated with chocolate consumption. For these questions, respondents could choose any number from 0–10, (0 = not at all like me and 10 = very much like me). All responses were summed to generate the guilt score, the higher the score the

more likely the participant is to feel guilty about consuming chocolate. The guilt score is directly related to negative feelings about chocolate consumption.

2.2.5. Consumption frequency

The frequency of small or medium chocolate bars consumption was assessed with the question “How often do you eat small and medium chocolate bars?” Participants responses were classified as (never, once/twice per month, once/twice per week, 3+ times within a week).

2.3. Statistical analysis

Analyses were performed using the statistical software Statistical Package for the Social Sciences (SPSS, IBM Corporation, NY). Descriptive statistics (number and percentage) were used to analyze characteristics of the participants. To test the association between categorical variables, chi-squared tests were used. For continuous variables, independent samples t-tests and one-way ANOVA analysis with Bonferroni adjustments, where appropriate were used. Analyses were 2-tailed, and statistical significance was set at $p < 0.05$.

3. Results

Table 1 summarizes the characteristics of the overall sample. A total of 89 individuals completed the questionnaire. Overall, respondents’ ages ranged from 18–64. Most were white (81.8%), had no dietary restrictions (85.1%), had underweight/normal BMI (57.8%) and definitely enjoyed chocolate (83.7). The mean (SD) mindfulness score was 36.3 (13.2), craving score was 25.0 (7.1), guilt score 28.4 (18.8) and hunger score 8.1 (2.4).

Table 2 summarizes the relationship between independent variables and mindfulness and craving scores. There was a significant association between education and mindfulness ($p = 0.031$). Doctorate students had the lowest mindfulness score 28.2 ± 12.4 and the professional/master students the highest with a mean 38.8 ± 12.3 . There was a marginal significant difference between the different age groups and mindfulness, with 18–24 group having the highest mindfulness score, $p = 0.057$. There were no statistical significant associations between any of the independent variables and craving score.

Table 3 summarizes the relationship between independent variables and guilt and hunger scores. There was a statistical significance between the age and guilt score ($p = 0.012$). The 18–24 year olds (34.5 ± 17.9) had the highest guilt score, and the 35+ had the lowest (19.5 ± 14.6). There was a marginal significance between guilt score and education ($p = 0.055$). Similarly, there was a statistical significance between the age and hunger score ($p = 0.002$), with the 18–24 year olds having the highest hunger score, mean 9.0 ± 1.9 and the 35+ the lowest hunger score, mean 6.9 ± 2.5 . Also, there was a statistical significance between education and hunger score ($p = 0.006$). Underclassmen students tended to have a higher hunger score than other students.

As shown in Table 4 no statistical significance was found between consumption frequency of small or medium chocolate bars and the independent variables. However, most participants consumed confectionery bars containing chocolate once/twice per month. Most of the students who consumed confectionery bars containing chocolate once/twice per month were 18–24 years (51%), whites (75.7%), getting a health degree (55.9%), and definitely enjoy chocolate (78.4%).

4. Discussion and implications

Current research on chocolate consumption and cravings and the relation with feelings like guilt, is indecisive. We found that the younger students, 18–24 year olds, tended to have a higher mindfulness score than the older groups. This means, that the younger participants were less mindful when eating chocolate than older participants. This finding highlights a need for efforts to increase mindfulness eating counseling, practices or tactics in the younger population. Surprisingly, there was no statistical significance between exercise frequency and mindfulness score or between degree sought profession

Table 1. Characteristics of survey participants (n = 89)

	Total
	Mean ± SD
	n (%)
Mindfulness score	36.3 ± 13.2
Craving score	25.9 ± 7.1
Guilt score	28.4 ± 18.8
Hunger score	8.1 ± 2.4
Age	
18-24	41 (46.6)
25-34	23 (26.1)
35+	24 (27.3)
Race	
White	72 (81.8)
Other	16 (18.2)
Education level	
Undergrad	35 (39.8)
Master	34 (38.6)
PhD	19 (21.6)
School	
Humanities	28 (34.6)
Health Degrees	39 (48.1)
Other Schools	14 (17.3)
Any dietary restrictions	
Yes	13 (14.9)
No	74 (85.1)
Body mass index	
Underweight/normal	48 (57.8)
Overweight	22 (26.5)
Obese	13 (15.7)
Do you enjoy chocolate	
Definitely Yes	72 (83.7)
Probably Yes	14 (16.1)
Exercise	
Never	22 (25.3)
1-2 times/week	19 (21.8)
3-4 times/week	37 (42.5)
4+ times/week	9 (10.3)
Chocolate is not bad as part of a balanced diet	
Strongly disagree/dis	6 (7.7)
Neutral	4 (5.1)
Agree	29 (37.2)
Strongly agree	39 (50.0)
I do not diet but watch what I eat	
Strongly disagree/dis	8 (10.3)
Neutral	11 (14.1)
Agree	30 (38.5)
Strongly agree	29 (37.2)

Table 2. Factors associated with mindfulness and craving

	Mean ± SD		Mean ± SD	
	Mindfulness	p-value	Craving	p-value
Age		0.057		0.063
18–24	39.5 ± 12.1		26.7 ± 6.9	
25–34	35.7 ± 13.4		25.2 ± 6.8	
35+	31.2 ± 13.7		25.1 ± 7.1	
Race/ethnicity		0.785		0.593
White	46.1 ± 13.0		26.1 ± 7.2	
Other race	37.1 ± 14.1		25.0 ± 6.4	
Education		0.031		0.271
Under classmen	37.2 ± 8.9		28.2 ± 5.8	
Upper classmen	38.7 ± 14.5		26.4 ± 6.8	
Professional/masters	38.8 ± 12.3		26.4 ± 7.3	
Doctorate	28.3 ± 12.4		23.2 ± 7.4	
Body mass index		0.414		0.602
Underweight/normal	36.0 ± 11.4		26.4 ± 7.2	
Overweight	34.0 ± 15.6		24.6 ± 7.7	
Obese	40.1 ± 12.6		26.5 ± 5.5	
School/Profession		0.523		0.180
Humanities	34.2 ± 12.8		23.9 ± 6.1	
Health Degree	38.0 ± 14.1		27.1 ± 7.6	
Other Schools	37.5 ± 10.9		26.8 ± 5.5	
Do You Enjoy Chocolate?		0.041		0.473
Definitely Yes	37.5 ± 12.4		27.0 ± 6.6	
Probably Yes	29.4 ± 15.5		20.3 ± 7.2	
Dietary Restrictions		0.947		0.473
Yes	36.5 ± 12.9		27.2 ± 8.7	
No	36.3 ± 13.3		25.6 ± 6.8	
Exercise		0.905		0.958
Never	36.9 ± 14.9		25.6 ± 7.0	
1–2 times/week	37.7 ± 13.7		25.6 ± 7.2	
3–4 times/week	35.9 ± 12.5		25.8 ± 6.9	
4+ times/week	33.9 ± 11.8		27.1 ± 8.7	
Chocolate is not bad as part of a balanced diet		0.503		0.605
Strongly disagree/dis	34.8 ± 10.6		29.7 ± 6.7	
Neutral	38.2 ± 16.2		25.2 ± 8.3	
Agree	39.0 ± 12.7		25.4 ± 6.6	
Strongly agree	34.4 ± 12.9		25.6 ± 7.5	
I do not diet but watch what I eat		0.585		0.799
Strongly disagree/dis	40.9 ± 16.1		27.5 ± 6.9	
Neutral	36.7 ± 8.5		24.3 ± 6.6	
Agree	37.1 ± 12.7		26.3 ± 5.7	
Strongly agree	34.1 ± 13.5		25.6 ± 8.7	

Table 3. Factors associated with guilt and hunger

	Mean ± SD		Mean ± SD	
	Guilt	p-value	Hunger	p-value
Age		0.012		0.002
18–24	34.5 ± 17.9		9.0 ± 1.9	
25–34	26.7 ± 20.8		7.8 ± 2.6	
35+	19.5 ± 14.6		6.9 ± 2.5	
Race/ethnicity		0.862		0.2
White	28.2 ± 18.8		8.0 ± 2.4	
Other race	29.1 ± 19.1		8.9 ± 2.7	
Education		0.055		0.006
Under classmen	37.6 ± 23.9		9.7 ± 2.2	
Upper classmen	29.2 ± 17.5		8.4 ± 2.2	
Professional/masters	30.7 ± 19.9		8.4 ± 2.5	
Doctorate	18.7 ± 11.7		6.6 ± 2.0	
Body mass index		0.258		0.698
Underweight/normal	31.3 ± 18.4		8.3 ± 2.3	
Overweight	23.0 ± 12.5		7.8 ± 2.2	
Obese	29.7 ± 25.3		8.3 ± 2.6	
School/Profession		0.889		0.452
Humanities	28.7 ± 19.0		8.3 ± 2.6	
Health degree	28.0 ± 18.1		7.9 ± 2.2	
Other schools	31.2 ± 24.0		8.9 ± 2.7	
Do you enjoy chocolate?		0.724		0.643
Definitely yes	28.0 ± 17.8		8.2 ± 2.3	
Probably yes	30.0 ± 24.4		7.8 ± 3.1	
Dietary restrictions		0.58		0.668
Yes	25.6 ± 16.9		8.4 ± 2.4	
No	28.9 ± 19.2		8.1 ± 2.4	
Exercise		0.666		0.133
Never	29.3 ± 19.8		9.0 ± 2.6	
1–2 times/week	32.9 ± 13.1		7.8 ± 2.5	
3–4 times/week	26.3 ± 19.6		7.6 ± 2.1	
4+ times/week	25.6 ± 22.5		9.0 ± 2.4	
Chocolate is not bad as part of a balanced diet		0.139		0.864
Strongly disagree/dis	17.7 ± 20.9		8.3 ± 2.1	
Neutral	35.7 ± 35.5		9.0 ± 1.4	
Agree	33.0 ± 16.6		8.0 ± 2.3	
Strongly agree	25.6 ± 16.4		8.1 ± 2.5	
I do not diet but watch what I eat		0.632		0.979
Strongly disagree/dis	31.6 ± 17.7		8.1 ± 2.9	
Neutral	31.0 ± 18.6		8.4 ± 1.3	
Agree	29.5 ± 19.4		8.0 ± 2.5	

and mindfulness score. Therefore, a higher regularity of physical activity is not directly related to mindful eating practices. Furthermore, body mass index was not associated with mindfulness. It is noteworthy, that younger participants also had the highest mean chocolate craving score. This means

Table 4. Frequency of consumption of small and medium chocolate bars

	Frequency (%)				p-value
	Never	Once/twice per month	Once/twice per week	3+ times within a week	
Age					0.321
18–24	4 (57.1)	19 (51.4)	13 (50.0)	5 (33.3)	
25–34	1 (14.3)	7 (18.9)	10 (38.5)	4 (26.7)	
35+	2 (28.6)	11 (29.7)	3 (11.5)	6 (40.0)	
Race					0.463
White	7 (100)	28 (75.7)	22 (84.6)	12 (80.0)	
Other	0 (0.0)	9 (24.3)	4 (15.4)	3 (20.0)	
Education level					0.545
Under classmen	1 (14.3)	7 (18.9)	2 (7.7)	0 (0.0)	
Upper classmen	2 (28.6)	11 (29.7)	8 (30.8)	4 (26.7)	
Professional/ masters	3 (42.9)	12 (32.4)	12 (46.2)	5 (33.3)	
Doctorate	1 (14.3)	7 (18.9)	4 (15.4)	6 (40.0)	
Body mass index					0.455
Underweight/ normal	6 (85.7)	18 (52.9)	15 (57.7)	8 (57.1)	
Overweight	1 (14.3)	12 (35.3)	5 (19.2)	3 (21.4)	
Obese	0 (0.0)	4 (11.8)	6 (23.1)	3 (21.4)	
School/Profession					0.422
Humanities	2 (33.3)	12 (35.3)	8 (32.0)	4 (28.6)	
Health degree	3 (50.0)	19 (55.9)	9 (36.0)	8 (57.1)	
Other schools	1 (16.7)	3 (8.8)	8 (32.0)	2 (14.3)	
Do you enjoy chocolate?					0.088
Definitely yes	4 (57.1)	29 (78.4)	24 (92.3)	13 (92.9)	
Probably yes	3 (42.9)	8 (21.6)	2 (7.7)	1 (7.1)	
Dietary restrictions					0.929
Yes	1 (14.3)	5 (13.5)	5 (19.2)	2 (13.3)	
No	6 (85.7)	32 (86.5)	21 (80.8)	13 (86.7)	
Exercise					0.232
Never	2 (28.6)	10 (27.0)	5 (19.2)	5 (33.3)	
1–2 times/week	0 (0.0)	10 (27.0)	4 (15.4)	4 (26.7)	
3–4 times/week	3 (42.9)	16 (43.2)	14 (53.8)	3 (20.0)	
4+ times/week	2 (28.6)	1 (2.7)	3 (11.5)	3 (20.0)	
Chocolate is not bad as part of a balanced diet					0.389
Strongly disagree/ disagree	0 (0.0)	2 (6.1)	4 (16.7)	0 (0.0)	
Neutral	1 (16.7)	2 (6.1)	0 (0.0)	1 (6.7)	
Agree	2 (33.3)	15 (45.5)	8 (33.3)	4 (26.7)	
Strongly agree	3 (50.0)	14 (42.4)	12 (50.0)	10 (66.7)	
I do not diet but watch what I eat					0.715
Strongly disagree/ disagree	1 (16.7)	3 (9.1)	2 (8.3)	2 (13.3)	
Neutral	1 (16.7)	6 (18.2)	2 (8.3)	2 (13.3)	
Agree	1 (16.7)	16 (48.5)	9 (37.5)	4 (26.7)	
Strongly agree	3 (50.0)	8 (24.2)	11 (45.8)	7 (46.7)	

that younger participants tend to crave chocolate more often than older participants, but there was no statistical significance, so further research with more participants is needed for valid conclusions.

The younger participants also had the highest hunger and guilt scores and these scores seem to decrease with age. This group of younger participants was also more likely to consume confectionary bars containing chocolate once or twice per month and more than twice per week when compared to older age groups. Furthermore, underclassmen had the highest mindfulness and hunger score. This finding leads to speculation that hunger may contribute to a decrease amount of mindfulness practices. People who practice restrictive eating tend to have high levels of hunger due to insufficient energy intake (Hudnall, 2017). Prolonged restrictive eating increases ghrelin, the hunger hormone in the body, further increasing the hunger sensation (Sumithran et al., 2011). The end response to intense hunger tends to be overeating or eating too quickly to allow the body to signal fullness (Tribble & Resch, 2012).

Similar to Meule and Hormes (2015), this study did not find any relationship between chocolate craving and BMI. This finding differs from Chao's study (2014) where BMI was positively associated with frequency of craving. Additionally, contrary to previous research by Benton et al. (1998), this study did not find a significant relation between chocolate craving and exercise.

This study did find age to be associated with chocolate consumption, which may be important when counseling younger students. Overall, this study found that the younger students, ages 18–24, had the highest guilt, hunger and mindfulness score. This means that the younger students tended to be hungry more often and were less mindful than older students. This study did not find a statistical significance between age and craving scores, but the decreased mindfulness practices in younger students may be the reason why they feel more guilty than older students. This means that as students age they are more mindful or aware of internal cues, which may result in decreased hunger and guilt.

5. Conclusion and limitations

This study has limitations. With only participants from one university, these findings may not be generalizable to the overall US university population. Future research should include multiple universities and should strive to analyze differences between genders, levels of stress and eating patterns or behaviors. Furthermore, the study included self-reported chocolate consumption and questions have the natural limitation of recall bias and social desirability bias. The small sample size prevented us from running advanced statistical methods which could have controlled for the effects of potential confounders.

This study found younger college students tend to be more frequently hungry than older students and usually eat less mindfully. Future research should explore if this is the reason they feel more guilt about eating chocolate than older students. College students tend to be susceptible to varying factors that can lead to problematic eating behaviors. Age and education appears to influence consumers' chocolate consumption behavior which may justify the implementation of specific marketing communications and nutrition counseling on a college campus for different age groups to increase effectiveness. Further qualitative research that controls and analyzes chocolate consumption and its underlying stimuluses, including seasonality, gender and accessibility would be beneficial to increase understanding of what motivates different age groups to consume chocolate.

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Competing Interests

The authors declare no competing interest.

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