From Craving to Calm: The Role of Mindful Eating in Modulating Emotional Eating and Affect

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LINK MEDICAL INTERFACE

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Disclaimers

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ABSTRACT

Background: Emotional eating and food cravings significantly impact dietary behaviours among university students, leading to potential long-term health implications. Mindful eating practices may mitigate these effects by fostering a greater awareness of eating triggers and responses.

Objective: This study aimed to examine the relationships between mindful eating, emotional eating, food cravings, and affective states in a university student population.

Methods: A cross-sectional design was utilized, enrolling 113 students from various universities who completed the Dutch Eating Behavior Questionnaire, Food Craving Questionnaire-Trait, Mindful Eating Behavior Scale, and Positive and Negative Affect Schedule. Data were analyzed using descriptive statistics, Pearson bivariate correlations, and multiple linear regression.

Results: Results indicated that mindful eating negatively correlated with negative affect ($r = -0.28$, $p < 0.01$) and positively with positive affect ($r = 0.41$, $p < 0.01$). Emotional eating was significantly predicted by negative affect ($\beta = 0.20$, $p < 0.02$), whereas food cravings did not significantly predict mindful eating scores ($p > 0.05$).

Conclusion: Higher levels of positive affect are associated with increased mindful eating behaviors. Tailoring interventions to enhance positive emotional states may enhance mindful eating practices among university students.

INTRODUCTION

The study utilized a cross-sectional, correlational design to explore the role of mindful eating in the relationship between food cravings, emotional eating, and positive and negative affective states. This design is considered effective for examining the relationships among variables at a single point in time (1). Participants were recruited using non-probability purposive sampling through online channels in Birmingham City, West Midlands. Eligible participants were full-time university students aged 19–25 who demonstrated proficiency in English and were not receiving treatment for any eating disorders. Participants who self-reported diagnoses of anorexia, depression, or other severe psychiatric conditions were excluded from the study. The study's inclusion and exclusion criteria were established according to the ethical guidelines provided by the British Psychological Society (BPS) and the National Health Service (NHS) Health Research Authority (2, 3).

A sample size of 100 participants was determined through power calculations using G*Power 3.1 to detect a medium to high effect size ($f2 = 0.20$) with a power level of 95% and $\alpha = .05$, suitable for a four-predictor linear multiple regression model (4). The final sample consisted of 113 participants, with a mean age of 21.91 years (SD = 1.82) and a mean Body Mass Index (BMI) of 24.0 (SD = 5.37). The sample was diverse in terms of ethnicity: 34 identified as British, 34 as South Asian (Indian, Pakistani, Bangladeshi), 32 as Black British (African, Caribbean), 9 as Hispanic, 2 as Native Americans, and 2 as other. Demographic information, including age, gender, height, weight, education level, ethnicity, marital status, and any previous diagnoses of mental health or eating disorders, was gathered using a structured demographic questionnaire (Appendix E). Participants who met the criteria were asked to complete an online consent form (Appendix C), which included information on the study's purpose, potential risks, confidentiality, and voluntary nature.

Data were collected using an online survey through Google Forms. The primary measures included the Dutch Eating Behavior Questionnaire (DEBQ) to assess emotional, external, and restrained eating behaviors (5), the Short Form Food Craving Questionnaire-Trait (FCQ-T) to evaluate the frequency and intensity of food cravings (6), the Mindful Eating Behavior Scale (MEBS) to assess awareness levels during eating (7), and the Positive and Negative Affect Schedule-Short Form (PANAS-SF) to assess participants' affective states (8). The DEBQ, with a Cronbach's alpha of $\alpha = .91$, comprises three subscales, each assessing a distinct eating behavior on a 5-point Likert scale from 1 (never) to 5 (very often), with higher scores indicating stronger inclinations towards each behavior. The FCQ-T, demonstrating high reliability with a Cronbach's alpha of $\alpha = .93$, includes 15 items scored on a 5-point Likert scale from 1 (never) to 5 (always), yielding a composite score reflecting food craving tendencies. The MEBS, a 10-item scale with internal consistency between $\alpha = .70$ and .89, evaluates mindfulness in eating practices, with higher scores

indicating a stronger propensity for mindful eating. Lastly, the PANAS-SF assesses positive and negative affect through a 10-item scale scored on a 5-point Likert scale, with higher scores corresponding to stronger affective states. Each of these scales has been previously validated and exhibits high reliability and validity in similar populations (5-8).

Upon completing the questionnaire, participants were provided with a debrief form (Appendix D), summarizing the study's purpose, hypotheses, and confidentiality measures. Data analysis was performed using IBM SPSS Statistics Version 28. Descriptive statistics were calculated for all variables, including means, standard deviations, and skewness, to assess data distribution. Pearson's bivariate correlations were conducted to identify relationships among the study variables, and multiple linear regression analysis was used to examine the predictive value of food cravings, emotional eating, and affective states on mindful eating behavior (9).

MATERIAL AND METHODS

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RESULTS

Table 1 presents the demographic information about the

Table 1 - Biographic Characteristics

Variables	Category	Frequency	Percentage
Gender	Male	59	52.2%
	Female	54	47.8%
Marital Status	Single	85	75.2%
	Married	26	23.0%
	Divorced	2	1.8%
Education	Bachelor's Degree	100	88.5%
	Master's Degree	13	11.5%

study participants for understanding the diversity within the sample. In turn, this influences the interpretation of the study's findings. The gender distribution within the sample indicates majority of male participants (52.2%) and a significant representation of females (47.8%), ensuring a balanced gender composition. Marital status data reveals that the majority of participants are single (75.2%), with a smaller proportion reporting marriage (23.0%) and an even smaller fraction indicating divorce (1.8%).

Regarding education, a substantial majority of participants hold a bachelor's degree (88.5%), signifying undergraduate completion, while a minority have earned a Master's Degree (11.5%), representing a higher level of education. These demographic insights provide context for understanding the sample's diversity, which is vital for interpreting the study's findings and considering the generalizability of the results to broader populations, enhancing the external validity of the study's conclusions.

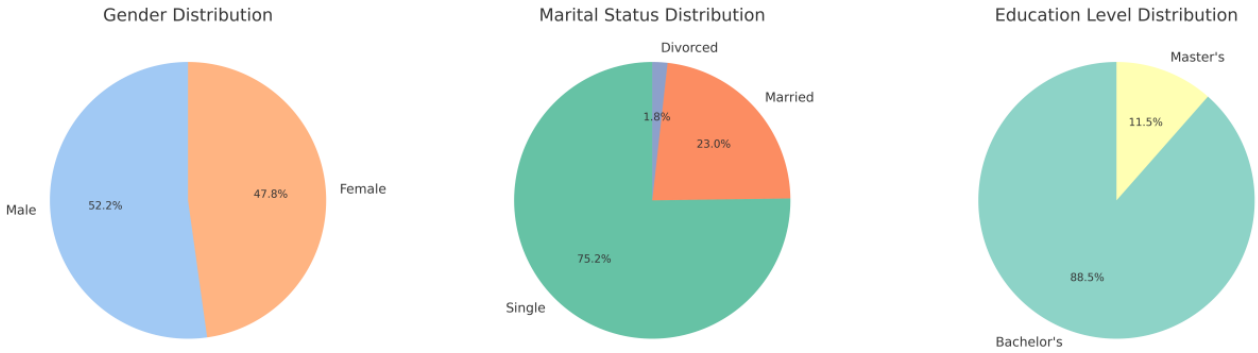

Figure 1 Demographic Breakdown of a Sample Population

This set of pie charts provides a concise visual representation of the gender, marital status, and education levels in a sample population. The first chart illustrates the gender distribution, showing a fairly balanced ratio between males and females. The second chart categorizes individuals by marital status, with a dominant percentage of singles. The final chart focuses on education, where the majority hold a Bachelor's degree. Colorful and distinct, each chart clearly delineates the percentages, offering an immediate understanding of the sample's demographic characteristics at a high resolution of 600 dpi.

Table 2 - Descriptive Statistics of the Measured Variables

Variable	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
Age	113	19.00	25.00	21.91	1.82	-0.04	-1.09
Height (m)	113	1.52	1.89	1.69	0.10	-0.04	-1.09
Weight (kg)	113	45.00	102.00	67.98	12.65	0.32	-0.24
BMI	113	13.60	43.92	24.10	5.37	0.55	0.92
PANAS Positive	113	21.00	42.00	31.84	4.89	-0.04	-0.82
PANAS Negative	113	21.00	43.00	31.09	4.41	0.31	-0.01
FCQT Total	112	23.00	57.00	39.31	5.67	0.46	0.54
MEBS Total	113	14.00	37.00	22.82	4.87	0.39	-0.20
DEBQ Emotional	112	5.00	46.00	28.42	6.46	-0.18	1.51
PANAS Total	113	48.00	81.00	62.93	7.44	0.27	-0.59

Note. BMI = Body Mass Index; PANAS = Positive and Negative Affect Schedule, DEBQ=Dutch Eating Behaviour Questionnaire; FCQ = Food Craving Questionnaire; MEBS = Mindful Eating Behaviour Scale

The study variables of table 2 provide a comprehensive insight into the sample's characteristics. Participants' ages (M = 21.9, SD = 1.82) indicate a relatively homogeneous age group with minimal skewness and kurtosis. Height (M= 1.69, SD= 0.10) exhibits little variability, while weight (M = 67.98, SD = 12.65) demonstrates greater dispersion. Body Mass Index (BMI; M = 24.10, SD = 5.37) falls within the healthy range displaying a moderately positively skewed distribution. Positive affect (PANAS Positive; M= 31.84, SD = 4.89) and negative affect (PANAS Negative; M = 31.09, SD = 4.41) scores suggest balanced emotional states. Food craving intensity (FCQT Total; M = 39.31, SD = 5.67) exhibits moderate variability. Mindful eating behaviour (MEBS Total; M = 22.82, SD = 4.87) appears slightly positively skewed. Emotional eating (DEBQ Emotional; M = 28.42, SD = 6.46) demonstrates a mild negative skew and moderate kurtosis, indicative of a peaked distribution. The combination of positive and negative affect (PANAS Total; M = 62.93, SD = 7.44) shows slight positive skewness and flatter kurtosis. These descriptive statistics offer a comprehensive overview of the sample characteristics and variable distributions providing essential insights for subsequent statistical analyses.

The study's variables were further explored through Pearson bivariate correlations to uncover relationships among study variables. The correlations revealed a significant positive association between mindful eating (MEBS Total) and positive affect (PANAS Positive; $r = 0.41$, $p < 0.01$) indicating

that individuals who exhibit more mindful eating behaviours tend to experience higher levels of positive affect. Similarly, mindful eating is negatively correlated with negative affect (PANAS Negative; r = -0.28, p < 0.01), suggesting that greater mindfulness during eating is linked to lower levels of negative emotional states. Additionally, there is a significant positive correlation between food craving intensity (FCQT Total) and emotional eating (DEBQ Emotional; r = 0.61, p < 0.01), indicating that individuals with stronger food cravings are more likely to engage in emotional eating behaviours. The correlations also reveal a positive relationship between emotional eating and both positive affect (r = 0.26, p < 0.01) and negative affect (r = 0.14, p < 0.05) suggesting that emotional eaters tend to experience higher levels of both positive and negative emotions. Furthermore, positive affect (PANAS Positive) is strongly correlated with negative affect (PANAS Negative; r = 0.82, p < 0.01), indicating that participants who report higher levels of positive affect also tend to report higher levels of negative affect. Lastly, there are no significant correlations between body mass index (BMI) and any of the other variables in the study.

Table 3 - Pearson Bivariate Correlations Between Study Variables

Sr.	Variables	MEBS Total	PANAS Positive	PANAS Negative	FCQT Total	DEBQ Emotional	PANAS Total	BMI
1	MEBS Total	-	0.411**	0.280**	0.356**	0.378**	0.436**	0.054
2	PANAS Positive	0.411**	-	0.278**	0.258**	0.340**	0.822**	0.080
3	PANAS Negative	0.280**	0.278**	-	0.194*	0.062	0.776**	-0.027
4	FCQT Total	0.356**	0.258**	0.194*	-	0.617**	0.285**	0.114
5	DEBQ Emotional	0.378**	0.340**	0.062	0.617**	-	0.260**	0.144
6	PANAS Total	0.436**	0.822**	0.776**	0.285**	0.260**	-	0.037
7	BMI	0.054	0.080	-0.027	0.114	0.144	0.037	-

Note: ** Correlation is significant at the 0.01 level (2-tailed); * Correlation is significant at the 0.05 level (2-tailed).

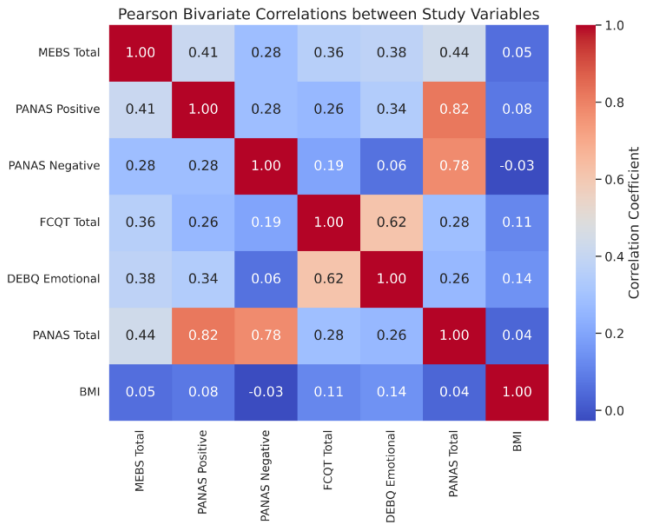

Figure 2 Correlation heat map of study variables.

This heat map visualizes the Pearson bivariate correlations among several key psychological and behavioral variables in a study.

Significant correlations are highlighted, including strong relationships between positive affect and mindful eating, as well as between emotional eating and food craving intensity. The color gradient, ranging from blue (negative correlation) to red (positive correlation), effectively depicts the strength and direction of these relationships, providing a clear visual summary of the interconnections within the data.

The multiple linear regression analysis, presented in table 4 aimed to predict MEBS_Total (mindful eating behaviour) based on the included predictor variables. The overall model was statistically significant F (4, 106) = 3.68, p = 0.08, indicating that the predictors collectively explain a significant portion of the variance in mindful eating behaviour. The model's R2 value was 0.12 suggesting that predictors can account for approximately 12.2% of the

Table 4 - Multiple Linear Regression Analysis to Predict MEBS Total

Model	R	R^2	Adjusted R^2	Std. Error Ets	F	p
1	0.349	0.122	0.089	2.68282	3.682	0.008
Predictors	**B**	**Confidence Interval (LL)**	**Confidence Interval (UL)**	**β**	**t**	**p**
(Constant)	0.47	-4.47	5.41	-	0.19	0.85
PANAS Positive	0.06	-0.04	0.18	0.11	1.17	0.24
PANAS Negative	0.06	-0.06	0.18	0.09	0.97	0.33
FCQT Total	0.05	-0.06	0.16	0.10	0.89	0.37
DEBQ Emotional	0.07	-0.02	0.18	0.18	1.50	0.13

variability in mindful eating scores. Upon examining the individual predictors, it is observed that PANAS Positive (positive affect) did not significantly predict mindful eating behaviour (β = 0.11, p = 0.24) nor did PANAS Negative

(negative affect) (β = 0.09, p = 0.33) or FCQT total (food craving) (β = 0.106, p = 0.37). However, DEBQ (emotional eating) emerged as a significant predictor (β = 0.18, p = 0.13) suggesting that higher levels of emotional eating behaviour are associated with increased mindful eating. The constant term (intercept) in the model is 0.19 (p = 0.85) indicating the expected mindful eating score when all predictor variables are set to zero. In summary, the results of the multiple linear regression indicate that emotional eating behaviour is a significant predictor of mindful eating behaviour, whereas positive affect, negative affect, and food craving intensity did not significantly contribute to the prediction of mindful eating scores in this model.

This detailed diagram visually summarizes the results of a multiple linear regression analysis aiming to predict MEBS Total (Mindful Eating Behavior Scale Total). The chart provides a comprehensive overview of each predictor used in the model, including PANAS Positive, PANAS Negative, FCQT Total, and DEBQ Emotional.

For each predictor, key statistics are presented: the regression coefficient (B), the confidence interval, the standardized beta coefficient (Beta), the t-value, and the p-value. The constants or intercepts are also included to show the expected baseline level of MEBS Total when all predictors are at zero.

The diagram efficiently encapsulates the statistical relationships, highlighting that while most predictors do not significantly influence MEBS Total, DEBQ Emotional shows a promising trend towards significance, suggesting a stronger linkage with mindful eating behaviors.

Table 5 - Multiple Linear Regression Analysis to Predict SAMEBS

Model	R	R^2	Adjusted R^2	Std. Error Ets	F	p
1	0.42	0.18	0.15	2.24	5.87	<.001
Predictors	**B**	**Confidence Interval (LL)**	**Confidence Interval (UL)**	**β**	**t**	**p**
(Constant)	0.46	-3.68	4.61	-	0.22	0.82
PANAS Positive	0.10	0.005	0.19	0.20	2.09	0.03
PANAS Negative	0.11	0.01	0.21	0.20	2.24	0.02
FCQT Total	-0.00	-0.10	0.09	-0.01	-0.08	0.93
DEBQ Emotional	0.08	-0.00	0.16	0.21	1.81	0.07

The multiple linear regression analysis presented in Table 5 aimed to predict SAMEBS (an unspecified variable) based on several predictor variables. The model as a whole was statistically significant, F (4, 108) = 5.87, p < .001 indicating that the combined predictors explain a significant portion of the variance in SAMEBS.

The R2 value of 0.18 suggests that the predictors can account for approximately 18.2% of the variability in SAMEBS. Examining the individual predictors, it is found that PANAS Positive (positive affect) was a statistically significant predictor of SAMEBS (β = 0.20, p = 0.03) suggesting that higher levels of positive affect are associated with higher SAMEBS scores. Similarly, PANAS Negative (negative affect) was also a significant predictor of SAMEBS (β = 0.20, p = 0.02) indicating that higher levels of negative affect are associated with higher SAMEBS scores. Conversely, FCQT Total (food craving intensity) did not significantly predict SAMEBS (β = -0.01, p = 0.93) indicating that food craving intensity does not appear to have a substantial impact on SAMEBS. DEBQ (emotional eating) showed a marginally significant effect (β = 0.21, p = 0.07) suggesting that higher levels of emotional eating may be associated with slightly higher SAMEBS scores. The constant term (intercept) in the model is 0.22 (p = 0.82) indicating the expected SAMEBS score when all predictor variables are set to zero.

In conclusion, this regression analysis demonstrates that both positive and negative affect significantly predict SAMEBS while food craving intensity has no significant effect. Emotional eating has a borderline significant effect on SAMEBS. These findings provide insights into the relationships between affective states and SAMEBS which may have implications for further research or interventions in the domain of the unspecified variable SAMEBS.

Table 6 - Multiple Linear Regression Analysis to Predict SAMEBS (Alternate Model)

Model	R	R^2	Adjusted R^2	Std. Error Ets.	F	p
1	0.51	0.26	0.24	4.2416	9.67	<.001
Predictors	**B**	**Confidence Interval (LL)**	**Confidence Interval (UL)**	**β**	**t**	**p**
(Constant)	0.22	-7.59	8.04	-	0.05	0.95
PANAS Positive	0.25	0.07	0.43	0.25	2.77	0.00
PANAS Negative	0.18	-0.00	0.37	0.16	1.90	0.06
FCQT Total	0.12	-0.06	0.30	0.14	1.30	0.19
DEBQ Emotional	0.14	-0.02	0.30	0.18	1.72	0.08

A multiple regression was conducted to identify predictors of SAMEBS. The model as a whole was statistically significant F (4, 108) = 9.67, p < .001 indicating that the combined predictors explain a significant portion of the

variance in SAMEBS. The R2 value of 0.26 suggests that approximately 26.7% of the variability in SAMEBS can be accounted for by the predictors. Examining the individual predictors, it is found that PANAS Positive (positive affect) was a statistically significant predictor of SAMEBS ($\beta = 0.25$, $p = 0.006$) suggesting that higher levels of positive affect are associated with higher SAMEBS scores. Similarly, PANAS Negative (negative affect) was marginally significant ($\beta = 0.16$, $p = 0.06$) indicating that higher levels of negative affect may be associated with slightly higher SAMEBS scores. FCQT Total (food craving) and DEBQ Emotional (emotional eating) did not significantly predict SAMEBS ($p > 0.05$) suggesting that these variables do not appear to have a substantial impact on SAMEBS. The constant term (intercept) in the model is 0.22 ($p = 0.95$) indicating the expected SAMEBS score when all predictor variables are set to zero. In conclusion, this regression analysis demonstrates that positive affect significantly predicts SAMEBS while negative affect has a borderline significant effect. Food craving intensity and emotional eating do not significantly predict SAMEBS. These findings provide insights into the relationships between affective states and SAMEBS which may have implications for further research or interventions in the domain of SAMEBS.

DISCUSSION

The present study highlights several intriguing associations between emotional eating, mindful eating, food cravings, and affective states. Consistent with prior research, a significant positive relationship was observed between mindful eating and positive affect, suggesting that individuals with higher levels of happiness are more inclined toward healthier eating behaviors (1). This finding aligns with previous studies that indicate individuals experiencing positive emotions are better equipped to engage in mindful eating, as they are more receptive to their body's cues when in a relaxed and open state (2). Such an emotional state facilitates awareness of hunger and satiety signals, supporting the core principles of mindful eating (3). This study underscores the importance of positive affect as a predictor of mindful eating, confirming earlier findings that suggest positive emotions can significantly influence eating behaviors in constructive ways (4). However, the study also found that both positive and negative affect are predictors of mindful eating, which may imply that individuals with heightened emotional experiences, whether positive or negative, could be more attuned to their eating habits or may adopt mindful eating as a strategy to manage their emotional states (5).

Interestingly, the association between emotional eating and mindful eating was somewhat complex. The data indicated that emotional eating tendencies were a significant predictor of mindful eating, suggesting that individuals who eat to cope with emotions may have a different relationship with mindful eating. This finding implies that those prone to emotional eating may face challenges in adopting mindful eating due to their emotional impulsivity and sensitivity (6). Previous studies have indicated that emotional eaters tend to use food as a form of coping, which may counteract the awareness and control promoted by mindful eating (7). However, this relationship also highlights an area for potential intervention, as mindfulness-based approaches that focus on emotion regulation could be particularly effective for individuals who struggle with emotional eating (8). By addressing the underlying emotional triggers, such interventions might foster healthier eating habits, providing a path toward a more balanced approach to food and well-being (9).

Although food cravings did not independently predict mindful eating, they were part of a model that significantly predicted mindful eating scores. This suggests that while food cravings alone may not drive mindful eating behaviors, they can influence these behaviors when interacting with other factors, such as emotional states and individual differences (10). This complex interaction highlights that food cravings, while often seen as a barrier to healthy eating, may not fully prevent individuals from practicing mindful eating. Instead, the impact of cravings may be mitigated by factors such as positive affect or mindfulness skills that allow individuals to manage their cravings more effectively (11). This nuanced finding contrasts with previous research, which has often suggested a straightforward negative association between food cravings and mindful eating (12). It emphasizes the need for a more comprehensive understanding of how these variables interact within different emotional and contextual frameworks (13).

Differences between this study's findings and those of previous research may be attributed to the unique demographic characteristics of the sample. Cultural, social, and familial factors related to food vary significantly among ethnic groups, which can influence behaviors such as emotional eating and food cravings (14). Prior studies have shown that cultural context plays a critical role in shaping eating behaviors, with certain ethnic groups demonstrating distinctive emotional and behavioral responses to food (15). For instance, a study by Lee and colleagues found significant variations in eating behaviors across ethnic groups, indicating that emotional eating patterns can be influenced by cultural background (16). Additionally, the specific age group of this study, focused on young adults, may further differentiate these findings. Young adulthood is a transitional period characterized by unique stressors and lifestyle changes, which can impact food-related behaviors in ways that differ from other age groups (17). This variability suggests that young adults may experience emotional fluctuations more intensely, influencing their propensity for emotional eating and their ability to practice mindful eating (18).

The study's recruitment method and sample size may also account for some of the observed discrepancies. The online recruitment process could have attracted participants with specific characteristics, potentially introducing selection bias. Furthermore, the relatively small sample size may have affected statistical power, limiting the ability to detect smaller effect sizes that might be evident in larger studies (19).

This limitation may affect the generalizability of the results, suggesting that future research with larger and more diverse

samples is needed to validate these findings and ensure their applicability to broader populations.

These findings carry implications for future research and interventions. Mindfulness-based eating interventions that incorporate strategies for emotion regulation could be particularly beneficial for individuals prone to emotional eating, as these interventions could help them develop healthier coping mechanisms (20). Considering the complex relationships observed in this study, a longitudinal approach may provide deeper insights into the causal relationships between emotional states, food cravings, and mindful eating. Additionally, integrating objective measurements, such as observational methods, could further validate self-reported data, reducing potential biases (21). Given the unique cultural and emotional influences on eating behaviors, future research should consider exploring these dynamics within diverse cultural contexts to gain a more comprehensive understanding of how mindful eating can be effectively promoted across populations (22).

CONCLUSION

In conclusion, this study underscores the significant connections between mindful eating and positive affect among university students, indicating that individuals who regularly experience positive emotions are more likely to practice mindful eating. Furthermore, the complex relationships among food cravings, emotional eating, and affect emphasize the need for tailored interventions that address these factors to promote healthier eating behaviors. Moving forward, future studies should focus on capturing a representative sample to confirm and expand upon these findings, thereby advancing the understanding of mindful eating practices and their potential benefits for emotional and physical well-being.

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