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Academic-related factors and emotional eating in adolescents

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Abstract

BACKGROUND—Existing literature indicates a relationship between stress and emotional eating in adults, yet limited research has examined the impact of school-related stress on emotional eating in adolescents. This study investigated the influence of academic factors on emotional eating among minority adolescents.

METHODS—A survey was implemented among a sample of minority adolescents (N=666) to investigate the relationship between emotional eating and 3 academic factors: academic self-esteem, grade point average (GPA), and academic worries. Forced-entry multiple linear regressions were used to test for relationships.

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Human Subjects Approval Statement
Study procedures were approved by the University of Southern California Institutional Review Board and the boards of participating schools and school districts (IRB# HS-014000).

RESULTS—Findings indicate that GPA, academic self-esteem, and academic worries were related to emotional eating scores in adolescents. There were no significant differences in academic factors between emotional eaters and non-emotional eaters.

CONCLUSIONS—Additional research is needed to further elucidate the complex interaction between emotional eating behavior and academics.

Keywords

academic self-esteem; grade point average; emotional eating; adolescent health; school-related stress

A clearer understanding of the link between stress and obesity in youth is needed; emotional eating may be an often overlooked part of the picture.[1] Increasing food intake in response to negative emotions, otherwise known as emotional eating, has been established as a common, yet "inapt" response.[2] Emotional eating, comfort eating, and stress-induced eating are terms to describe the repeated response of consuming food to cope with unpleasant psychological emotions.[3] The existing research on emotional eating has primarily focused on Caucasian, adult female participants, but it is likely that emotional eating occurs in people of all ages, sexes, and ethnicities. When emotional eating has been studied among larger culturally diverse samples of children and adolescents, results have indicated that approximately 10 to 60% of youth emotionally eat.[4,5]

Studies among adults support the notion that stress significantly increases emotional eating behavior and weight gain,[6–8] with 70% of people increasing food intake when stressed.[9] Ozier et al found that adults who are most likely to eat in response to stress and emotions were 13 times more likely to be overweight or obese than adults who have low tendencies to eat in response to emotions.[7] Although most research in this area has focused on adults, research has found emotional eating in early childhood to be a stable trait that continues over time.[10] Because emotional eating appears to frequently manifest prior to adulthood, identifying perpetuating factors of emotional eating in youth can help identify methods of prevention. Thus, the study of emotional eating during formative years of adolescence is warranted.

Furthermore, the source(s) and types of stress impacting diet have yet to be thoroughly identified and surveyed. A pioneer study by Belcher et al. (2011) found that worries about self-image, relationships, and school significantly predicted emotional eating in Latina female adolescents.[11] This study also reported that emotional eating significantly moderated the relationship between baseline worries and body mass index (BMI) percentile at follow-up. Another study focused on worries in adolescents and found that 42% of students worried about school grades every day.[12] Grades were the most frequency source of daily worry, followed by physical appearance and problems at home. Few studies have focused on academic stress as an influence on emotional eating in adolescents and children, despite school being a mandatory and often stressful obligation in their lives.

The limited research on the relationships between academic stress and eating behaviors has targeted populations generally regarded as having increased levels of perceived stress, such

as university students. These studies have found that college students with higher stress levels had poorer nutrition habits and increased emotional eating and night-eating than those with less stress.[13–15] Similar results were found in high-school students in Korea; students who reported high academic stress ate larger meals and consumed more sugar than those reporting low academic stress.[16] Other studies indicate shifts in dietary patterns associated with periods of major exams.[17,18] While these studies suggest that elements related to school often influence the eating patterns of students, more evidence is needed to understand which particular academic factors are associated with eating patterns, with a particular focus on measuring emotional eating.

Despite the fact that school can be a major source of stress for youth, research elucidating school-related elements that may contribute to emotional eating in adolescents is lacking. Past studies have largely considered high school, college student, and adult participants. No known studies have focused investigation on minority middle school populations living in large urban environments and whether academic factors such as grade point average (GPA), academic stress, and school-related worries are related to emotional eating in these younger, minority adolescents. Investigation around emotional eating in adolescents, especially minority students, can inform culturally appropriate interventions around development of healthier coping behaviors for lifelong health. The purpose of this study was to investigate the influence of academic factors on emotional eating among a sample of minority adolescents (including both sexes). Specifically, this study examined whether (1) academic self-esteem, (2) GPA, and (3) academic worries were related to emotional eating. It was hypothesized that there would be significant differences in academic self-esteem, GPA, and academic worries between emotional eaters and non-emotional eaters. Additionally, it was hypothesized that academic self-esteem, GPA, and academic worries would be significantly related to emotional eating scores.

METHODS

Participants

The study utilized cross-sectional, baseline data from a sample of 666 middle school students in Los Angeles County in 2004. Participants were from 7 schools, both public and private, enrolled in a larger physical activity intervention focused on minority girls (Get Moving!). Seventh and eighth graders completed a psychosocial survey that included scales to assess a variety of factors related to physical and mental health (such as physical activity, body image, smoking, and weight concerns). Emotional eating, academic self-esteem, and frequency of school-related worries were assessed in the questionnaire and were the focus of the present study. Demographic information such as age, ethnicity, and sex were also included.

School selection—Sampling methods focused on selecting Los Angeles County schools based on ethnic makeup and socioeconomic status. Data were obtained from the California Board of Education and the Roman Catholic Archdiocese to identify schools of both high and low socioeconomic status (SES) and over 60% Latino, as the parent study aimed to intervene on physical activity with Latina girls. The schools that agreed to participate had

high numbers of Latino students and were mixed socioeconomically. Eight public and private schools that were matched on SES and ethnic makeup were selected, and one of each pair was randomly assigned to intervention vs. control conditions. In total, 7 schools participated in the study, as one control school dropped out just prior to data collection due to school district requirements.

Student recruitment—Physical education (PE) instructors at each school were approached to invite their classrooms to take part in the study. Since the target population of the larger study was female participants, any girls-only PE classes were specifically targeted. Of the 18 physical education teachers approached to participate, 17 agreed to participate. All students in the class were invited to complete the surveys.

Student recruitment lasted 3 days; the principal investigator explained the study and distributed parental consent forms on the first day. All forms were available in both English and Spanish. A separate parent refusal form was distributed on day 3 to those students who had not returned the consent forms. Students with implied consent (ie, those who did not provide active parental consent or parental refusal), were given an abbreviated version of the survey. The Institutional Review Board approved the implied consent abbreviated survey that excluded items on pubertal development and any questions concerning family or religion. Since these items were not included here, these exclusions did not affect the current analysis. Student active assent was also required for participation. About 85% of students consented (active and implied) to participate. Overall, 75 children chose not to participate; they were able to read or work on other school work during survey administration.

Instrumentation

Emotional eating—Emotional eating was measured using the *Emotional Eating Subscale* of the *Dutch Eating Behavior Questionnaire* (DEBQ), a 13-item questionnaire assessing eating behaviors in response to emotions.[19] The DEBQ has been used extensively with adolescent populations and normative data with cut points for youth have been provided by the scale author, supporting its psychometric quality. The scale authors report high factorial validity for this measure.[20–22] A 5-point Likert scale was used to measure responses ranging from “never” to “very often.” The mean scores of the 13 items were calculated to obtain a continuous score for emotional eating behavior (Cronbach’s $\alpha = 0.95$). The emotional eating subscale shows high internal consistency and high factorial validity in samples of obese and normal weight men and women.[19] Based on age and sex cut-off values available in the DEBQ manual,[23] students were further categorized as “emotional eaters” or “non-emotional eaters,” creating a nominal variable for analysis.

Academic self-esteem—Academic self-esteem was measured using a subscale of the *Self-Image Questionnaire for Young Adolescents* (SIQYA) created by Marsh, Parker, and Smith (1983),[24] which has been shown to have good concurrent and discriminant validity. The academic confidence subscale of the SIQYA consists of 10-items and was used to measure students’ attitudes and perceptions about their academic ability and performance. A 4-point Likert scale was used to measure responses with the options reading “mostly false,” “false,” “true,” and “mostly true.” The mean scores of the ten items were calculated to

obtain a continuous score for academic self-esteem (Cronbach's α = 0.81). Rasch analysis indicates that the academic confidence subscale of the SIQYA fits the Rasch model and is a one-dimensional instrument.[25]

Grade point average (GPA)—After approval from the school district and school, students' GPAs from student records (de-identified, labeled only by study ID number) were provided to the investigator. GPA is used as a measurement of academic achievement through grades and is calculated by dividing the total number of grade points by number of attempted credit units. The values for GPA range from 0.00 to 4.00, with 4.00 indicating the highest academic performance.

Academic worries—A scale developed by Spruijt-Metz and Spruijt was utilized to measure worries, which are internal and often uncontrollable negative thoughts.[26] Latent variable analyses indicate a good fitting model, supporting the scale's psychometric quality.[26] The questions assessed how often the adolescent worried about each item over the past month. A 4-point Likert scale was employed with responses ranging from "I never worry about this" to "I worry about this a lot." The worry scale shows good internal consistency in adolescent populations including both sexes.[26] Two items that were specifically related to school were used to create an academic worries subscale in order to assess how often students worry about school-related matters. These items were averaged to obtain a scale score (Cronbach's α = 0.70).

Procedure

Data collectors were student research assistants who received instruction in survey administration. Standardized protocols and scripts were used during training and data collection. During training, scripts, and protocols were reviewed with research assistants; then they engaged in mock data collection sessions, receiving guidance and instruction for improvement by the investigator.

Because the classes were PE classes, data collection took place predominately in school gyms, although some schools provided access to the library for data collection. Data collectors passed out and collected surveys; during survey completion, they sat off to the side, available to answer questions, but allowing distance to preserve confidentiality and comfort levels of participants while they completed surveys. The paper-and-pencil survey was given over 2 class periods and took approximately 45 minutes in total for students to complete. Confidentiality was explained to students and maintained by assigning individual, arbitrary identification numbers to each student. Permission to use the collected data in the proposed study was attained by a signed consent letter from the principal investigator.

Data Analysis

All statistical analyses were conducted using SPSS Version 21.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to examine demographic factors of participants. Independent samples t-tests were used to investigate potential differences between emotional eaters and non-emotional eaters. Cohen's d is reported to provide estimates of effect size. Forced entry multiple linear regressions were used for testing whether academic self-esteem,

GPA, and academic worries were significantly related to emotional eating, controlling for age and sex. Statistical significance was set at $p < .05$; 95% confidence intervals are presented as indicators of precision.

Because data were nested within schools, multi-level modeling was performed to control for the random effect of school, addressing the violation of the assumption of independence encountered with the use of nested data. Residual analysis and influence diagnostics indicated the model was a good fit to the observed data. Further model analyses supported cross-validation of the model as there was no substantial shrinkage. Most of the assumptions of multiple linear regression were met, although normality of the residuals may be problematic. However, based on central limit theorem, the sample is likely large enough to meet normality and the model would likely generalize to other samples within the targeted adolescent population.

RESULTS

In total, 666 students completed surveys and their responses were included in data analyses; Table 1 describes the sample. The age of the sample ranged from 11 to 15 years, with a mean of 12.5 years. Nearly three-fourths of the sample was female (73%) and over half were Latino. Roughly one-fifth of participants were classified as emotional eaters. Considering the possible range of scores, the mean values for both academic self-esteem and worries were moderately high.

Differences in Academic Factors and Emotional Eating between Participants

Two-tailed independent samples t-tests were used to investigate differences in academic factors between emotional and non-emotional eaters; results are presented in Table 2. There was not a statistically significant difference in GPA between emotional eaters and non-emotional eaters ($p = .547$, $d = .510$). Additionally, there was no statistically significant difference in academic self-esteem between emotional and non-emotional eaters ($p = .278$, $d = .879$), nor was there a statistically significant difference in academic worries between emotional and non-emotional eaters ($p = .633$, $d = .380$).

Relationship between Academic Factors and Emotional Eating

Results indicate that a linear regression model significantly explained 2.8% of the variance in emotional eating, $F(5,601) = 3.479$, $p = .004$, as shown in Table 3. Academic self-esteem, GPA, and academic worries were significantly related to emotional eating; the group-level effect was not statistically significant (beta = 0.008 ± 0.010, $p = .426$). Relationships were positive for academic worries and GPA. Thus, as academic worries and GPA increased, emotional eating increased. The relationship between academic self-esteem and emotional eating was negative; as academic self-esteem increased emotional eating decreased.

DISCUSSION

Bivariate analyses in the current study did not show significant differences in academic self-esteem, GPA, and academic worries between emotional eaters vs. non-emotional eaters. One possible explanation may be that the bivariate analyses failed to control for additional

factors; these analyses only capture simple associations, however, the relationship between academic factors and emotional eating appears to be more complex. Additionally, t-tests are less able to capture linear relationships, potentially contributing to the non-significant results. Another potential explanation is that there was a type II error, as effect sizes (Cohen's d values) indicate real world significance, beyond statistical significance. Further, when data are dichotomized, this reduces the variability in the data, which can reduce ability to find statistically significant results. Relatedly, the number of emotional eaters in the sample was small (less than 20%); this could impact variance, which is directly related to the value of test statistics.

A study performed by Belcher et al illustrated that worries significantly predicted emotional eating in adolescents; the findings in the present study are similar, but specific to school-related worries. Additionally, the study by Belcher et al included entirely female participants whereas the current study included both sexes, although the sample was predominantly female.[11] The current study lends to the generalizability of findings in the area of emotional eating to both sexes (as historically studies have been largely focused on female participants). The current study found no association between emotional eating and sex, indicating that the problem may affect both sexes equally.

Regression analyses revealed a positive, significant relationship between GPA and emotional eating. It was unexpected that the relationship was positive; it was assumed that the relationship would be negative because students with poor grades (low GPA) may have higher stress levels about school, which would increase the likelihood of emotional eating as a coping response. However, those with higher GPA scores had higher scores on emotional eating. One possible explanation for this result may be that individuals maintaining noble grades through dedication to their school work may have high levels of stress and engage in emotional eating to deal with the pressures of earning and maintaining high grades. Results from Kim et al indirectly support this idea as they found high-school students who reported higher academic stress ate larger portions and more sugar than those who were less stressed academically.[16] Earning high grades has the possibility of causing high academic-related stress, but the direct relationship between GPA and stress was not examined in the present study.

Results of the linear regression also showed a negative, significant association between academic self-esteem and emotional eating. As overall feelings of academic success and satisfaction of accomplishments increased, emotional eating decreased. Although no known studies have specifically examined academic self-esteem, these findings are in line with previous similar research. One study scrutinized relationships among self-esteem, stress, coping, and eating behavior in adolescents.[27] Martyn-Nemeth et al found that those with higher self-esteem reported less unhealthy eating behaviors and used less avoidant coping behaviors than adolescents with lower self-esteem. Although Martyn-Nemeth et al studied overall self-esteem, their results are like the present study which focused on academic self-esteem. Additionally, the present study identified 19.8% of sample participants were emotional eaters which is like the results by Martyn-Nemeth et al; they stated that 25% of adolescents used food as a coping mechanism to deal with problems.[27]

Limitations

The cross-sectional design of this study solely allowed the associations between academic factors and emotional eating to be described; however, temporality nor causality can be concluded. In addition, results may not be easily extrapolated to the general population as the sample was largely composed of minority adolescents with a high number of female participants. The time (approximately 45 minutes) needed to complete the survey could have impacted validity of data, as boredom or fatigue may have reduced attention given to carefully answering questions. Thus, it is possible the data do not accurately capture student feelings and behaviors—a common issue in psychosocial assessment. In addition, data were self-reported which may have impacted accuracy; however, self-report is the best means available for psychosocial information to be collected.

Whereas the explained variance was quite limited, the goal of this study was not to build an explanatory model of emotional eating. Rather, it aimed to identify whether academics may be a source of stress related to this behavior. There is a wide range of emotions related to emotional eating, and it is rare to find psychological factors that account for great amounts of variability in eating behavior; thus, it was not expected that academic-related stressors would explain a large amount of variability in this outcome. Perhaps the variables in the current analyses did not capture academic stress factors that are most related to emotional eating; further research is needed to ascertain whether academic stress leads to emotional eating.

Conclusion

Limited prior research examines academic stress and eating behavior of students. This study was the first known to investigate specific school-related factors as indicators of academic stress and how they relate to emotional eating in adolescents. Given that academic self-esteem, GPA, and academic worries were significantly related to emotional eating, it may be useful to engage in longitudinal research in this area to find whether strategies to help adolescents develop healthier, non-food coping mechanisms during academic programs will significantly impact health.

The current study revealed information that has been largely overlooked: school is a common experience for nearly all youth, and related stressors and negative emotions appear to contribute to emotional eating behavior. It is possible that emotional eating behavior is well-embedded long before students enter universities, where much of existing research between academics and eating patterns has focused. Further understanding the multiple factors related to emotional eating in youth may help develop programs that can emphasize the development of alternative, more adaptive coping mechanisms and healthier eating habits. Although the present study did not specifically focus on emotional coping mechanisms in adolescents, emotional eating, by definition, is an avoidant coping behavior in response to negative feelings. Results from previous research suggest that adolescent coping mechanisms may be lacking; teaching teenagers healthy alternatives to managing negative feelings may help decrease a range of maladaptive coping behaviors. Furthermore, the extent to which parents and school/after school leaders are aware of the prevalence of emotional eating among adolescents is unknown. Further research should seek to delineate

awareness of emotional eating among parents and school leaders (counselors, teachers, and administrators), and to identify strategies these key players can use to effectively reduce the risk of emotional eating.

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IMPLICATIONS FOR SCHOOL HEALTH

A meta-analysis of school-based stress management programs concluded that primary stress prevention programs should be promoted for children and adolescents, as overall results show positive outcomes including improved coping and stress reduction.[28] Successful reductions in psychological stress and anxiety have also been found by Tai Chi and Yoga programs for youth.[29,30] Although these programs aim to reduce overall stress, no known programs have targeted academic-related stress in an effort to reduce emotional eating in adolescence. Educating youth on the potential consequences of emotional eating and teaching healthier alternatives to deal with academic stress could possibly help change unhealthy eating behaviors before they become embedded, lifelong habits.

Potential methods to implement these recommendations within existing school programs include:

- Integration of mental health and stress management education into existing curriculum. Science courses could incorporate modules on the physiological response to stress and teach students about the effects of mental health on physical health.
- Health courses should include specific modules on stress and coping skills. Students should be taught how to become aware of their stressors so that they know when to implement coping strategies. Key stressful times associated with academics could be highlighted—during midterms, final exams, times for entrance or placement exams, and state-mandated testing. The differences and utility of maladaptive, eg, emotional eating, vs. adaptive coping, eg, yoga, strategies must be explained, along with instruction for when it is most appropriate to use particular strategies, such as emotion-focused versus problem-focused methods. An array of stress management skills, such as diaphragmatic breathing, progressive relaxation, and guided imagery, should be taught so that students can identify particular strategies that work for them.
- Physical education courses should include health education components that emphasize the many health benefits of physical activity, including stress reduction and healthier eating patterns. These health education modules would be especially useful on days when there is no planned exercise, like during state exams, or when extreme weather does not permit. Stress reduction physical activities such as Tai Chi and Yoga could be implemented as additional exercise modalities.

These suggestions provide feasible strategies to enhance students' abilities to cope with stress within the constraints of the school environment, which is charged with enriching the lives and well-being of its students. Suggested applications of the study can be interwoven within a framework such as Whole School, Whole Community, Whole Child model which emphasizes the important relationship between student health and academic achievement.[31]

Table 1

Characteristics of the Sample (N = 666)

Variable	M	SD	Range
Age (months)	155.67	7.81	138 – 184
Male *	179	26.9	–
Ethnicity *			
Asian/PI	107	16.1	–
Latino	407	61.1	–
Multi-ethnic	77	11.6	–
Other	44	6.6	–
White	24	3.6	–
Emotional eaters *	124	19.8	–
Emotional eating score	1.83	0.82	1 – 5
GPA	2.77	0.86	0 – 4
Academic self-esteem	3.06	0.56	1 – 4
Academic worries	3.14	0.90	1 – 4

* N (%) reported for categorical variables

Table 2

Differences in Academic Factors between Emotional and Non-emotional Eaters

Academic Factors	Emotional Eaters	Non-Emotional Eaters	95% CI of Difference	t	p-value
	Mean (SE)	Mean (SE)			
Academic self-esteem	3.01 (0.05)	3.08 (0.03)	−.336, −.060	−1.09	.278
GPA	2.81 (0.08)	2.76 (0.04)	.016, .206	−0.60	.547
Academic worries	3.18 (0.08)	3.14 (0.04)	.006, .125	−0.48	.633

Table 3

Associations between Emotional Eating and Academic Factors: Multiple Linear Regression Analyses

	Emotional Eating			
	Coefficient	**SE**	**95% CI**	**p-value**
GPA	0.142	0.048	.016, .206	.022
Academic self-esteem	−0.144	0.007	−.336, −.060	.005
Academic worries	0.084	0.037	.006, .152	.035

Note: R^2= .028; All parameter estimates (coefficients) are adjusted for age, sex, and random effect of school. Age (p = .253), sex (p = .945) and school (p = .426) were not statistically significant.