Eating Disorders and Academic Performance Among College Students: Psychological, Nutritional, and Educational Health Perspectives

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Introduction

Although the prevalence of eating disorders (EDs) is usually less than 5% in the US and worldwide, the public health cost is considerable, with annual treatment estimates of $1,288 to $8,042 per patient, comparable to the cost of treating schizophrenia.[1, 2] Additionally, individuals with EDs have high mortality rates, the highest of which is seen among those with anorexia, who die primarily by suicide or complications from heart failure.[3]

Within the United States' college student population, there is a greater prevalence of individuals with ED symptoms ranging from 9-13% among females and 3-4% among male college students.[4] However, less than 20% of students who screen positive for EDs report receiving treatment and only 6% of students with disordered eating were asked about it by a health professional.[4, 5] Therefore, college students with EDs are a vulnerable population risking significant physical and psychological consequences if untreated, which may manifest itself through a variety of ways, including substance use and depression, but also possibly through academic performance (AP).

The pathway between EDs and poorer AP can partially be explained through the effect of malnutrition or poor nutrition on the brain. Malnutrition is correlated with cognitive and linguistic deficiencies which can greatly hamper academic success.[6] However, systematic reviews of the association between malnutrition and AP have neglected to consider individuals with EDs, greatly limiting the ability to understand that specific relationship.[7]

Additionally, there is a paucity of research exploring how EDs are associated with AP among college students, which is surprising given that there are a number of factors, including malnutrition or personality traits, that could be associated with academic performance.[8] However, since EDs can impair cognitive functioning and brain cortical volume, it is important to conduct population-based studies to better understand the potential relationship between EDs and AP and how treatment might influence that relationship.[9]

In what studies that do exist, research conducted in a small population of medical students (N=315) found 1.6% of participants self-reported experiencing an ED which impacted their AP, and 29.1% listed it as one of their most threatening health-related impediments to AP.[10] This study, however, did not address specifically how EDs were related to AP.

An economic study using a longitudinal sample of students to understand the connection between mental health and AP during college found that 8% of study participants screened positive for an ED.[11] The risk of dropping out from college was increased (though not significantly) for those who screened positive for an ED, but the impact of a positive ED screen did not necessarily impair AP while the student was in college. This study is also limited because its attention to EDs was a secondary aim and thus, all EDs were grouped together from a symptom-based screening tool that captured symptoms of both AN, BN, and binge-eating disorder (BED). This is problematic because AP could differ by type of ED.

To further illustrate the incomplete understanding of the linkage between EDs and AP, a multi-site international study examining over 2,000 women found that those with EDs were less educated than controls.[12] Additionally, the age of onset and the duration of the illness were associated with educational attainment, suggesting EDs could potentially impair educational achievement. However, this study did not control for depression which could explain some of the

association with educational attainment since it is known that depression is a significant predictor of lower grade point average and only included women, excluding the experience of men with EDs.[12]

Based on the paucity of research regarding EDs and specific measures of AP, there is a need for a more comprehensive study examining the association among college students. The purpose of this study is to investigate the association between EDs and AP in a large, nation-wide sample of college students. The study was guided by two hypotheses. First, we hypothesized that there would be a relationship between eating disorder status (either AN or BN self-reported diagnoses) and GPA. However, we also hypothesized that students who reported having undergone treatment for AN or BN might have higher GPAs than students without EDs. Although we expected differences between males and females for both hypotheses, owing to the preliminary nature of the study, no specific hypothesis was tested. Analyses controlled for key demographic and behavioral covariates including gender, sleep difficulties, and treatment or diagnosis of depression or substance use.

Materials and Methods

Data

The American College Health Association-National College Health Assessment (ACHA-NCHA) was used for this study, which is a nationally-representative survey.[13] For the purposes of this study, the Spring 2010 to Spring 2011 National College Health Assessment data was utilized. The participating institutions in this study include 2-year and 4-year postsecondary institutions who self-selected to participate in the Spring 2010, Fall 2010, and Spring 2011

ACHA-NCHA, respectively, totaling 95,712 (Spring, 2010), 30,093 (Fall, 2010) and 105,781 (Spring 2011) surveys completed by students (N=231,586). A total of 223,887 students provided complete information for eating disorder diagnoses and approximate GPA (a total of 7,699 students were lost when these criteria were applied). The ACHA-NCHA used mixed method data collection (paper and web) and reported three response rates: for the paper and web surveys, and the mean response proportion. The response rates for Spring 2010 were 85% (paper), 21% (web) with the mean response of 33%. Response rates were similar for the 2010-2011 academic year: Fall 2010 response rates were 81% (paper), 21% (web), and the mean response proportion was 28.5%; response rates for Spring 2011 were 78% (paper), 19% (web), and the mean response proportion was 30.9%. Both paper and web response rates individually or combined mirror other national surveys in higher education.[14]

Measures

Eating Disorder Diagnosis: The independent variables, anorexia (AN) and bulimia (BN) were assessed by the question separately: “Within the last 12 months, have you been diagnosed or treated by a professional for any of the following?” Response options were: *no*; *yes, diagnosed but not treated*; *yes, treated with medication*; *yes, treated with psychotherapy*; *yes, treated with medication and psychotherapy*; or *yes, other treatment*. Only one answer choice was allowed per disease/disorder.

Academic Performance: The dependent variable, academic performance (AP), was ascertained by the question: “What is your approximate cumulative grade average?”. Response options were categorical: *A, B, C, D/F*.

Covariates:

Demographic and behavioral covariates were controlled for due to their known correlation with ED diagnoses and academics. One significant covariate was *gender* since females are disproportionately affected by EDs and there is a known 'female advantage' in academics.[15] *Sleep difficulties in the last 12 months* was another covariate included since sleep difficulty has recently been shown to be correlated with both EDs and AP.[10, 16] *Depression* and *substance abuse* were also controlled for because they are often comorbid with EDs and have been shown to be associated with AP.[11] Depression and substance abuse were measured by the question: "Within the last 12 months have you been diagnosed or treated by a professional for any of the following" Answer choices for both depression and substance abuse were: *no; yes, diagnosed but not treated; yes, treated with medication; yes, treated with psychotherapy; yes, treated with medication and psychotherapy; or yes, other treatment*. Only one answer choice was allowed per disease/disorder.

Analysis:

Ordinal logistic regressions analyzed the association between those diagnosed with or treated for AN or BN in the last 12 months and approximate GPA. The referent group for all regressions were those not diagnosed with or treated for AN or BN in the past 12 months. Models were estimated both before (unadjusted) and after controlling for covariates (adjusted) for the entire sample and then stratified by gender. All analyses were conducted using SAS JMP® 12.0.

Results

Sample

The majority of respondents were female (n=143,673; 64.8%), white (n=161,766; 72.2%), and reported an A or B approximate GPA (n=191,284; 85.4%). Students were mostly young and normal weight although there was high variance on both age (22.36 ± 5.96) and BMI (24.24 ± 5.12). Less than 2% reported being diagnosed with or treated for either AN or BN in the past 12 months; the majority of those diagnosed reported receiving no treatment (n=651, 0.29%; n=647 0.28%). Less than 10% reported diagnosis of or treatment for depression within the last 12 months and less than 2% reported substance abuse or addiction diagnoses/treatment. Twenty-five percent (n = 55,758) indicated difficulty sleeping in the last 12 months. See **Table 1.**

Table 1. Sample Demographic and Clinical Characteristics

Characteristic	**Total N = 223,887**	
	N (%)[a]	**Mean ± SD**
Age		22.3 ± 6.0
Gender		
Male	77665 (35.0)	
Female	143673 (64.8)	
Transgender	462 (0.21)	
Race/ethnicity		
White, non-Hispanic	161766 (72.3)	
Black, non-Hispanic	13159 (5.9)	
Hispanic or Latino/a	19069 (8.5)	
Asian or Pacific Islander	27513 (12.3)	
American Indian, Alaskan Native, Native Hawaiian	4120 (1.8)	
Biracial or Multiracial	8482 (3.8)	
Other	5912 (2.6)	
BMI		24.2 ± 5.1
Approximate GPA		
A	87514 (39.2)	
B	103770 (46.3)	
C	25445 (11.4)	
D/F	1635 (0.7)	
Eating Disorder Diagnoses[b]		
Anorexia		
Diagnosed, not treated	651 (0.29)	
Treated w/medication	133 (0.06)	
Treated w/psychotherapy	598 (0.27)	
Treated w/medication & psychotherapy	375 (0.17)	
Other Treatment	255 (0.11)	
Bulimia		
Diagnosed, not treated	647 (0.29)	

Treated w/medication	189 (0.08)
Treated w/psychotherapy	559 (0.25)
Treated w/medication & psychotherapy	444 (0.20)
Other Treatment	172 (0.08)
Sleep Difficulties[c]	55758 (25)
Depression	
Diagnosed, not treated	3352 (1.5)
Treated w/medication	7327 (3.3)
Treated w/psychotherapy	3807 (1.7)
Treated w/medication & psychotherapy	6847 (3.1)
Other Treatment	727 (0.3)
Substance Abuse/Addiction	
Diagnosed, not treated	738 (0.33)
Treated w/medication	169 (0.08)
Treated w/psychotherapy	702 (0.31)
Treated w/medication & psychotherapy	252 (0.11)
Other Treatment	580 (0.26)

[a] Not all variables will add up to 100%
[b] Diagnosed/treated in last 12 months
[c] Sleep difficulties in last 12 months were difficult to handle

Regression Analyses

Table 2 provides results of the unadjusted and adjusted regression analyses, although only findings for the adjusted analyses are reported here. There was no evidence of multicollinearity and model assumptions were met.

Table 2. Ordinal logistic regression examining anorexia and bulimia as predictors of academic performance

	Unadjusted OR (95% CI)	Adjusted[a] OR (95% CI)	*p*
Anorexia Nervosa			
Yes, diagnosed but not treated	0.81 (0.70, 0.94)	0.91 (0.78, 1.05)	0.2043
Yes, treated w/medication	0.71 (0.54, 0.94)	0.85 (0.64, 1.13)	0.2606
Yes, treated w/psychotherapy	1.25 (1.07, 1.45)	1.10 (0.94, 1.28)	0.2347
Yes, treated w/medication & psychotherapy	1.58 (1.32, 1.90)	1.49 (1.24, 1.80)	<.0001**
Yes, other treatment	0.92 (0.75, 1.15)	0.99 (0.80, 1.23)	0.9302
Bulimia Nervosa			
Yes, diagnosed but not treated	0.93 (0.80, 1.07)	1.04 (0.89, 1.20)	0.6457
Yes, treated w/medication	0.73 (0.57, 0.94)	0.85 (0.66, 1.00)	0.2214
Yes, treated w/psychotherapy	1.23 (1.06, 1.44)	1.08 (0.92, 1.26)	0.3515

Yes, treated w/medication & psychotherapy	1.41 (1.19, 1.68)	1.35 (1.13, 1.61)	0.0009*
Yes, other treatment	0.69 (0.53, 0.88)	0.75 (0.58, 0.97)	0.0285*

[a] The adjusted model controls for gender; diagnosis/treatment of depression and substance abuse or addiction in the last 12 months; and sleep difficulties in the last 12 months
*p < .05
** p < .0001

Anorexia Diagnosis. All students (male and female students combined) diagnosed, but not treated did not have significant difference in GPA compared to students not diagnosed with AN (p = 0.20). When students with AN were treated with either medication, psychotherapy, or 'other treatment,' their GPAs were still not significantly different (p = 0.26; p = 0.23; p = 0.93). However, those students with AN and treated with medication and psychotherapy were 1.49 (95% CI 1.24, 1.80) times more likely to report a higher GPA than those not diagnosed with AN (p<.0001).

Bulimia Diagnosis. All students (male and female students combined) diagnosed, but not treated did not have significant difference in GPA compared to students not diagnosed with BN (p = 0.65). When students with BN were treated with either medication or psychotherapy their GPAs were still not significantly different (p = 0.22; p = 0.35). However, those diagnosed with BN and treated with both psychotherapy and medication were also significantly more likely to report a higher GPA than those not diagnosed with BN (OR=1.36, 95% CI 1.11, 1.67, p=0.004). However, those with BN who received "other treatment" had a 25% reduced chance of having a high GPA (95% CI: 0.58, 0.97; p=.029).

When stratified by gender (see **Table 3**), there were significant differences between males and females for both the association between AN and BN and GPA (p<.0001). Overall, women with both AN (OR = 1.55; 95% CI: 1.26, 1.92) and BN (OR = 1.44; 95% CI = 1.18, 1.75) have significantly higher GPAs with a combination of medication and psychotherapy;

whereas men have significantly higher GPAs associated with no treatment or other treatment for BN (OR = 2.00; 95% CI: 1.12, 3.60). However, females with BN treated with 'other treatment reported a 26% (OR = 0.64; 95% CI: 0.47, 0.87) lower GPA compared with students not diagnosed with BN.

Table 3. Ordinal logistic regression examining anorexia and bulimia as predictors of academic performance adjusting for covariates, by gender

	Female OR (95% CI)	**Male OR (95% CI)**	***p***
Anorexia Nervosa			<.0001**
Yes, diagnosed but not treated	0.79 (0.66, 0.94)	1.38 (0.99, 1.93)	
Yes, treated w/medication	1.14 (0.77, 1.69)	0.75 (0.47, 1.19)	
Yes, treated w/psychotherapy	1.03 (0.87, 1.23)	0.96 (0.64, 1.45)	
Yes, treated w/medication & psychotherapy	1.55 (1.26, 1.92)	0.70 (0.42, 1.19)	
Yes, other treatment	0.92 (0.75, 1.15)	1.39 (0.81, 2.38)	
Bulimia Nervosa			<.0001**
Yes, diagnosed but not treated	0.97 (0.82, 1.16)	1.22 (0.88, 1.71)	
Yes, treated w/medication	0.99 (0.71, 1.39)	0.68 (0.44, 1.06)	
Yes, treated w/psychotherapy	1.11 (0.93, 1.33)	0.74 (0.49, 1.13)	
Yes, treated w/medication & psychotherapy	1.44 (1.18, 1.75)	0.80 (0.49, 1.29)	
Yes, other treatment	0.64 (0.47, 0.87)	2.00 (1.12, 3.60)	

*p < .05
** p < .0001

Comment:

Our first hypothesis confirmed that those with diagnosed, but untreated AN or BN did not report significantly higher GPAs than students not diagnosed with AN or BN. Our second hypothesis was also supported that students with AN or BN who had received medication or psychotherapy for their disease, had significantly higher GPAs than students not diagnosed with those conditions. However, when the analysis was stratified by gender, the hypothesis was supported only for female students: females with AN or BN who received treatment, but only

medication and psychotherapy, achieved significantly higher GPAs compared to students not diagnosed with AN or BN.

Based on these findings, we offer the following explanations. First, findings suggest not all treatment is equal. Prior research has demonstrated that combining psychotherapy and medication-assisted treatment produce the best *health* outcomes for AN and BN, but it was unknown how those results translated into other important aspects of life, like AP.[17] Results from this study suggest there are multiple ancillary benefits to combined therapies that produce positive *academic* outcomes as well and indicate the need for multi-modal treatment to address EDs and their consequences. Our findings with a considerably larger sample size, greater power, and more specific indicators of AP, also differ from the findings by Maxwell et al. which suggested that women with EDs are less educated than controls.[12]

Second, the finding of reduced AP among females with BN who received "other treatment" supports the need for traditional treatments, such as psychotherapy or medication or a combined approach. Conversely, males in this sample with BN reported significantly higher GPAs with "other" treatments. Although findings for males should be interpreted cautiously owing to fewer males who reported a BN diagnosis in the sample (0.45% for a BN diagnosis with no or any treatment), one possible explanation for this finding may be that current treatments for EDs are still focused primarily on women and men may feel treatment is incongruent with their experience.[18]

We are limited in not being able to ascertain what other treatment(s) males might have sought for BN that benefitted their AP. Nevertheless, it is clear "other" treatments did not result in significantly increased AP in the full sample. The number of students diagnosed but not receiving treatment for AN or BN (combined N = 1,353; 0.6%) raises concerns; however, this

study showed a higher percentage of students with EDs seeking treatment than previous estimates (67% compared with less than 20%).[4]

Limitations

Since colleges self-select to participate in the ACHA, we cannot exclude potential selection bias from this study. In addition, this study utilized self-report data, which could also introduce recall bias, social-desirability bias, and non-response bias. Study findings cannot be generalized to non-college populations, nor can results be interpreted as causal, owing to the cross-sectional study design. We are also limited to the questions asked and information collected by the ACHA in our analyses. For example, the survey does not ask students to report what type of medications or psychotherapy were used for their treatment. However, since depression was controlled for in the analyses, it is unlikely that medication to treat comorbid depression could have influenced GPA. Additionally, there should be some caution exerted in interpreting the data due to the relatively small number of students reporting an ED in a large data set. Lastly, although this study considers AN and BN in association with academic performance, we were limited to those diagnoses surveyed by the questionnaire and do not have information on binge-eating disorder (BED) or Other Specified Feeding or Eating Disorder (OSFED).

Conclusion

This study extends the extant literature on college students with eating disorders and suggests treating students may be correlated with academic performance. Although perfectionism tracks with EDs, our findings suggest females with either AN or BN did not report significantly higher GPAs unless they received both psychotherapy and medication, even when

controlling for important confounders. However, separate analyses by gender suggest females with both disorders followed the same trend of a higher GPAs with a combination of medication and psychotherapy, but men had higher GPAs associated with no or other treatment.

The 21st Century Cures Act was passed in December 2016 and is the first legislation to directly address EDs' insurance coverage.[19] This study provides further evidence of the importance of ED treatment by demonstrating links with AP, another indicator of life success. Thus, increasing recognition of the need to treating college students with EDs may not only improve medical and psychological outcomes, but also academic performance. Colleges are intended to help students achieve their full potential and addressing medical barriers to AP, such as EDs, is part and parcel of that mission. Due to the small number of students seeking treatment, colleges also need to have a better way to link students with effective ED treatments.

These findings also lend greater support to Wilfley et al.'s proposed model for identifying and treating EDs at a population-level in colleges to both improve student well-being and achievement potential.[20] This model relies on committed involvement of college counseling centers and stakeholders to help implement several interventions: a) an online screening and early-identification program with in-person follow-up/evaluation; b) tailored, evidence-based interventions online or in person with a stepped-care approach; c) ongoing symptom monitoring; and d) community culture and policy interventions to improve cultural and environmental norms in colleges. This allows for both evidence-based psychotherapy interventions as well as in-person care possibly with medication and psychotherapy depending on need.

From a therapeutic stance, this study may also provide additional motivation to students with EDs to seek or continue treatment from their diseases. With the connection between perfectionism and EDs like AN and BN,[8] it is likely that some students with EDs might be

motivated to recover if they knew that their academic performance might also benefit from that recovery. However, this study is based on cross-sectional data, so longitudinal studies will be needed to confirm that association.

As the evidence base continues to emerge on the most effective treatments for EDs, additional research will also be needed to determine whether these treatments translate into improvements in other outcomes, such as academic success. This study indicates that a combination of medication and psychotherapy could potentially improve academic performance among students with eating disorders; however, linking students with these effective treatments remains a challenge.

Conflict of Interest:
No authors have a conflict of interest to declare.

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