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The Relationship between Body Composition, Stress, and Academic Performance in First-Semester College Students

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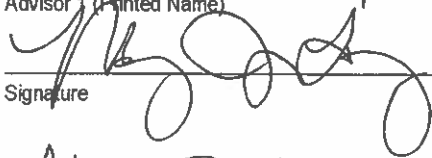
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Title of Honors Project - (10 words or less)

The Relationship between Body Composition, Stress, and Academic Performance in First-Semester College Students
Approval of Honors Project *Final Grade of Project:* A

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Thanks!

Josie, Dr. Ludy, and Dr. Braden

**THE RELATIONSHIP BETWEEN BODY COMPOSITION, STRESS,
AND ACADEMIC PERFORMANCE IN FIRST-SEMESTER COLLEGE STUDENTS**

JOSIE A. MANSPERGER

HONORS PROJECT

**Submitted to the Honors College
at Bowling Green State University in partial fulfillment of the
requirements for graduation with**

**UNIVERSITY HONORS
May 2017**

Mary-Jon Ludy, Public and Allied Health, Advisor

Abby Braden, Psychology, Advisor

ABSTRACT

Background. Students often experience undesirable body composition changes, as well as previously unknown stressors, during the transition to college. This study characterizes the relationship between body composition, stress, and academic performance in the first semester of college.

Methods. At the beginning and end of their first semester, 54 students (59.2% female) completed in-person weight and fat assessment (bioelectrical impedance analysis), as well as online stress assessment (“academic stress” via the Inventory of College Students’ Recent Life Experiences, ICSRLE, and “perceived stress” via the Perceived Stress Scale, PSS). Grade point average (GPA) was obtained from the registrar. Paired t-tests were used to determine if changes occurred from the beginning to end of semester. Pearson correlation coefficients were used to identify associations between variables.

Results. Increases in weight (2.5 ± 6.2 lbs), fat ($1.4 \pm 2.4\%$), and academic stress were noted in all students, while perceived stress increased in females only ($p < .05$ for all). GPA was negatively associated with change in academic stress in all students (academic stress Δ = ICSRLE post–pre; $r = -.325$, $p < .05$), meaning conflict with professors or dissatisfaction with school was related to lower grades. Changes in weight and perceived stress were positively associated in females only (perceived stress Δ = PSS post–pre; $r = .419$, $p < .05$), meaning that greater weight gain was related to feelings of lacking control in life events.

Conclusions. Undesirable increases in weight and fat were noted in all first-semester college students, whereas stress increased more in females. Targeted interventions related to stress reduction and weight maintenance are warranted for optimal health and academic performance in college.

INTRODUCTION

Many students try to handle multiple events simultaneously during their college career (1); for example, courses, part-time jobs, student organizations, and volunteering. Dealing with many events at once has been associated with anxiety, depression, and stress (2). Previous research indicates that stress can have a harmful effect on students' grade point average (GPA), emotions, and well-being (2-4). During Fall 2016, the Health, Wellness, and You Learning Community at Bowling Green State University (BGSU) looked at first-year students' perceived stress, academic stress, and its effect on their GPA scores. This included 54 participants (59.2% female) who were aged 18.2 ± 0.4 years with GPA scores of 3.1 ± 0.8 . The results revealed that perceived stress, refer to Table 3, increased among females ($p=0.019$) and academic stress, refer to Table 2, increased among all students ($p=0.015$) during their first semester of college. GPA was negatively associated with change in academic stress ($r=-0.325$, $p=0.016$), meaning that as academic stress increased, GPA decreased (and vice versa), refer to Table 1.

Based on increased academic and perceived stress, as well as the relationship between stress and GPA, implementation of stress-reducing interventions throughout campus are needed. Previous studies have shown that exercises, such as writing about stressful events and debriefing about traumatic events have increased students' GPA (5-7). Other de-stressing activities such as the use of adult coloring (8), mindfulness (9), or interacting with therapy dogs (10-11) are beneficial in reducing stress levels and are appealing to college students.

METHODS

Body Composition. Body composition was measured using a bioelectrical impedance scale factoring in participants' height, weight, and % body fat. Height was measured to the nearest 0.1 cm using a stadiometer with participants in bare feet (Hopkins Road Rod Portable Stadiometer, Hopkins Medical Products, Baltimore, MD). Body weight and fat mass were measured to the nearest 0.1 kg and 0.1%, respectively, on a bioelectrical impedance analysis (InBody 270 Body Composition Analyzer, InBody USA, Cerritos, CA).

Academic Stress. Academic stress was assessed using the Inventory of College Students Recent Life Experiences (ICSRLE). This questionnaire was comprised of 49 academic-related questions. Questions were ranked on a scale of 1 to 4 and total points for the 49 questions were calculated. Scores could range from 49 (least academic stress) to 196 (most academic stress). Refer to Appendix 1.

Perceived Stress. Perceived stress was assessed using the Perceived Stress Scale (PSS). This questionnaire was comprised of 10 stress-related questions that pertain to real life situations. Questions were ranked on a scale of 1 to 4 and total points for the 10 questions were calculated. Scores could range from 0 to 40 with 0-13 being low perceived stress, 14-26 being moderate perceived stress, and 27-40 being high perceived stress. Refer to Appendix 2.

Academic Performance. Academic performance was assessed by obtaining first-semester grade point average (GPA) from the university registrar.

Statistical Analysis. Paired t-test were used to identify differences between beginning (August/September) and end (November/December) values. Pearson correlation coefficients were used to identify associations between variables. P-values less than 0.05 were considered statistically significant. IBM SPSS Statistics (Armonk, NY) was used for analysis.

RESULTS

Increases in weight, fat, and academic stress were noted in all students, while increases in perceived stress occurred only in females ($p < 0.05$ for all). GPA was negatively associated with change in academic stress in all students, meaning that lower academic performance was related to increased academic stress (e.g., conflict with professors/peers, inadequate leisure time, inability to meet academic standards, and/or dissatisfaction with school; $p < 0.05$). Changes in weight and perceived stress were positively associated in females only, meaning that greater weight gain was related to greater perceived stress (e.g., unexpected incidents, inability to overcome difficulties piling up, and/or feelings of lacking control in life events; $p < 0.05$).

Body Composition. Weight increased significantly among males during their first semester of college (4.5 ± 7.5 lbs, $p = 0.013$), however, the weight change in females was not significant (1.1 ± 4.7 lbs, $p = 0.191$). Body fat increased significantly in both males and females (1.4 ± 2.4 % fat, $p < 0.001$), as shown in Table 1.

Table 1. Changes in Body Composition and Stress in the First College Semester

	All Aug/Sept	All Nov/Dec	p- value	Male Aug/Sept	Male Nov/Dec	p- value	Female Aug/Sept	Female Nov/Dec	p- value
Weight (lbs)	170.6 \pm 52.4	173.1 \pm 53.0	0.005	184.1 \pm 53.3	188.5 \pm 53.1	0.013	161.1 \pm 50.5	162.2 \pm 50.9	0.191
Fat (%)	25.9 \pm 12.1	27.3 \pm 12.0	<0.001	17.6 \pm 9.6	19.5 \pm 10.2	0.008	31.7 \pm 10.2	32.7 \pm 10.2	0.006
Academic Stress[‡]	83.9 \pm 21.7	91.7 \pm 27.5	0.015	75.2 \pm 17.3	77.0 \pm 21.0	0.602	89.9 \pm 22.7	101.9 \pm 27.1	0.015
Perceived Stress[‡]	20.1 \pm 4.9	21.6 \pm 5.7	0.072	18.5 \pm 3.9	18.8 \pm 5.8	0.837	21.1 \pm 5.3	23.6 \pm 4.8	0.019

[‡] Academic stress was assessed using the ICSRLE. Scores ranged from 49 (minimum) to 196 (maximum).

[‡] Perceived stress was assessed using the PSS. Scores ranged from 0 (minimum) to 40 (maximum).

Significant differences between Aug/Sept and Nov/Dec are bolded.

Academic Stress. Mean ICSRLE responses ranged from 1.0 to 3.0, which is consistent with academic stress that is “not at all part of my [the students’] life” to “distinctly part of my [the students’] life.” ICSRLE responses for all students, males, and females are shown in Table 2. Academic stress was significantly associated with GPA (academic stress Δ = ICSRLE post–pre; $r = -0.325$, $p = 0.016$).

Male. The top sources of academic stress at the beginning of the first semester were: important decisions about your future career (2.5 ± 1.1), too many things to do at once (2.1 ± 1.1), and loneliness (2.1 ± 1.1). At the end of the first semester, the top sources of academic stress were: too many things to do at once (2.4 ± 0.9), a lot of responsibilities (2.4 ± 0.9), and important decisions about your future career (2.3 ± 0.9). Responses to 3 of 49 ICSRLE questions demonstrated significant increases contributing to academic stress. These include: lower grades than you hoped for ($p = 0.004$), finding course(s) uninteresting ($p = 0.009$), and dissatisfaction with school ($p = 0.042$).

Female. The top sources of academic stress at the beginning of the first semester were: a lot of responsibilities (2.9 ± 0.9), separation from people you care about (2.8 ± 1.0), and too many things to do at once (2.7 ± 0.9). At the end of the first semester, the top sources of academic stress were: a lot of responsibilities (3.0 ± 0.8), too many things to do at once (3.0 ± 0.8), and important decision about your future career (2.9 ± 0.9). Responses to 14 of 49 ICSRLE questions demonstrated significant increases contributing to academic stress. The top three were: lower grades than you hoped for ($p < 0.001$), dissatisfaction with school ($p = 0.002$), and important decisions about your future career ($p = 0.014$). See Table 2 for full description of differences.

Table 2. Changes in Academic Stress in the First College Semester

	All Aug/ Sept	All Nov/ Dec	p- value	Male Aug/ Sept	Male Nov/ Dec	p- value	Female Aug/ Sept	Female Nov/ Dec	p- value
1. Conflicts with boyfriend's/girlfriend's/spouse's family	1.5±0.8	1.5±0.7	0.888	1.3±0.8	1.3±0.5	0.803	1.6±0.9	1.6±0.8	0.564
2. Being let down or disappointed by friends	1.8±0.8	1.9±0.8	0.542	1.6±0.7	1.5±0.6	0.266	2.0±0.9	2.2±0.7	0.050
3. Conflict with professor(s)/ instructor(s)	1.2±0.4	1.4±0.7	0.022	1.2±0.4	1.2±0.4	1.000	1.2±0.4	1.6±0.8	0.879
4. Social rejections	1.8±0.9	1.7±0.8	0.401	1.6±0.7	1.5±0.7	0.648	1.9±1.0	1.8±0.8	0.361
5. Too many things to do at once	2.5±1.0	2.8±0.9	0.048	2.1±1.1	2.4±0.9	0.283	2.7±0.9	3.0±0.8	0.077
6. Being taken for granted	1.9±1.1	2.0±1.0	0.458	1.6±0.7	1.5±0.9	0.628	2.1±1.2	2.3±1.0	0.338
7. Financial conflicts with family members	1.6±0.9	1.8±0.9	0.079	1.3±0.5	1.5±0.8	0.137	1.8±1.1	2.0±1.0	0.018
8. Having your trust betrayed by a friend	1.4±0.8	1.7±0.8	0.103	1.2±0.5	1.2±0.4	0.715	1.6±0.9	2.0±0.9	0.378
9. Separation from people you care about	2.4±1.1	2.5±1.1	0.718	1.9±1.0	1.9±1.0	0.833	2.8±1.0	2.9±0.9	0.638
10. Having your contributions overlooked	1.6±0.9	2.0±1.0	0.026	1.5±0.7	1.6±0.7	0.480	1.8±1.0	2.3±1.0	0.129
11. Struggling to meet your own academic standards	2.2±0.9	2.5±1.0	0.025	2.0±0.8	2.2±1.0	0.406	2.3±1.0	2.8±0.9	0.118
12. Being taken advantage of	1.6±0.9	1.8±0.9	0.219	1.4±0.6	1.4±0.7	0.747	1.7±1.0	2.0±1.0	0.442
13. Not enough leisure time	1.8±0.8	2.2±0.9	0.007	1.6±0.8	1.8±0.9	0.257	1.9±0.8	2.4±0.8	0.033
14. Struggling to meet the academic standards of others	1.8±1.0	2.2±1.1	0.019	1.7±1.0	1.9±1.1	0.478	1.9±1.0	2.5±1.0	0.119
15. A lot of responsibilities	2.6±1.0	2.8±0.9	0.139	2.1±0.9	2.4±0.9	0.162	2.9±0.9	3.0±0.8	0.021
16. Dissatisfaction with school	1.5±0.7	2.1±1.0	<0.001	1.6±0.7	2.0±1.0	0.042	1.4±0.7	2.1±1.1	0.002
17. Decisions about intimate relationship(s)	1.9±1.2	1.9±1.0	1.000	1.5±0.9	1.6±0.8	0.747	2.2±1.3	2.1±1.1	0.420
18. Not enough time to meet your obligations	2.0±0.9	2.1±0.8	0.185	1.7±0.7	1.9±0.8	0.096	2.2±0.9	2.3±0.8	0.010
19. Dissatisfaction with your mathematical ability	1.9±1.2	2.1±1.2	0.109	1.6±1.0	1.7±1.0	0.840	2.0±1.3	2.4±1.3	0.645
20. Important decisions about your future career	2.5±1.1	2.7±1.0	0.200	2.5±1.1	2.3±0.9	0.110	2.4±1.1	2.9±0.9	0.014
21. Financial burdens	2.4±1.1	2.3±1.1	0.560	1.9±0.9	2.0±1.1	0.493	2.7±1.1	2.5±1.1	0.141
22. Dissatisfaction with your reading ability	1.5±0.8	1.3±0.5	0.060	1.4±0.5	1.3±0.5	0.162	1.6±1.0	1.3±0.6	0.028
23. Important decisions about your education	2.2±1.1	2.2±0.9	0.666	2.0±1.0	1.9±0.8	0.526	2.3±1.1	2.4±0.9	0.206
24. Loneliness	2.2±1.1	2.1±1.1	0.811	2.1±1.1	1.7±0.9	0.072	2.2±1.1	2.4±1.1	0.007
25. Lower grades than you hoped for	1.5±0.6	2.3±1.0	<0.001	1.4±0.5	2.1±0.9	0.004	1.7±0.7	2.5±1.1	<0.001
26. Conflict with teaching assistant(s)	1.2±0.4	1.2±0.5	0.518	1.0±0.2	1.1±0.3	0.576	1.2±0.5	1.3±0.6	0.243
27. Not enough time for sleep	2.1±1.1	2.3±1.0	0.237	2.0±1.0	1.8±0.6	0.204	2.2±1.1	2.7±1.1	0.032
28. Conflicts with your family	1.4±0.7	1.6±0.9	0.086	1.4±0.7	1.4±0.7	0.748	1.5±0.8	1.8±1.0	0.455
29. Heavy demands from extracurricular activities	1.7±1.0	1.7±0.9	0.780	1.5±0.9	1.4±0.7	0.771	1.8±1.0	1.9±1.0	0.501
30. Finding courses too demanding	1.8±0.8	2.0±0.8	0.041	1.6±0.8	1.7±0.8	0.789	1.9±0.8	2.3±0.7	0.557
31. Conflicts with friends	1.4±0.7	1.8±0.8	0.001	1.2±0.4	1.3±0.5	0.267	1.6±0.8	2.2±0.9	0.054
32. Hard effort to get ahead	2.0±0.8	2.3±1.1	0.128	1.9±0.7	2.0±0.9	0.815	2.1±0.9	2.5±1.2	0.572
33. Poor health of a friend	1.1±0.3	1.4±0.8	0.015	1.1±0.3	1.1±0.4	0.329	1.1±0.3	1.5±0.9	0.113
34. Disliking your studies	1.6±0.6	1.8±0.9	0.117	1.5±0.5	1.6±0.7	0.576	1.6±0.7	1.9±1.0	0.269
35. Getting "ripped off" or cheated in the purchase of services	1.3±0.5	1.3±0.7	0.485	1.3±0.6	1.1±0.4	0.267	1.3±0.5	1.5±0.8	0.054
36. Social conflicts over smoking	1.2±0.5	1.2±0.6	0.470	1.2±0.7	1.1±0.5	0.576	1.1±0.4	1.3±0.7	0.245
37. Difficulties with transportation	1.4±0.6	1.5±0.7	0.606	1.5±0.7	1.4±0.6	0.715	1.4±0.6	1.5±0.8	0.395
38. Disliking fellow student(s)	1.5±0.8	1.6±0.8	0.335	1.2±0.5	1.3±0.5	0.329	1.7±0.9	1.8±0.9	0.096
39. Conflicts with boyfriend/ girlfriend/ spouse	1.3±0.7	1.5±0.9	0.067	1.1±0.4	1.3±0.7	0.162	1.4±0.9	1.6±1.0	0.021
40. Dissatisfaction with your ability at written expression	1.4±0.7	1.5±0.9	0.266	1.4±0.5	1.5±0.7	0.540	1.4±0.8	1.6±0.9	0.238
41. Interruptions of your school work	1.8±0.8	2.1±0.9	0.096	1.7±0.6	1.9±0.9	0.505	1.9±0.8	2.2±0.9	0.165
42. Social isolation	1.6±1.0	1.7±0.8	0.569	1.7±0.8	1.7±0.8	1.000	1.6±1.0	1.7±0.8	1.000
43. Long waits to get service (e.g., at banks or stores)	1.6±0.9	1.4±0.6	0.008	1.4±0.6	1.3±0.5	0.493	1.8±1.0	1.4±0.7	0.161
44. Being ignored	1.6±0.8	1.8±0.8	0.109	1.5±0.7	1.5±0.6	0.748	1.6±0.9	2.0±0.9	0.488
45. Dissatisfaction with your physical appearance	2.2±1.1	2.4±1.1	0.085	1.7±0.9	2.1±1.1	0.119	2.5±1.1	2.7±1.1	0.016
46. Finding course(s) uninteresting	1.7±0.7	2.0±0.9	0.004	1.5±0.5	1.9±0.9	0.009	1.8±0.8	2.1±0.9	0.001
47. Gossip concerning someone you care about	1.3±0.8	1.5±0.8	0.074	1.0±0.2	1.1±0.4	0.329	1.5±0.9	1.8±1.0	0.110
48. Failing to get expected job	1.4±0.8	1.3±0.8	0.784	1.2±0.4	1.3±0.7	0.329	1.5±0.9	1.3±0.8	0.077
49. Dissatisfaction with your athletic skills	1.5±0.7	1.7±1.0	0.052	1.2±0.4	1.3±0.6	0.576	1.7±0.8	2.0±1.1	0.255

Significant differences between Aug/Sept and Nov/Dec are bolded.

Perceived Stress. Mean PSS responses ranged from 1.2 to 3.0, which is consistent with perceived stress that is “almost never” to “fairly often.” ICSRLE responses for all students, males, and females are shown in Table 3. Increases in perceived stress was significantly associated with change in body fat (perceived stress Δ = PSS post–pre; $r=0.354$, $p=0.013$).

Male. The top sources of perceived stress at the beginning of the first semester were: not being able to control irritations in your life (1.3 ± 0.5), feelings of not being on top of things (1.2 ± 0.5), and not being confident about your ability to handle your personal problems (1.6 ± 0.7). At the end of the first semester, the top sources of perceived stress were: feelings of not being on top of things (1.2 ± 0.4), not being confident about your ability to handle your personal problems (1.5 ± 0.7), and not being able to control irritations in your life (1.5 ± 0.8). Responses to 1 of 10 PSS questions demonstrated significant increases contributing to academic stress. This was: upset because of something that happened unexpectedly ($p=0.803$).

Female. The top sources of perceived stress at the beginning of the first semester were: feeling nervous and stressed (1.2 ± 0.4), not being able to control irritations in your life (1.8 ± 1.1), and feelings of not being on top of things (1.6 ± 0.9). At the end of the first semester, the top sources of perceived stress were: feeling that things were not going your way (3.0 ± 0.8), angered because of things that happened that were outside of your control (2.9 ± 0.9), and could not cope with all of the things you had to do (2.3 ± 1.0). Responses to 6 of 10 PSS questions demonstrated significant increases contributing to perceived stress. The top three were: unable to control the important things in your life ($p=0.005$), felt difficulties were piling up so high that you could not overcome them ($p=0.007$), and upset because of something that happened unexpectedly ($p=0.014$). See Table 3 for full description of differences.

Table 3. Changes in Perceived Stress in First College Semester

	All Aug/ Sept	All Nov/ Dec	p- value	Male Aug/ Sept	Male Nov/ Dec	p- value	Female Aug/ Sept	Female Nov/ Dec	p- value
1. Upset because of something that happened unexpectedly?	1.5 \pm 0.8	1.5 \pm 0.7	0.888	1.3 \pm 0.8	1.3 \pm 0.5	0.803	1.6 \pm 0.9	1.6 \pm 0.8	0.564
2. Unable to control the important things in your life?	1.8 \pm 0.8	1.9 \pm 0.8	0.542	1.6 \pm 0.7	1.5 \pm 0.6	0.266	2.0 \pm 0.9	2.2 \pm 0.7	0.050
3. Felt nervous and stressed?	1.2 \pm 0.4	1.4 \pm 0.7	0.022	1.2 \pm 0.4	1.2 \pm 0.4	1.000	1.2 \pm 0.4	1.6 \pm 0.8	0.879
4. (NOT) confident about your ability to handle your personal problems?	1.8 \pm 0.9	1.7 \pm 0.8	0.401	1.6 \pm 0.7	1.5 \pm 0.7	0.648	1.9 \pm 1.0	1.8 \pm 0.8	0.361
5. Felt that things were (NOT) going your way?	2.5 \pm 1.0	2.8 \pm 0.9	0.048	2.1 \pm 1.1	2.4 \pm 0.9	0.283	2.7 \pm 0.9	3.0 \pm 0.8	0.077
6. Could not cope with all the things that you had to do?	1.9 \pm 1.1	2.0 \pm 1.0	0.458	1.6 \pm 0.7	1.5 \pm 0.9	0.628	2.1 \pm 1.2	2.3 \pm 1.0	0.338
7. (NOT) able to control irritations in your life?	1.6 \pm 0.9	1.8 \pm 0.9	0.079	1.3 \pm 0.5	1.5 \pm 0.8	0.137	1.8 \pm 1.1	2.0 \pm 1.0	0.018
8. Felt that you were (NOT) on top of things?	1.4 \pm 0.8	1.7 \pm 0.8	0.103	1.2 \pm 0.5	1.2 \pm 0.4	0.715	1.6 \pm 0.9	2.0 \pm 0.9	0.378
9. Angered because of things that happened that were outside of your control?	2.4 \pm 1.1	2.5 \pm 1.1	0.718	1.9 \pm 1.0	1.9 \pm 1.0	0.833	2.8 \pm 1.0	2.9 \pm 0.9	0.638
10. Felt difficulties were piling up so high that you could not overcome them?	1.6 \pm 0.9	2.0 \pm 1.0	0.026	1.5 \pm 0.7	1.6 \pm 0.7	0.480	1.8 \pm 1.0	2.3 \pm 1.0	0.129

Significant differences between Aug/Sept and Nov/Dec are bolded.

DISCUSSION

Based on increased academic and perceived stress, as well as the relationship between stress and GPA, implementation of stress-reducing interventions throughout campus are needed. Females are the main target population for this intervention due to having responses to 14 of 49 ICSRLE questions that demonstrated significant increases contributing to academic stress and having 6 of 10 PSS questions that demonstrated significant increases contributing to perceived stress. The first-year female population at BGSU is highly stressed and it is negatively affecting their GPA scores. Top academic stressors that need to be addressed in the intervention include but are not limited to: lower grades than you hoped for, dissatisfaction with school, and important decisions about your future career. Top perceived stressors that need to be addressed in the intervention include but are not limited to: unable to control the important things in your life, felt difficulties were piling up so high that you could not overcome them, and upset because of something that happened unexpectedly. These academic and perceived stressors can be addressed and combatted with tutoring help, academic advisors, counseling center help, and implementation of introduction courses for first-year students geared towards time management, emotional well-being, and career planning. Other de-stressing activities such as coloring (8), mindfulness (9), or therapy dogs (10-11) may provide benefit. Implementation of these exercises could improve students' GPA and overall drop the stress level of first-year students at BGSU.

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Appendix 1. Inventory of College Students' Recent Life Experiences (ICSRLE, 12). This instrument measures academic stress level using a series of 49 life-related events. Scores range from 49 (least academic stress) to 196 (most academic stress).

Following is a list of experiences which many students have some time or other.

Please indicate for each experience how much it has been a part of your life since coming to BGSU this fall.

For each question choose from the following alternatives:

- Not at all part of my life (score = 1)
- Only slightly part of my life (score = 2)
- Distinctly part of my life (score = 3)
- Very much part of my life (score = 4)

- | | |
|--|---|
| 1. Conflicts with boyfriend's/girlfriend's/spouse's family | 26. Conflict with teaching assistant(s) |
| 2. Being let down or disappointed by friends | 27. Not enough time for sleep |
| 3. Conflict with professor(s) instructor(s) | 28. Conflicts with your family |
| 4. Social rejections | 29. Heavy demands from extracurricular activities |
| 5. Too many things to do at once | 30. Finding courses too demanding |
| 6. Being taken for granted | 31. Conflicts with friends |
| 7. Financial conflicts with family members | 32. Hard effort to get ahead |
| 8. Having your trust betrayed by a friend | 33. Poor health of a friend |
| 9. Separation from people you care about | 34. Disliking your studies |
| 10. Having your contributions overlooked | 35. Getting "ripped off" or cheated in the purchase of services |
| 11. Struggling to meet your own academic standards | 36. Social conflicts over smoking |
| 12. Being taken advantage of | 37. Difficulties with transportation |
| 13. Not enough leisure time | 38. Disliking fellow student(s) |
| 14. Struggling to meet the academic standards of others | 39. Conflicts with boyfriend/girlfriend/spouse |
| 15. A lot of responsibilities | 40. Dissatisfaction with your ability at written expression |
| 16. Dissatisfaction with school | 41. Interruptions of your school work |
| 17. Decisions about intimate relationship(s) | 42. Social isolation |
| 18. Not enough time to meet your obligations | 43. Long waits to get service (e.g., at banks or stores) |
| 19. Dissatisfaction with your mathematical ability | 44. Being ignored |
| 20. Important decisions about your future career | 45. Dissatisfaction with your physical appearance |
| 21. Financial burdens | 46. Finding course(s) uninteresting |
| 22. Dissatisfaction with your reading ability | 47. Gossip concerning someone you care about |
| 23. Important decisions about your education | 48. Failing to get expected job |
| 24. Loneliness | 49. Dissatisfaction with your athletic skills |
| 25. Lower grades than you hoped for | |

Appendix 2. Perceived Stress Scale (PSS, 13). This instrument measures perceived stress level using a series of 10 stress-related questions that pertain to real-life situations. Scores range from 0 to 40 with 0-13 being low perceived stress, 14-26 being moderate perceived stress, and 27-40 being high perceived stress.

The questions in this scale ask you about your feelings and thoughts since coming to BGSU this fall. In each case, you will be asked to indicate how often you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate questions. The best approach is to answer fairly quickly. That is, don't try to count up the number of times you felt a particular way; rather indicate the alternative that seems like a reasonable estimate.

For each question choose from the following alternatives:

- Never (score = 0 or 4, depending on prompt)
- Almost never (score = 1 or 3, depending on prompt)
- Sometimes (score = 2)
- Fairly often (score = 3 or 1, depending on prompt)
- Very often (score = 4 or 0, depending on prompt)

Since coming to BGSU this fall, how often have you:

1. Been upset because of something that happened unexpectedly?
2. Felt that you were unable to control the important things in your life?
3. Felt nervous and stressed?
4. Felt confident about your ability to handle your personal problems?
5. Felt that things were going your way?
6. Found that you could not cope with all the things that you had to do?
7. Been able to control irritations in your life?
8. Felt that you were on top of things?
9. Been angered because of things that happened that were outside of your control?
10. Felt difficulties were piling up so high that you could not overcome them?

The Relationship between Body Composition, Stress, and Academic Performance in First-Semester College Students



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Abstract

Background: Students often experience undesirable body composition changes, as well as previously unknown stressors, during the transition to college. This study characterizes the relationship between body composition, stress, and academic performance in the first semester of college.

Methods: At the beginning and end of their first semester, 54 students (59.2% female) completed in-person weight and fat assessment (bioelectrical impedance analysis), as well as online stress assessment ("academic stress" via the Inventory of College Students' Recent Life Experiences, ICSRLE, and "perceived stress" via the Perceived Stress Scale, PSS). Grade point average (GPA) was obtained from the registrar. Paired t-tests were used to determine if changes occurred from the beginning to end of semester. Pearson correlation coefficients were used to identify associations between variables.

Results: Increases in weight (2.5±6.2lbs), fat (1.4±2.4%), and academic stress were noted in all students, while perceived stress increased in females only (p<.05 for all). GPA was negatively associated with change in academic stress in all students (academic stress Δ = ICSRLE post-pre; r=-.325, p<.05), meaning conflict with professors or dissatisfaction with school was related to lower grades. Changes in weight and perceived stress were positively associated in females only (perceived stress Δ = PSS post-pre; r=.419, p<.05), meaning that greater weight gain was related to feelings of lacking control in life events.

Conclusions: Undesirable increases in weight and fat were noted in all first-semester college students, whereas stress increased more in females. Targeted interventions related to stress reduction and weight maintenance are warranted for optimal health and academic performance in college.

Introduction

Common stressors for students include:

- Pressure to receive good grades,
- Change in living environment,
- Starting college,
- Choosing a major, and
- Moving or transferring to a new school (1).

Stress and BMI:

- Strongly influence weight changes in college freshmen (2).
- Are related to emotional eating.
 - For individuals with low BMI, increased stress predicts increased emotional eating.
 - The more stress coping mechanisms individuals have, the less they eat emotionally (3).

College students with more stressors tend to:

- Be females (4-5) who have concerns related to relationships, roommate conflicts, poor grades, weight loss, alcohol usage, and exercise (5).
- Start college at an older age (4).
- Consume less fruits and vegetables (4).

Research Questions

Does stress change during the first semester of college?

If so, how are these changes related to body composition and academic performance?

Methods

Table 1. Demographics

	Males n=22 (40.8%)	Females n=32 (59.2%)
Age	18.3±0.5	18.1±0.4
GPA	3.16±0.85	3.08±0.74

Academic Stress

Academic stress was assessed using the Inventory of College Students' Recent Life Experiences (ICSRLE, 6). The ICSRLE:

- Measures academic stress level using a series of 49 life-related events.
- Ranks the events on a scale of 1 (not at all part of my life) to 4 (very much part of my life)
- Ranges in score from 49 (least academic stress) to 196 (most academic stress)

Following is a list of experiences which many students have some time or other. Please indicate for each experience how much it has been a part of your life over the past month. Put a "1" in the space provided next to an experience if it was not at all part of your life over the past month; for example, "trouble with mother in law - 1"; "2" for an experience which was only slightly part of your life over that time; "3" for an experience which was distinctly part of your life; and "4" for an experience which was very much part of your life over the past month.

Intensity of Experience over Past Month
1 = not at all part of my life
2 = only slightly part of my life
3 = distinctly part of my life
4 = very much part of my life

- Conflicts with boyfriend/girlfriend's spouse's family
- Being let down or disappointed by friends
- Conflict with professor(s)
- Social rejection
- Too many things to do at once
- Being taken for granted
- Financial conflicts with family members
- Having your trust betrayed by a friend

Figure 1. Inventory of College Students' Recent Life Experiences

Perceived Stress

Perceived stress was assessed using the Perceived Stress Scale (PSS, 7).

The PSS:

- Measures perceived stress level using a series of 10 stress-related questions that pertain to real life situations.
- Ranks the questions on a scale of 0 (never) to 4 (very often)
- Ranges in score from 0 to 40
 - 0-13 being low perceived stress,
 - 14-26 being moderate perceived stress, and
 - 27-40 being high perceived stress.

For each question choose from the following alternatives:
0 - never 1 - almost never 2 - sometimes 3 - fairly often 4 - very often

- In the last month, how often have you been upset because of something that happened unexpectedly?
- In the last month, how often have you felt that you were unable to control the important things in your life?
- In the last month, how often have you felt nervous and stressed?
- In the last month, how often have you felt confident about your ability to handle your personal problems?
- In the last month, how often have you felt that things were going your way?
- In the last month, how often have you found that you could not cope with all the things that you had to do?
- In the last month, how often have you been able to control irritations in your life?
- In the last month, how often have you felt that you were on top of things?
- In the last month, how often have you been angered because of things that happened that were outside of your control?
- In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

Figure 2. Perceived Stress Scale

Results and Discussion

Table 2. Changes in Body Composition and Stress in the First College Semester

	All Aug/Sept	All Nov/Dec	p- value	Male Aug/Sept	Male Nov/Dec	p- value	Female Aug/Sept	Female Nov/Dec	p- value
Weight (lbs)	170.6±52.4	173.1±53.0	0.005*	184.1±53.3	188.5±53.1	0.013*	161.1±50.5	162.2±50.9	0.191
Fat (%)	25.9±12.1	27.3±12.0	<0.001*	17.6±9.6	19.5±10.2	0.008*	31.7±10.2	32.7±10.2	0.006*
Academic Stress	83.9±21.7	91.7±27.5	0.015*	75.2±17.3	77.0±21.0	0.602	89.9±22.7	101.9±27.1	0.015*
Perceived Stress	20.1±4.9	21.6±5.7	0.072	18.5±3.9	18.8±5.8	0.837	21.1±5.3	23.6±4.8	0.019*

Increases in academic stress for all students were related to:

- Lower grades than students hoped for (p<0.001),
- Dissatisfaction with school (p<0.001),
- Conflicts with friends (p=0.001),
- Struggling to meet the academic standards of others (p=0.019),
- Having your contributions overlooked (p=0.026),
- Not enough leisure time (p=0.007),
- Finding course(s) uninteresting (p=0.004),
- Struggling to meet their own academic standards (p=0.025),
- Too many things to do at once (p=0.048),
- Poor health of a friend (p=0.015),
- Conflict with professor(s)/instructor(s) (p=0.022), and
- Finding courses too demanding (p=0.041).

Academic stress was significantly associated with:

- GPA (r=-0.325, p=0.016).

Increases in perceived stress among females related to being:

- Upset because something happened unexpectedly to them (p=0.002),
- Feeling that difficulties were piling up so high that they could not overcome them (p=0.004),
- Unable to control the important things in their life (p=0.001).

Increases in perceived stress was significantly associated with:

- Change in body fat (r=0.354, p=0.013).

Conclusions

Undesirable increases in weight and fat were noted in all first-semester college students, whereas stress increased more in females.

Females had greater increased in stressor than males, which may inhibit normal daily function.

- Increased academic stress was associated with = lower GPA, and vice versa.
- Increased perceived stress was associated with = increased body fat, and vice versa.

Targeted interventions related to stress reduction and weight maintenance are warranted for optimal health and academic performance in college.

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