

STUDY AND ANALYSIS OF UPPER
GASTROINTESTINAL SYMPTOMS AMONG
STUDENTS AT THE UNIVERSITY OF
CENTRAL FLORIDA

2016

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STUDY AND ANALYSIS OF UPPER GASTROINTESTINAL SYMPTOMS
AMONG STUDENTS AT THE UNIVERSITY OF CENTRAL FLORIDA

by

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A Thesis Submitted in Partial Fulfillment of the Requirements
for the Honors in the Major Program in Health Science
in the College of Health and Public Affairs
and in The Burnett Honors College
at the University of Central Florida
Orlando, Florida

Fall Term 2016

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Abstract

Upper gastrointestinal symptoms can be caused by many different diseases and can present themselves in many different forms and range in intensity depending on the person. In previous research, upper gastrointestinal symptoms have been correlated with stress, smoking, alcohol intake, and nonsteroidal anti-inflammatory drugs (NSAIDs), among others. The purpose of this study will be focusing on finding any association between these risk factors mention and symptoms of upper gastrointestinal disease among college students. The study will utilize an Izumo scale questionnaire for the assessment of abdominal symptoms and Quality of Life (QOL). The questionnaire was built using Survey Monkey and distributed via email to students at the University of Central Florida (UCF). The main hypothesis was that the more the student's advancement in their college career, stress load, alcohol consumption, smoking, poor diet and a high consumption of some over the counter medication (specifically Non-Steroidal Anti Inflammatory Drugs), the more prone the students will be to present symptoms of upper gastrointestinal disease. The results were analyzed using Statistical Package for the Social Science (SPSS), and Analysis of Variance (ANOVA) were used to find any associations. The One-Way ANOVA tests showed an association between gender, ethnicity, student status, major, cigarette smoking habits, alcohol consumption, binge drinking, diet, stress, sleeping, and overall health. The results of this study present clear evidence that among college students, their demographics as well as lifestyle and school choices have significant associations to the amount of gastrointestinal symptoms they present with.

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BACKGROUND

Upper gastrointestinal symptoms can be due to many gastrointestinal problems and diseases. The American Nutrition Association reports that about 70 million people suffer from some form of digestive issue.¹ Common diseases that are associated with the upper gastrointestinal system include Barrett's Esophagus, gastritis, gastroesophageal reflux disease (GERD), hiatus hernia, and peptic ulcer disease. We will be focusing on the symptoms associated with upper gastrointestinal problems and not the diseases themselves, but they will be briefly described.

Some of the symptoms associated with upper gastrointestinal problems include heartburn and regurgitation. Heartburn, is defined as "burning retrosternal pain with concurrent features, often of radiation of the burning distress in an oral direction and exacerbation or following large meals".² They arise because of the reflux of gastric content into the esophagus. Reflux episodes that reach the proximal esophagus are more likely to cause symptoms compared with those reaching only the distal part of the esophagus.³ The actual symptom perception varies widely between patients. The sensory innervation of the esophagus is supplied by vagal and spinal afferents, where the spinal afferent transport the painful stimuli.³

Throat discomfort is also a symptom associated with upper gastrointestinal diseases. This is a symptom of dysphagia, which is subjective difficulty in swallowing, it may feel like it is difficult to initiate swallowing or as if the food/liquid "sticks" in the esophagus. Sometimes dysphagia is accompanied with odynophagia. There are three main pathophysiologic basis for dysphagia: one being problems in delivery of bolus or fluid into the esophagus because of a

neuromuscular incoordination, two, problems with esophageal peristaltic activity, and three, problems of the lower esophageal sphincter therefore resulting in problems with the bolus entering the stomach.⁴

Upper gastrointestinal symptoms can also include abdominal pain. Abdominal pain is categorized into three types; these three types may happen simultaneously or separately. The first kind is visceral pain which happens from stretching or distending of an abdominal organ or from inflammation, this pain is diffused and not well localized and has a burning or cramping quality. Another type of pain is somatic pain which results from injury to the abdominal wall, the parietal peritoneum, the root of the mesenteric or the diaphragm. This pain is sharp, more intense, and well localized. The last type of pain is referred pain, which is pain felt at a location distant from the origin but in the same dermatome. Referred pain is sharp, and also well localized.⁴

Another symptom of upper gastrointestinal problems includes early satiation. Early satiation is marked by feeling full after one has eaten a small amount of food, feeling full sooner than normal or after eating less than usual. This can be caused by heartburn or a nervous system problem that causes delayed stomach emptying. Postprandial nausea and fullness is another symptom that is linked to upper gastrointestinal problems, as is epigastric bloating.

Upper gastrointestinal symptoms can vary widely and can be associated with many different diseases. Some of the most common diseases include gastroesophageal reflux disease (GERD), Barrett's esophagus, hiatal hernias, gastritis, and peptic ulcers.

Gastroesophageal reflux disease is the backflow of gastric content into the esophagus through the lower esophageal sphincter (LES), and it does not always produce symptoms. The

prevalence of reflux symptoms is steadily rising throughout the industrialized world. An estimated 20-40% of Western adult population report chronic heartburn, although fewer meet formal diagnostic criteria for GERD.⁵ Anything that alters the strength of the LES* or increases intraabdominal pressure predisposes an individual to GERD. A few examples that may affect the closure of the LES include intake of fatty foods, caffeine, alcohol and cigarette smoking.⁴ Certain medications may also alter the pressure of the LES, like birth control and narcotics. Barrett esophagus is a complication of chronic GERD and it involves columnar tissue replacing the normal squamous epithelium of the distal part of the esophagus. It carries a significant risk for esophageal cancer.⁴ A hiatal hernia is when the upper part of the stomach bulges through an opening in the diaphragm. The diaphragm helps keep acid from coming up into the esophagus. With a hiatal hernia it is easier for acid to enter the esophagus. Therefore, someone with this condition is predisposed to GERD. There are two hiatal hernias that are commonly recognized, the sliding hernia and the paraesophageal hernia.⁴ A sliding hiatal hernias is when both a part of the stomach and the gastroesophageal junction slip up into the thorax.⁴ Paraesophageal hiatal hernias are when a part of the greater curvature of the stomach rolls through the diaphragmatic defect. In paraesophageal hernias the junction remains in its normal position.⁶

Gastritis occurs when the lining of the stomach becomes inflamed or swollen. It can be acute, which only last a short time and chronic gastritis which can last months or years. Acute inflammation of the stomach lining can happen after the ingestion of alcohol, aspirin, or irritating substances, as well as caused by viral, bacterial, or autoimmune illness.⁴ In the Western countries

* Lower esophageal sphincter

the overuse of nonsteroidal anti-inflammatory drugs (NSAIDs) and the use of alcohol and tobacco for recreational purposes are preeminent causes of acute gastritis.⁴

Peptic ulcers result if there is an increase in acid-pepsin activity stimulated by smoking, excessive gastrin secretion, and NSAIDs*.⁷ The presence of hydrochloric acid potentiates the actions of pepsin and other injurious substances such as aspirin and NSAIDs. Peptic Ulcer disease has also been attributed to a stressful lifestyle and an irritating diet. In 2011 there were 1.5 million people affected with peptic ulcers in the United States.⁸

* Non-steroidal anti-inflammatory drugs

LITERATURE REVIEW

There were several studies found related to the upper gastrointestinal problems in general but not many studies on gastrointestinal disease among college students. These studies look at individual aspects among the general population, not specifically related to young adults. It has long been recognized that psychosocial and lifestyle factors are associated with upper gastrointestinal symptoms.⁹ A study was done that related stress and peptic ulcers stating that when *Helicobacter pylori* was discovered as a cause of peptic ulcers it led many to conclude that psychological factors were unimportant.¹⁰ But in reality research has proven that psychological stress is not only associated with ulcers, but it is a very plausible risk factor for ulcer disease.¹⁰ It is also reported that stress trigger symptoms in GERD* patients and that a severe life stress exacerbates reflux symptoms.¹¹ Another study that was conducted included 13 nations and it analyzed upper gastrointestinal symptoms and their association with socioeconomic factors. The study concluded that smoking and alcohol consumption were not significantly associated with upper gastrointestinal symptoms; however, there was a trend for alcohol consumption being associated with dyspepsia.¹² Furthermore, two studies concluded that smoking may be most strongly associated as a trigger of GERD*.^{9,13} NSAIDs** are known to cause peptic ulcers. A study reported that NSAIDs induced peptic ulcers are found in approximately 20% of NSAIDs users undergoing endoscopy.¹⁴ Stress is known to impede ulcer healing, and stress is also a very plausible risk factor for ulcer disease.¹⁰ The occurrence of peptic ulceration has also been

*Gastroesophageal reflux disease

* Gastroesophageal reflux disease

** Non-steroidal anti-inflammatory

inconsistently associated with smoking, caffeine and alcohol consumption and low socioeconomic status.⁹

Although there are some studies done on the effect of stress, smoking, and NSAIDs on upper gastrointestinal disease, the results are not always significant and coherent. There have not been studies done, or found through database search engines, on the relationship between upper gastrointestinal symptoms and college students. However, there are studies that correlate college students with stress and smoking. A study shows that the pressure that college students have of meeting grade requirements, taking test, material needed to be learned and time management have shown to be a significant source of stress; also financial difficulties increase stress.¹⁵ Stress is also correlated with detrimental behavior like smoking, poor diet, and poor sleeping habits.¹⁵ The American College Health Association reported that about 10 percent of students smoked cigarettes in the past 30 days for spring of 2015. For fall of 2010 about 15 percent of students reported smoking cigarettes.¹⁶ Although cigarette use is declining, smoking tobacco with a waterpipe (hookah) is an emerging trend. After cigarettes, waterpipe use was the most common form of tobacco use among university students.¹⁷ The aim of this study is to analyze and discuss any association between upper gastrointestinal symptoms and college student's demographics and lifestyle. In this study we are looking into individuals' age, gender, race, academic level, enrolment status, major, and employment status. Lifestyle wise, we will be analyzing smoking habits, alcohol consumption, diet, medication, stress and sleeping habits. The main hypothesis is that depending on the student's advancement in their college career, stress load, alcohol consumption, smoking, and use of certain medication the more prone the students will be to present symptoms of upper gastrointestinal problems.

METHODS

Study Design

This study employs a retrospective study design to identify any association between upper gastrointestinal disease among college student and their demographics as well as lifestyle, including status at UCF, major, smoking, alcohol intake, diet, nonsteroidal anti-inflammatory drugs (NSAIDs), stress, and sleep. Participants were recruited from the University of Central Florida, a survey was built through SurveyMonkey and distributed to students at the University of Central Florida via email. The survey was utilized as the primary data collection method. The survey included questions on demographics, general health, smoking, alcohol intake, stress, and sleeping habits. It also included an Izumo scale questionnaire to measure the symptoms of gastrointestinal problems, the Izumo Scale was previously tested for validity. This sample included all enrolled students at UCF at the time of survey distribution during Summer 2016, consequently the overall participation of 1475 was large enough to be representative of UCF. The study was submitted to, and approved by the University Institutional Review Board (IRB), the survey (Appendix-1) was distributed via mass email, and was open for four weeks. The purpose of this study is to report any association between gastrointestinal symptoms among college students, using the Izumo Scale. All collected data from SurveyMonkey was downloaded into SPSS and corresponding data was descriptively analyzed and some was analytically analyzed with One-Way ANOVA Testing.

Sampling

The target population of this study was college students. To access this population, we targeted students enrolled at the University of Central Florida. The sample population consisted

of all actively enrolled students at the time survey distribution, Summer Term 2016. The study population included the students who received the survey and agree to complete it. Therefore, our sample included those actively enrolled and who agreed to complete the survey; students included undergraduates, graduate/professional students, or non-degree seeking students.

The sample size of the study was 1475 students who took the survey. Recruitment of the sample population was done online through a mass email that was sent out to all students enrolled in classes the Summer Term of 2016. Participants were not compensated for their participation or given any incentives to complete the survey sent to them. Inclusion criteria for this study included being a student at the University of Central Florida, being above the age of 18, and consenting to take the survey.

Study Instrumentation

The Izumo Scale is a questionnaire for the assessment of quality of life (QOL) of the patients with gastrointestinal symptoms. This study utilized the Izumo scale questionnaire. This QOL[†] questionnaire includes 15 questions that are grouped to assess 5 domains of gastrointestinal symptoms: Reflux, Pain, Fullness, Constipation, and Diarrhea. Each one of the five domains included three questions. Question 1, 2, and 3 relate to the Reflux domain; 4, 5, and 6 relate to the Pain domain; 7, 8, and 9 relate to the Fullness domain; 10, 11, and 12 relate to the Constipation Domain; and 13, 14, and 15 relate to the Diarrhea domain. Careful validation of the Izumo scale as a self-reporting instrument has been previously tested, with good internal consistency, and reproducibility¹⁸. The participants were asked to answer each question using a

[†] Quality of Life

Likert Scale which ranges from not disturbed (0) to intolerable (5).^{18,19} The higher the score the participant receives the more gastrointestinal symptoms they present with.

In the survey we also incorporated demographics questions including age, gender, and race. In addition, we asked about status at UCF (freshman, sophomore, junior, or senior, graduate or professional, and non-degree seeking), enrolment status, major, work status, smoking habits, alcohol consumption, diet, medication use such as NSAIDs*, stress and sleeping habits.

Participants were asked about NSAID use because previous research has reported that there is a higher prevalence of gastrointestinal symptoms among NSAID users compared to non-NSAID users.²⁰ The side effects of NSAIDs include abdominal pain, diarrhea, and upset stomach, long term patients develop peptic ulcers.

Data Collection

All data was collected from SurveyMonkey, including the demographic, lifestyle, and Izumo questionnaire data. Data was downloaded into a Statistical Package for the Social Science (SPSS). The results and data were only accessed by the researchers and stored in password protected computers. Appropriate data was analyzed descriptively, like demographics, major, over the counter medication, and diagnosed diseases. The rest of the data was analyzed analytically though One-Way ANOVA testing.

* Non-steroidal anti-inflammatory drugs

RESULTS

Descriptive Analysis of Demographics

The demographics of the participants are shown in Table 1. Demographics included are age, gender, race as well as status at UCF, enrollment status, and working status. Table 1 summarizes the number of participants who identified with each response, and the valid percent of each response, as well as the total Izumo score of each. For example, when looking at age you can see 580 participants (41%) were between the age of 18-20 and their total Izumo score was 11.59 compared to 370 participants (26%) between the age of 21-23 who's total Izumo score was higher, 13.76.

Table 1. Demographics

| Demographics | N | % | Total Izumo Score* |
|--|----------|----------|---------------------------|
| Age | | | |
| 18-20 | 580 | 41 | 11.59 |
| 21-23 | 370 | 26 | 13.76 |
| 24-26 | 155 | 11 | 13.54 |
| 27-30 | 114 | 8 | 12.40 |
| 30+ | 200 | 14 | 12.18 |
| Gender | | | |
| Male | 321 | 22.2 | 9.13 |
| Female | 1112 | 77 | 13.41 |
| Other | 11 | 0.8 | 17.33 |
| Race | | | |
| White | 900 | 62.3 | 13.33 |
| Black | 127 | 8.8 | 8.27 |
| Hispanic or Latino/a | 236 | 16.3 | 11.57 |
| Asian or Pacific Islander | 86 | 6 | 11.60 |
| American Indian, Alaskan Native, or Hawaiian | 7 | 0.5 | 18.86 |
| Biracial or Multiracial | 58 | 4 | 12.82 |
| Other | 31 | 2.1 | 11.88 |
| Status at UCF | | | |
| Freshman (1-30 credits) | 232 | 16.1 | 9.88 |
| Sophomore (31-60 credits) | 153 | 10.6 | 12.78 |
| Junior (61-90 credits) | 302 | 20.9 | 12.88 |
| Senior (90-120 credits) | 282 | 19.5 | 14.52 |
| Senior (120+ credits) | 154 | 10.7 | 12.29 |
| Graduate or Professional Student | 278 | 19.2 | 11.58 |
| Non-degree Seeking Student | 11 | 0.8 | 10.50 |
| Transfer Student | 33 | 2.3 | 15.87 |
| Enrollment Status | | | |
| Full-time | 1191 | 82.6 | 12.54 |
| Part-time | 237 | 16.4 | 12.35 |
| Other | 14 | 1 | 15.15 |
| Working Status | | | |
| Full-time | 310 | 21.4 | 13.22 |
| Part-time | 515 | 35.6 | 11.98 |
| Not working | 621 | 42.9 | 12.63 |

* Total Izumo score ranges from 0-75, with a lower score being a better result/having less GI symptoms

Another aspect of demographics we asked about were the majors students studied; this is shown in table 2 and figure 1. Table 2 summarizes the number of participants who identified

with each response, and the valid percent of each response, as well as the total Izumo score of each. Figure 1 shows the total Izumo scores among the different majors.

Table 2. Izumo Score Among Students with Different Majors

| Major | N | % | Izumo Score |
|--------------------|----------|----------|--------------------|
| Chemistry | 15 | 1.3 | 17.42 |
| Biology | 62 | 5.3 | 16.24 |
| Psychology | 104 | 9.0 | 16.00 |
| Advertising | 6 | .5 | 15.80 |
| Business | 49 | 4.2 | 15.23 |
| Criminal Justice | 30 | 2.6 | 14.56 |
| Art | 26 | 2.2 | 14.26 |
| Nursing | 117 | 10.1 | 13.70 |
| Political Science | 29 | 2.5 | 13.29 |
| Management | 45 | 3.9 | 13.06 |
| Education | 111 | 9.6 | 13.02 |
| Finance | 20 | 1.7 | 12.61 |
| Biomedical Science | 102 | 8.8 | 12.31 |
| English | 23 | 2.0 | 11.91 |
| Accounting | 24 | 2.1 | 11.13 |
| Health Science | 210 | 18.1 | 10.61 |
| Computers | 48 | 4.1 | 10.03 |
| Engineering | 105 | 9.1 | 9.63 |
| Marketing | 15 | 1.3 | 8.58 |
| Music | 4 | .3 | 7.00 |
| Athletic Training | 11 | .9 | 4.78 |
| Economics | 4 | .3 | 3.25 |

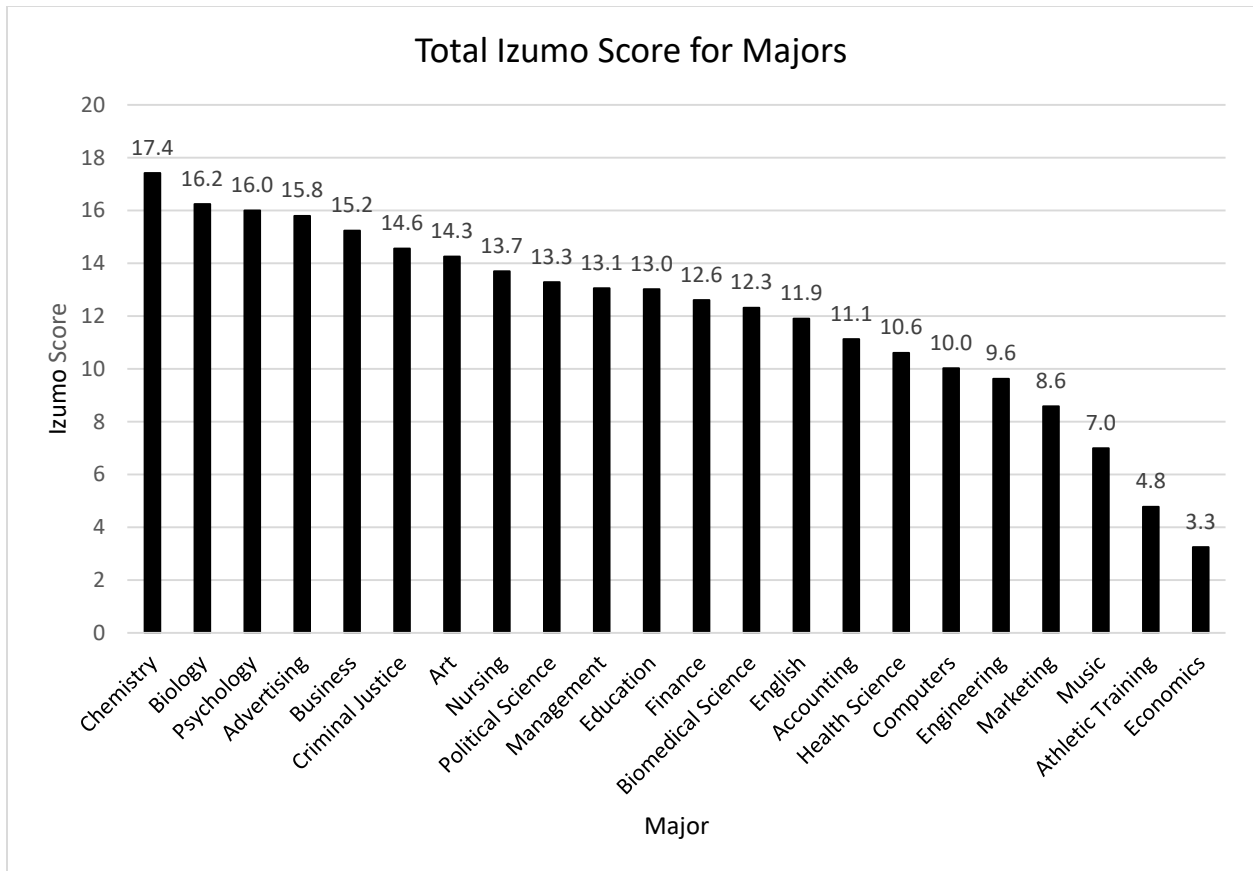


Figure 1. Total Izumo Score for Majors

Factors Affecting GI Symptoms

Over The Counter Non-Steroidal Anti-inflammatory Drugs (NSAIDS)

Table 3 shows the total Izumo score as well as the score for each domain for participants who are using NSAIDS such as Ibuprofen, Aspirin, and Naproxen. The total Izumo score among participants who are taking over the counter NSAIDS is also illustrated in Figure 2.

Table 3. OTC Medication, in particular NSAIDs and Izumo Score

| | Ibuprofen | Aspirin | Naproxen | None |
|----------------------|------------------|----------------|-----------------|-------------|
| Total Izumo Score* | 15.79 | 15.39 | 17.77 | 11.03 |
| Reflux Domain* | 2.70 | 2.61 | 3.30 | 1.93 |
| Pain Domain* | 2.58 | 2.50 | 2.81 | 1.81 |
| Fullness Domain* | 3.27 | 3.22 | 3.66 | 2.42 |
| Constipation Domain* | 3.68 | 3.47 | 4.48 | 2.61 |
| Diarrhea Domain* | 3.47 | 3.40 | 3.50 | 2.24 |

* Score from each individual domain ranges from 0-15; with a lower score being a better result/having less GI symptoms

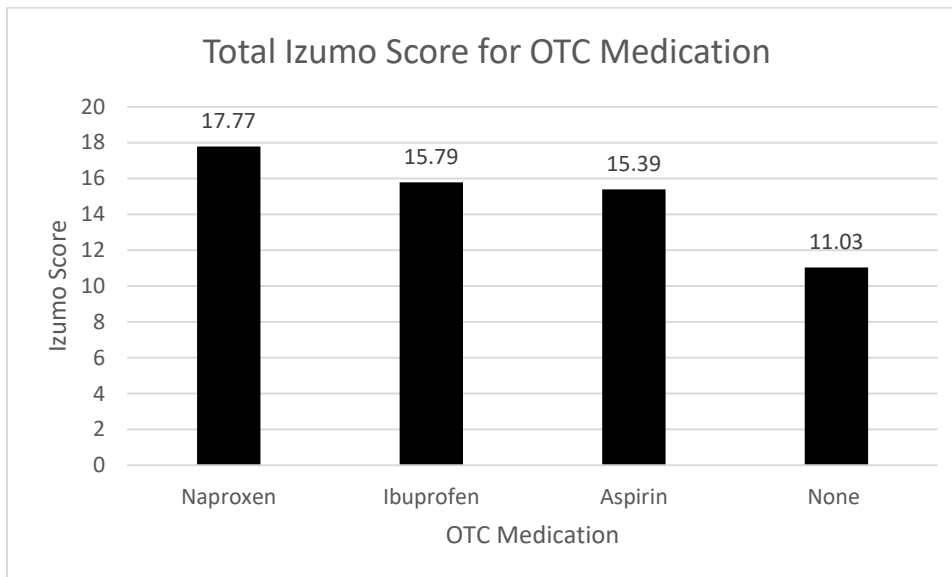


Figure 2. Total Izumo Score among participants who reported use of NSAIDs

Association Between Pre-existing Disorders and GI Symptoms

Table 4 shows diagnosed diseases and the total Izumo score as well as the individual Izumo scores for each domain among participants. Figure 3 depicts the total Izumo Score for diagnosed diseases.

Table 4. Diagnosed Diseases and Izumo Score

| | Diabetes | Thyroid Disease | Hypertension | Gastritis | Acid Reflux | Ulcers in GI |
|---------------------|----------|-----------------|--------------|-----------|-------------|--------------|
| Total Izumo Score | 13.08 | 15.62 | 18.53 | 27.03 | 23.34 | 22.86 |
| Reflux Domain | 1.92 | 2.90 | 4.18 | 4.99 | 6.23 | 4.73 |
| Pain Domain | 1.38 | 2.79 | 2.09 | 5.70 | 4.25 | 4.29 |
| Fullness Domain | 4.31 | 3.92 | 4.12 | 6.40 | 4.94 | 5.40 |
| Constipation Domain | 2.54 | 3.46 | 3.74 | 4.99 | 4.17 | 3.70 |
| Diarrhea Domain | 2.92 | 2.81 | 4.53 | 4.74 | 3.65 | 4.40 |

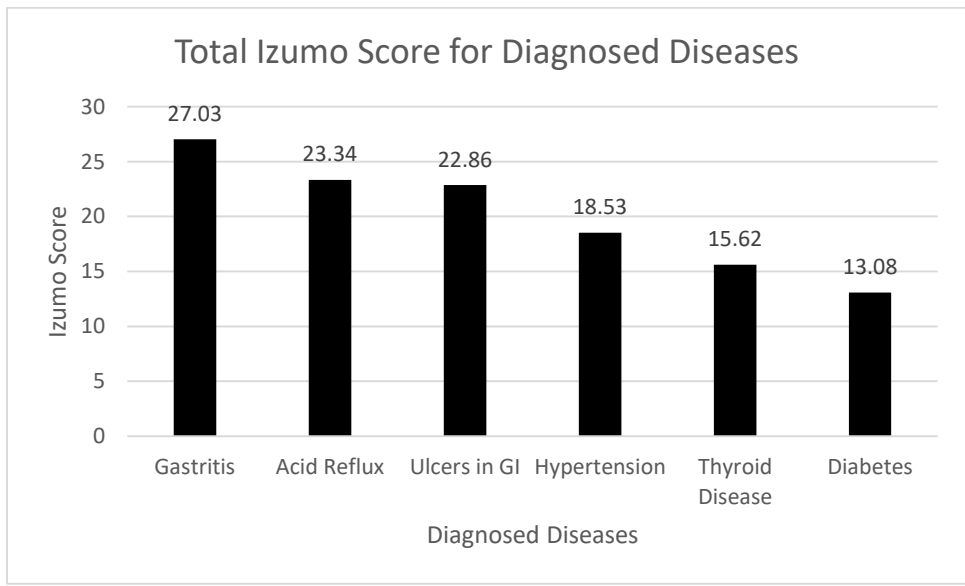


Figure 3. Total Izumo Score among participants who previously reported Diagnosed Diseases

One-Way ANOVA Test Results

To establish the statistical significance of differences between total Izumo scores and several factors that may have an impact on GI symptoms we used One-Way ANOVA. There was a statistically significant difference in the One Way ANOVA analysis done between the total Izumo score and gender, ethnicity, status, major, cigarette smoking habits, alcohol use, binge

drinking, diet, stress, sleeping habits, and overall health. However, when analysis was done based on individual domains Izumo score, not all domains showed statistical significance.

Gender and Izumo Scores

There was a statistically significant difference between total Izumo score and gender as determined by one-way ANOVA ($F(2,1246) = 15.70, p = 0.00$). There was also statistical significance in every domain based on gender except in the reflux domain. This is shown in table 5.

Table 5. One-Way ANOVA, GI Symptoms and Gender

| | | Sum of Squares | df | Mean Square | F | Sig. |
|-------------------|----------------|-----------------------|-----------|--------------------|----------|-------------|
| Total Izumo Score | Between Groups | 4100.39 | 2.00 | 2050.20 | 15.70 | 0.00 |
| | Within Groups | 162757.77 | 1246.00 | 130.62 | | |
| | Total | 166858.16 | 1248.00 | | | |
| Reflux | Between Groups | 26.86 | 2.00 | 13.43 | 1.62 | 0.20 |
| | Within Groups | 10784.23 | 1297.00 | 8.32 | | |
| | Total | 10811.09 | 1299.00 | | | |
| Pain | Between Groups | 120.63 | 2.00 | 60.31 | 8.22 | 0.00 |
| | Within Groups | 9497.29 | 1294.00 | 7.34 | | |
| | Total | 9617.92 | 1296.00 | | | |
| Fullness | Between Groups | 354.43 | 2.00 | 177.22 | 18.28 | 0.00 |
| | Within Groups | 12507.06 | 1290.00 | 9.70 | | |
| | Total | 12861.49 | 1292.00 | | | |
| Constipation | Between Groups | 260.28 | 2.00 | 130.14 | 11.53 | 0.00 |
| | Within Groups | 14607.26 | 1294.00 | 11.29 | | |
| | Total | 14867.54 | 1296.00 | | | |
| Diarrhea | Between Groups | 193.56 | 2.00 | 96.78 | 8.52 | 0.00 |
| | Within Groups | 14715.87 | 1296.00 | 11.36 | | |
| | Total | 14909.44 | 1298.00 | | | |

Ethnicity and Izumo Scores

There was a statistically significant difference in total Izumo score among students with different ethnicity, as well as in the pain domain, and the diarrhea domain; shown in table 6. The total Izumo score for ethnicity determined by one-way ANOVA was ($F(6,1242) = 3.49, p = 0.00$).

Table 6. One-Way ANOVA, GI Symptoms and Ethnicity

| | | Sum of Squares | df | Mean Square | F | Sig. |
|-------------------|----------------|----------------|---------|-------------|------|------|
| Total Izumo Score | Between Groups | 2771.23 | 6.00 | 461.87 | 3.49 | 0.00 |
| | Within Groups | 164355.70 | 1242.00 | 132.33 | | |
| | Total | 167126.94 | 1248.00 | | | |
| Reflux | Between Groups | 57.97 | 6.00 | 9.66 | 1.16 | 0.32 |
| | Within Groups | 10753.12 | 1293.00 | 8.32 | | |
| | Total | 10811.09 | 1299.00 | | | |
| Pain | Between Groups | 142.01 | 6.00 | 23.67 | 3.22 | 0.00 |
| | Within Groups | 9487.40 | 1290.00 | 7.36 | | |
| | Total | 9629.41 | 1296.00 | | | |
| Fullness | Between Groups | 118.94 | 6.00 | 19.82 | 2.00 | 0.06 |
| | Within Groups | 12753.82 | 1286.00 | 9.92 | | |
| | Total | 12872.76 | 1292.00 | | | |
| Constipation | Between Groups | 80.73 | 6.00 | 13.46 | 1.17 | 0.32 |
| | Within Groups | 14787.40 | 1290.00 | 11.46 | | |
| | Total | 14868.13 | 1296.00 | | | |
| Diarrhea | Between Groups | 503.33 | 6.00 | 83.89 | 7.49 | 0.00 |
| | Within Groups | 14469.78 | 1292.00 | 11.20 | | |
| | Total | 14973.12 | 1298.00 | | | |

Status at UCF and Izumo Scores

Status is defined as being a Freshman (1-30 credits), Sophomore (31-60 credits), Junior (61-90 credits), Senior (90-120 credits), Senior (120+ credits), Graduate or Professional Students, Non-degree seeking, and Transfer students. There was statistically significant difference in the total Izumo score, reflux domain, fullness domain, constipation domain, and

diarrhea domain; shown in table 7. The total Izumo score for status determined by one-way ANOVA was ($F(7,1242) = 3.11, p = 0.00$).

Table 7. One-Way ANOVA, GI Symptoms and Status

| | | Sum of Squares | df | Mean Square | F | Sig. |
|-------------------|----------------|----------------|---------|-------------|------|------|
| Total Izumo Score | Between Groups | 2877.47 | 7.00 | 411.07 | 3.11 | 0.00 |
| | Within Groups | 164360.32 | 1242.00 | 132.34 | | |
| | Total | 167237.78 | 1249.00 | | | |
| Reflux | Between Groups | 134.56 | 7.00 | 19.22 | 2.33 | 0.02 |
| | Within Groups | 10676.57 | 1293.00 | 8.26 | | |
| | Total | 10811.13 | 1300.00 | | | |
| Pain | Between Groups | 100.92 | 7.00 | 14.42 | 1.95 | 0.06 |
| | Within Groups | 9532.66 | 1289.00 | 7.40 | | |
| | Total | 9633.58 | 1296.00 | | | |
| Fullness | Between Groups | 165.82 | 7.00 | 23.69 | 2.40 | 0.02 |
| | Within Groups | 12706.94 | 1285.00 | 9.89 | | |
| | Total | 12872.76 | 1292.00 | | | |
| Constipation | Between Groups | 169.29 | 7.00 | 24.18 | 2.12 | 0.04 |
| | Within Groups | 14698.84 | 1289.00 | 11.40 | | |
| | Total | 14868.13 | 1296.00 | | | |
| Diarrhea | Between Groups | 269.88 | 7.00 | 38.55 | 3.39 | 0.00 |
| | Within Groups | 14703.24 | 1291.00 | 11.39 | | |
| | Total | 14973.12 | 1298.00 | | | |

Majors and Izumo Scores

There was a statistically significant difference in the total Izumo score among students with different majors, and in the constipation domain; shown in table 8. The total Izumo score for major determined by one-way ANOVA was ($F(21,976) = 2.05, p = 0.00$).

Table 8. One-Way ANOVA, GI symptoms and Major

| | | Sum of Squares | df | Mean Square | F | Sig. |
|-------------------|----------------|-----------------------|-----------|--------------------|----------|-------------|
| Total Izumo Score | Between Groups | 5697.83 | 21.00 | 271.33 | 2.05 | 0.00 |
| | Within Groups | 129294.41 | 976.00 | 132.47 | | |
| | Total | 134992.24 | 997.00 | | | |
| Reflux | Between Groups | 147.35 | 21.00 | 7.02 | 0.84 | 0.68 |
| | Within Groups | 8537.70 | 1016.00 | 8.40 | | |
| | Total | 8685.05 | 1037.00 | | | |
| Pain | Between Groups | 208.43 | 21.00 | 9.93 | 1.32 | 0.15 |
| | Within Groups | 7616.49 | 1012.00 | 7.53 | | |
| | Total | 7824.91 | 1033.00 | | | |
| Fullness | Between Groups | 298.40 | 21.00 | 14.21 | 1.41 | 0.11 |
| | Within Groups | 10197.04 | 1009.00 | 10.11 | | |
| | Total | 10495.43 | 1030.00 | | | |
| Constipation | Between Groups | 526.21 | 21.00 | 25.06 | 2.25 | 0.00 |
| | Within Groups | 11315.78 | 1014.00 | 11.16 | | |
| | Total | 11841.99 | 1035.00 | | | |
| Diarrhea | Between Groups | 323.54 | 21.00 | 15.41 | 1.35 | 0.14 |
| | Within Groups | 11621.29 | 1015.00 | 11.45 | | |
| | Total | 11944.84 | 1036.00 | | | |

Cigarette Smoking and Izumo Scores

There was a statistically significant difference in total Izumo score among students and their cigarette smoking habits, as well as in the reflux domain, pain domain, fullness domain, and diarrhea domain; shown in table 9. The total Izumo score for cigarette smoking habits determined by one-way ANOVA was ($F(3,1240) = 7.27, p = 0.00$).

Table 9. One-Way ANOVA, GI Symptoms and Cigarette Smoking Habits

| | | Sum of Squares | df | Mean Square | F | Sig. |
|-------------------|----------------|-----------------------|-----------|--------------------|----------|-------------|
| Total Izumo Score | Between Groups | 2880.63 | 3.00 | 960.21 | 7.27 | 0.00 |
| | Within Groups | 163854.36 | 1240.00 | 132.14 | | |
| | Total | 166734.99 | 1243.00 | | | |
| Reflux | Between Groups | 135.61 | 3.00 | 45.20 | 5.50 | 0.00 |
| | Within Groups | 10609.22 | 1290.00 | 8.22 | | |
| | Total | 10744.83 | 1293.00 | | | |
| Pain | Between Groups | 138.67 | 3.00 | 46.22 | 6.28 | 0.00 |
| | Within Groups | 9481.26 | 1288.00 | 7.36 | | |
| | Total | 9619.93 | 1291.00 | | | |
| Fullness | Between Groups | 133.74 | 3.00 | 44.58 | 4.50 | 0.00 |
| | Within Groups | 12697.69 | 1283.00 | 9.90 | | |
| | Total | 12831.42 | 1286.00 | | | |
| Constipation | Between Groups | 88.77 | 3.00 | 29.59 | 2.58 | 0.05 |
| | Within Groups | 14745.14 | 1287.00 | 11.46 | | |
| | Total | 14833.91 | 1290.00 | | | |
| Diarrhea | Between Groups | 140.87 | 3.00 | 46.96 | 4.09 | 0.01 |
| | Within Groups | 14784.23 | 1289.00 | 11.47 | | |
| | Total | 14925.10 | 1292.00 | | | |

Alcohol Use and Izumo Scores

There was a statistically significant difference in total Izumo score among students who drank alcohol, as well as in the reflux domain, constipation domain and diarrhea domain; shown in table 10. The total Izumo score for alcohol use determined by one-way ANOVA was ($F(5,1221) = 5.36, p = 0.00$).

Table 10. One-Way ANOVA, GI Symptoms and Alcohol Use

| | | Sum of Squares | df | Mean Square | F | Sig. |
|-------------------|----------------|-----------------------|-----------|--------------------|----------|-------------|
| Total Izumo Score | Between Groups | 3543.50 | 5.00 | 708.70 | 5.36 | 0.00 |
| | Within Groups | 161363.57 | 1221.00 | 132.16 | | |
| | Total | 164907.06 | 1226.00 | | | |
| Reflux | Between Groups | 133.37 | 5.00 | 26.67 | 3.28 | 0.01 |
| | Within Groups | 10310.83 | 1269.00 | 8.13 | | |
| | Total | 10444.19 | 1274.00 | | | |
| Pain | Between Groups | 71.96 | 5.00 | 14.39 | 1.94 | 0.09 |
| | Within Groups | 9423.40 | 1267.00 | 7.44 | | |
| | Total | 9495.36 | 1272.00 | | | |
| Fullness | Between Groups | 113.23 | 5.00 | 22.65 | 2.27 | 0.05 |
| | Within Groups | 12628.95 | 1263.00 | 10.00 | | |
| | Total | 12742.18 | 1268.00 | | | |
| Constipation | Between Groups | 232.40 | 5.00 | 46.48 | 4.08 | 0.00 |
| | Within Groups | 14408.55 | 1265.00 | 11.39 | | |
| | Total | 14640.95 | 1270.00 | | | |
| Diarrhea | Between Groups | 288.00 | 5.00 | 57.60 | 5.04 | 0.00 |
| | Within Groups | 14468.77 | 1267.00 | 11.42 | | |
| | Total | 14756.76 | 1272.00 | | | |

Binge Drinking and Izumo Scores

There was a statistically significant difference in total Izumo score among students who binge drink, as well as in the pain domain; shown in table 11. The total Izumo score for binge drinking determined by one-way ANOVA was ($F(5,1238) = 2.37, p = 0.04$).

Table 11. One-Way ANOVA, GI Symptoms and Binge Drinking

| | | Sum of Squares | df | Mean Square | F | Sig. |
|-------------------|----------------|----------------|---------|-------------|------|------|
| Total Izumo Score | Between Groups | 1579.39 | 5.00 | 315.88 | 2.37 | 0.04 |
| | Within Groups | 165162.94 | 1238.00 | 133.41 | | |
| | Total | 166742.32 | 1243.00 | | | |
| Reflux | Between Groups | 34.43 | 5.00 | 6.89 | 0.83 | 0.53 |
| | Within Groups | 10656.93 | 1287.00 | 8.28 | | |
| | Total | 10691.36 | 1292.00 | | | |
| Pain | Between Groups | 124.97 | 5.00 | 24.99 | 3.39 | 0.01 |
| | Within Groups | 9488.78 | 1285.00 | 7.38 | | |
| | Total | 9613.74 | 1290.00 | | | |
| Fullness | Between Groups | 69.26 | 5.00 | 13.85 | 1.39 | 0.23 |
| | Within Groups | 12772.99 | 1282.00 | 9.96 | | |
| | Total | 12842.25 | 1287.00 | | | |
| Constipation | Between Groups | 70.37 | 5.00 | 14.08 | 1.23 | 0.30 |
| | Within Groups | 14753.74 | 1284.00 | 11.49 | | |
| | Total | 14824.12 | 1289.00 | | | |
| Diarrhea | Between Groups | 97.69 | 5.00 | 19.54 | 1.69 | 0.13 |
| | Within Groups | 14832.82 | 1286.00 | 11.53 | | |
| | Total | 14930.50 | 1291.00 | | | |

Diet and Izumo Scores

There was a statistically significant difference in total Izumo score among students and their diet, as well as in the reflux domain, fullness domain, constipation domain, and diarrhea domain; shown in table 12. The total Izumo score for diet determined by one-way ANOVA was ($F(4,1245) = 4.90, p = 0.00$).

Table 12. One-Way ANOVA, GI Symptoms and Diet

| | | Sum of Squares | df | Mean Square | F | Sig. |
|-------------------|----------------|-----------------------|-----------|--------------------|----------|-------------|
| Total Izumo Score | Between Groups | 2591.53 | 4.00 | 647.88 | 4.90 | 0.00 |
| | Within Groups | 164646.26 | 1245.00 | 132.25 | | |
| | Total | 167237.78 | 1249.00 | | | |
| Reflux | Between Groups | 86.89 | 4.00 | 21.72 | 2.63 | 0.03 |
| | Within Groups | 10724.24 | 1296.00 | 8.28 | | |
| | Total | 10811.13 | 1300.00 | | | |
| Pain | Between Groups | 64.48 | 4.00 | 16.12 | 2.18 | 0.07 |
| | Within Groups | 9569.11 | 1293.00 | 7.40 | | |
| | Total | 9633.58 | 1297.00 | | | |
| Fullness | Between Groups | 104.56 | 4.00 | 26.14 | 2.64 | 0.03 |
| | Within Groups | 12775.47 | 1289.00 | 9.91 | | |
| | Total | 12880.03 | 1293.00 | | | |
| Constipation | Between Groups | 162.73 | 4.00 | 40.68 | 3.58 | 0.01 |
| | Within Groups | 14714.11 | 1293.00 | 11.38 | | |
| | Total | 14876.84 | 1297.00 | | | |
| Diarrhea | Between Groups | 209.10 | 4.00 | 52.28 | 4.58 | 0.00 |
| | Within Groups | 14770.82 | 1295.00 | 11.41 | | |
| | Total | 14979.92 | 1299.00 | | | |

Caffeinated Beverages and Izumo Scores

There was no statistically significant difference in total Izumo score among students who consumed caffeinated beverages, or in any domain; shown in table 13.

Table 13. One-Way ANOVA, Domains and Caffeinated Beverages

| | | Sum of Squares | df | Mean Square | F | Sig. |
|-------------------|----------------|-----------------------|-----------|--------------------|----------|-------------|
| Total Izumo Score | Between Groups | 642.29 | 3.00 | 214.10 | 1.60 | 0.19 |
| | Within Groups | 166385.77 | 1245.00 | 133.64 | | |
| | Total | 167028.06 | 1248.00 | | | |
| Reflux | Between Groups | 35.56 | 3.00 | 11.85 | 1.43 | 0.23 |
| | Within Groups | 10775.53 | 1296.00 | 8.31 | | |
| | Total | 10811.09 | 1299.00 | | | |
| Pain | Between Groups | 26.48 | 3.00 | 8.83 | 1.19 | 0.31 |
| | Within Groups | 9606.02 | 1293.00 | 7.43 | | |
| | Total | 9632.50 | 1296.00 | | | |
| Fullness | Between Groups | 23.00 | 3.00 | 7.67 | 0.77 | 0.51 |
| | Within Groups | 12851.72 | 1289.00 | 9.97 | | |
| | Total | 12874.72 | 1292.00 | | | |
| Constipation | Between Groups | 54.44 | 3.00 | 18.15 | 1.59 | 0.19 |
| | Within Groups | 14772.67 | 1293.00 | 11.43 | | |
| | Total | 14827.11 | 1296.00 | | | |
| Diarrhea | Between Groups | 51.68 | 3.00 | 17.23 | 1.50 | 0.21 |
| | Within Groups | 14887.35 | 1295.00 | 11.50 | | |
| | Total | 14939.03 | 1298.00 | | | |

Stress and Izumo Scores

There was a statistically significant difference in total Izumo score among students and stress, as well as in the reflux domain, pain domain, fullness domain, constipation domain, and diarrhea domain; shown in table 14. The total Izumo score for stress determined by one-way ANOVA was ($F(4,1245) = 17.84, p = 0.00$).

Table 14. One-Way ANOVA, GI Symptoms and Stress

| | | Sum of Squares | df | Mean Square | F | Sig. |
|-------------------|----------------|-----------------------|-----------|--------------------|----------|-------------|
| Total Izumo Score | Between Groups | 9066.70 | 4.00 | 2266.68 | 17.84 | 0.00 |
| | Within Groups | 158171.08 | 1245.00 | 127.05 | | |
| | Total | 167237.78 | 1249.00 | | | |
| Reflux | Between Groups | 143.18 | 4.00 | 35.79 | 4.35 | 0.00 |
| | Within Groups | 10667.96 | 1296.00 | 8.23 | | |
| | Total | 10811.13 | 1300.00 | | | |
| Pain | Between Groups | 165.38 | 4.00 | 41.35 | 5.65 | 0.00 |
| | Within Groups | 9468.20 | 1293.00 | 7.32 | | |
| | Total | 9633.58 | 1297.00 | | | |
| Fullness | Between Groups | 502.94 | 4.00 | 125.73 | 13.09 | 0.00 |
| | Within Groups | 12377.10 | 1289.00 | 9.60 | | |
| | Total | 12880.03 | 1293.00 | | | |
| Constipation | Between Groups | 702.68 | 4.00 | 175.67 | 16.03 | 0.00 |
| | Within Groups | 14174.16 | 1293.00 | 10.96 | | |
| | Total | 14876.84 | 1297.00 | | | |
| Diarrhea | Between Groups | 550.90 | 4.00 | 137.72 | 12.36 | 0.00 |
| | Within Groups | 14429.03 | 1295.00 | 11.14 | | |
| | Total | 14979.92 | 1299.00 | | | |

Sleep and Izumo Scores

There was a statistically significant difference in total Izumo score among students and their sleeping, as well as in the pain domain, fullness domain, and constipation domain; shown in table 15. The total Izumo score for sleep determined by one-way ANOVA was ($F(4,1245) = 4.43, p = 0.00$).

Table 15. One-Way ANOVA, GI Symptoms and Sleep

| | | Sum of Squares | df | Mean Square | F | Sig. |
|-------------------|----------------|----------------|---------|-------------|------|------|
| Total Izumo Score | Between Groups | 2348.95 | 4.00 | 587.24 | 4.43 | 0.00 |
| | Within Groups | 164888.83 | 1245.00 | 132.44 | | |
| | Total | 167237.78 | 1249.00 | | | |
| Reflux | Between Groups | 34.09 | 4.00 | 8.52 | 1.03 | 0.39 |
| | Within Groups | 10777.04 | 1296.00 | 8.32 | | |
| | Total | 10811.13 | 1300.00 | | | |
| Pain | Between Groups | 82.87 | 4.00 | 20.72 | 2.81 | 0.03 |
| | Within Groups | 9550.71 | 1293.00 | 7.39 | | |
| | Total | 9633.58 | 1297.00 | | | |
| Fullness | Between Groups | 225.35 | 4.00 | 56.34 | 5.74 | 0.00 |
| | Within Groups | 12654.69 | 1289.00 | 9.82 | | |
| | Total | 12880.03 | 1293.00 | | | |
| Constipation | Between Groups | 193.41 | 4.00 | 48.35 | 4.26 | 0.00 |
| | Within Groups | 14683.44 | 1293.00 | 11.36 | | |
| | Total | 14876.84 | 1297.00 | | | |
| Diarrhea | Between Groups | 81.52 | 4.00 | 20.38 | 1.77 | 0.13 |
| | Within Groups | 14898.40 | 1295.00 | 11.51 | | |
| | Total | 14979.92 | 1299.00 | | | |

Overall Health and Izumo Scores

There was a statistically significant difference in total Izumo score among students and their overall health, as well as in the reflux domain, pain domain, fullness domain, and constipation domain and diarrhea domain; shown in table 16. The total Izumo score for overall health determined by one-way ANOVA was ($F(4,1244) = 17.88, p = 0.00$).

Table 16. One-Way ANOVA, GI Symptoms and Overall Health

| | | Sum of Squares | df | Mean Square | F | Sig. |
|-------------------|----------------|-----------------------|-----------|--------------------|----------|-------------|
| Total Izumo Score | Between Groups | 9090.43 | 4.00 | 2272.61 | 17.88 | 0.00 |
| | Within Groups | 158090.70 | 1244.00 | 127.08 | | |
| | Total | 167181.12 | 1248.00 | | | |
| Reflux | Between Groups | 376.70 | 4.00 | 94.18 | 11.69 | 0.00 |
| | Within Groups | 10434.39 | 1295.00 | 8.06 | | |
| | Total | 10811.09 | 1299.00 | | | |
| Pain | Between Groups | 297.31 | 4.00 | 74.33 | 10.29 | 0.00 |
| | Within Groups | 9332.10 | 1292.00 | 7.22 | | |
| | Total | 9629.41 | 1296.00 | | | |
| Fullness | Between Groups | 459.93 | 4.00 | 114.98 | 11.93 | 0.00 |
| | Within Groups | 12412.83 | 1288.00 | 9.64 | | |
| | Total | 12872.76 | 1292.00 | | | |
| Constipation | Between Groups | 313.85 | 4.00 | 78.46 | 6.96 | 0.00 |
| | Within Groups | 14562.09 | 1292.00 | 11.27 | | |
| | Total | 14875.94 | 1296.00 | | | |
| Diarrhea | Between Groups | 485.02 | 4.00 | 121.26 | 10.83 | 0.00 |
| | Within Groups | 14492.31 | 1294.00 | 11.20 | | |
| | Total | 14977.34 | 1298.00 | | | |

DISCUSSION

Our sample included students enrolled in the Summer term of 2016. When examining the age distribution among participants, the majority of respondents were between the ages of 18-20 years of age, and the fewest number of respondents were between 27-30 years of age. The total Izumo score was not significantly different among different age distributions. That can be attributed to additional factors other than age that can be responsible for GI symptoms. When analyzing the Izumo scores by gender, there was a statistically significant difference in all domains except the reflux domain, with females reporting higher Izumo score (13.41) than males (9.13). It appears that females reported higher GI symptoms. Still keeping in mind that there were more female participants than male participants. Previous research has proven that levels of depression and anxiety are related to functional gastrointestinal disorders, and that women, especially younger women, tend to be more depressed.²¹ This further explains why females might have had a higher Izumo score.

Based on ethnicity there was a statistically significant difference in the total Izumo score, pain domain, and diarrhea domain; with American Indian, Alaskan Native, or Native Hawaiian reporting the highest mean score (18.56) and blacks reporting the lowest mean score (8.27) in total Izumo score. There were only 7 participants who identified as American Indian, Alaskan Native, or Native Hawaiian and this could be a reason why their means were so different and much higher. The second highest total Izumo score was among Whites (13.33), they were also the highest scoring in the diarrhea domain. As reported by the American Society for Gastrointestinal Endoscopy in 2015 esophageal adenocarcinoma is more prevalent among Caucasian men than in African Americans, Native Americans/Alaska Natives, and Asian

Americans.²² But other diseases like esophageal squamous cell carcinoma and gastric neoplasia were not more prevalent among Whites. When analyzing student's status at UCF by One-Way ANOVA there was a statistically significant difference in the mean of the total Izumo score as well as in all domains except the pain domain. Transfer students had the highest total Izumo score (15.87) and seniors with 90-120 credits hours had the second highest total Izumo score (14.52). This could be because transfer students face many challenges when transferring to a school as big as UCF and it is also a change of environment. When analyzing the results of One-Way ANOVA among majors, there was a statistically significant difference in the total Izumo score and the constipation domain. The major with the highest Izumo score was Chemistry, followed by Biology, and Psychology. This makes sense because if students have a major with "hard" science classes it is more likely for them to experience more stress and less sleep therefore presenting with more GI symptoms.

When analyzing the results of the One-Way ANOVA for average cigarette smoking habits there was a statistically significant difference in the means of the total Izumo score as well as all domains except constipation. The highest total Izumo score was reported by participants who smoked less than five cigarettes a day, however the bulk of students, 1184, responded that they did not smoke. It is reported that smoking prevents the production of bicarbonate ions, leaving the mucus layer susceptible to erosion which in turn gets damaged by the acid and can then cause gastric ulcers.²³ Smoking also increases ones' risk of an H. pylori infection which also leads to ulcers. One-Way ANOVA of alcohol consumption showed a statistically significant difference in the means of the total Izumo score, reflux domain, and the diarrhea domain. The highest total Izumo score (14.30) was seen among participants who drink two or three times a

week. The lowest total Izumo score was among participants who reported they never drink (10.28). These results show an association between college students who drink two or three times a week and GI symptoms. When analyzing the results of the One-Way ANOVA for binge drinking, there was a statistically significant difference in the mean of the total Izumo score as well as the pain domain for GI symptoms. Participants who responded that they binged more than four times a month had a total Izumo score of 18.47 compared to participants that responded they did not binge drink which had a total Izumo score of 11.97. Research has proven that alcohol-induced organ damage happens through an inflammatory process, and the gastrointestinal tract is included in the inflammation. Alcohol changes the intestinal microbiota composition and function, and it can also disrupt the intestinal barrier. This can explain the higher scores of the participants who reported drinking more.²⁴

The effect of diet on presence of GI symptoms was analyzed by One-Way ANOVA. The results showed a statistically significant difference in the mean of the total Izumo score as well as all domains except the pain domain. The students who reported a poor diet had the highest Izumo score (16.66) across all domains except the diarrhea domain. Therefore, showing that there is an association between poor diet and GI symptoms. The One-Way ANOVA for the questions on consumption of caffeinated beverages actually did not show any statistically significant difference in any of the domains, which did not support our hypothesis.

The analysis of stress among college students by One-Way ANOVA showed a statistically significant difference in the mean of the total Izumo score and all domains. Students that responded that they had tremendous stress received the highest total Izumo score (17.54) while student that reported that they had no stress received the lowest total Izumo score of (5.4).

These findings show an association between the amount of stress student report having and the extent of GI symptoms they present with, which support our hypothesis. These finding are supported by previous research stating that stress increases risk of disease and it also impacts the short and long term function of the GI tract. The diseases most related to emotional stress include GERD, peptic ulcers, irritable bowel syndrome, and Crohn's disease.²⁵

One-Way ANOVA of the average hours of sleep students get per night showed a statistically significant difference in the mean of the total Izumo score and all domains except reflux and diarrhea. Students who reported having 2-4 hours of sleep per night had the highest total Izumo score of 21.67 while students who reported sleeping between 6-8 had the lowest total Izumo score of 11.93. There was a statistically significant difference in the mean of the total Izumo score as well as in all domains when analyzing the results of One-Way ANOVA among overall health. Total Izumo score increased when health decreased, students that reported excellent health had a total Izumo score of 6.99 while students that reported poor health had and a total Izumo score of 19. This shows that there is an association between student's health and presence of GI symptoms.

CONCLUSION

As seen from the discussion, the One-Way ANOVA tests showed there was an association between gender, ethnicity, student status, major, cigarette smoking habits, alcohol consumption, binge drinking, diet, stress, sleeping, and overall health. The results of this study presents clear evidence that among college students, their demographics as well as lifestyle and school choices have significant associations to the amount of gastrointestinal symptoms they present with. This study can serve as a means to continue research and prove how exactly these associations are correlated with college students. Through further research, if there is a significant correlation between these factor and gastrointestinal symptoms programs and policies could be made to help students manage their lifestyles. UCF could implement their to be healthier eating options available at the Student Union. As of now there are only a few and students get bored of eating from the same places often; which could result in them making unhealthy choices later. There could be “de-stressing stations” at the library year round, with activities such as coloring books, puzzles, and snacks.

LIMITATIONS

The limitations that were encountered was the fact that the sample population was collected through convenience sampling. We were not able to pick a random sample and therefore the results may not be completely representative of the school as a whole. This study also relied on self-reporting, which can lead to recall bias and therefore some discrepancy among the results. Another limitation is that a gold standard to diagnose upper gastrointestinal disease is an endoscopy, which was not performed due to the invasive properties of the test and the need for a trained professional to do it; therefore, we used a questionnaire.

APPENDIX: RESEARCH QUESTIONNAIRE

Demographic and General Health Questions

1. How old are you?
 - a) Less than 18
 - b) 18-20
 - c) 21-23
 - d) 24-26
 - e) 27-30
 - f) 30+

2. What is your gender?
 - a) Female
 - b) Male
 - c) Other

3. How do you usually describe yourself? (*Mark all that apply*)
 - a) White
 - b) Black
 - c) Hispanic or Latino/a
 - d) Asian or Pacific Islander
 - e) American Indian, Alaskan Native, or Native Hawaiian
 - f) Biracial or Multiracial
 - g) Other

4. What is your status at UCF?
 - a) Freshman (1-30 credit hours)
 - b) Sophomore (31-60 credit hours)
 - c) Junior (61-90 credit hours)
 - d) Senior (91-120 credit hours)
 - e) Senior (120+ credit hours)
 - f) Graduate or Professional Student
 - g) Non-degree Seeking Student
 - h) Transfer Student

5. If you are an undergrad student how did you start your college study at UCF?
 - a) I started as a freshmen
 - b) I started at a community/state college and finished an AA or AS degree then transferred to UCF
 - c) I transferred to UCF from another 4-year college or university without an AA or AS
 - d) Other, please specify _____

e) I am not an undergrad student

6. What is your enrollment status?

- a) Full-time
- b) Part-time
- c) Other: _____

7. What is your major?

- | | | |
|--------------------|----------------------|-----------------------|
| a) Psychology | k) Engineering | q) Biomedical Science |
| b) Health Sciences | l) Criminal Justice | r) Chemistry |
| c) Biology | m) Political Science | s) Computers |
| d) Nursing | n) Advertising | t) Economics |
| e) Business | o) Art | u) English |
| f) Education | p) Athletic Training | v) Music |
| g) Accounting | | w) Other _____ |
| h) Management | | |
| i) Finance | | |
| j) Marketing | | |

8. Are you currently working?

- a) Yes, full-time
- b) Yes, part-time
- c) I am not currently working

Smoking:

9. What do you smoke?

- a. Cigarettes
- b. Hookah
- c. Cigars, cigarillos, or little cigars
- d. I do not smoke

10. How would you describe your average cigarette smoking habits?

- a) I do not smoke cigarettes
- b) I smoke less than five cigarettes per month
- c) I smoke more than five cigarettes per month, but not everyday
- d) I smoke cigarettes everyday

11. If you smoke cigarettes, when did you start smoking?

- a) Within the past six months
- b) Within the past two years
- c) Longer than two years ago

12. How would you describe your average Hookah smoking habits?

- a. I do not smoke Hookah
- b. I smoke Hookah less than five times per month

- c. I smoke Hookah more than five times per month, but not everyday
 - d. I smoke Hookah everyday
13. How would you describe your average cigars, cigarillos, or little cigars smoking habits?
- a. I do not smoke cigars, cigarillos, or little cigars
 - b. I smoke less than five cigars, cigarillos, or little cigars per month
 - c. I smoke more than five cigars, cigarillos, or little cigars per month, but not everyday
 - d. I smoke cigars, cigarillos, or little cigars everyday

Alcohol:

14. How often do you have a drink containing alcohol?
- a. Never
 - b. Monthly or less
 - c. Two to four times a week
 - d. Two or three times a week
 - e. Four or more times a week
15. How many drinks containing alcohol do you have on a typical day when you are drinking?
- a. 1 or 2
 - b. 3 or 4
 - c. 5 or 6
 - d. 7 or 9
 - e. 10 or more
16. How would you best describe yourself in terms of your current use of alcohol?
- a. Abstainer
 - b. Abstainer- former problem drinker in recovery
 - c. Infrequent drinker
 - d. Moderate drinker
 - e. Heavy drinker
 - f. Problem drinker
17. In an average month, how many times do you binge drink? Binge drinking corresponds to 5 or more drinks on a single occasion for men or 4 or more drinks on a single occasion for women.
- a) I do not binge drink
 - b) 1 time
 - c) 2 times
 - d) 3 times
 - e) 4 times
 - f) 5 or more times

Diet and Medication:

18. In general, how healthy is your overall diet? Would you say
- Excellent
 - Very good
 - Good
 - Fair
 - Poor
19. Which meals do you eat regularly? (pick all they apply)
- Breakfast
 - Lunch
 - Brunch
 - Dinner
20. How often do you drink caffeinated beverages? (I.e. coffee, tea, energy drinks, pop, etc.)
- Rarely
 - Often
 - Daily
 - I do not drink caffeinated beverages
21. Are you currently taking over the counter medications? (Nonsteroidal anti-inflammatory medications- NSAIDs)
- No
 - Ibuprofen (Advil, Motrin, Nuprin)
 - Aspirin (Bayer, Bufferin, Excedrin)
 - Naproxen (Aleve, Naproysin)
 - Other, please list the medications _____

Stress:

22. Within the last 12 months, how would you rate the overall level of stress you have experienced?
- No stress
 - Less than average stress
 - Average stress
 - More than average stress
 - Tremendous stress
23. When you are feeling more than average stress, which of the following applies?
- I make worse health-related choices than usual.
 - I make about the same health-related choices.
 - I make better health-related choices than usual.

Sleeping Habits:

24. On average how many hours of sleep do you get per night?
- a) More than 8 hours
 - b) 6-8 hours
 - c) 4-6 hours
 - d) 2-4 hours
 - e) Less than 2 hours
25. In regard to sleepiness (feeling sleep, struggling to stay awake) how do you describe your feeling during your daytime activities?
- a) I feel well rested
 - b) I feel sleepy/tired at the end of the day
 - c) I feel sleepy/tired throughout most of the day
 - d) I am always sleepy/tired
26. Have you been diagnosed with following?
- a. Diabetes
 - b. Thyroid disease
 - c. Hypertension
 - d. Gastritis
 - e. Acid reflux
 - f. Ulcers in GI
27. In general, would you say your overall health is,
- a. Excellent
 - b. Very good
 - c. Good
 - d. Fair
 - e. Poor

Izumo Scale for Abdominal Symptom-Related QOL

28. Are you bothered by acid reflux?
- a) Not bothered
 - b) Not so bothered
 - c) Slightly bothered
 - d) Bothered
 - e) Strongly bothered
 - f) Intolerably bothered
29. Are you bothered by heartburn centered in the anterior chest?

- a) Not bothered
- b) Not so bothered
- c) Slightly bothered
- d) Bothered
- e) Strongly bothered
- f) Intolerably bothered

30. Are you bothered by throat discomfort?

- a) Not bothered
- b) Not so bothered
- c) Slightly bothered
- d) Bothered
- e) Strongly bothered
- f) Intolerably bothered

31. Are you bothered by epigastric pain (pain localized to the region of the upper abdomen immediately below the ribs)?

- a) Not bothered
- b) Not so bothered
- c) Slightly bothered
- d) Bothered
- e) Strongly bothered
- f) Intolerably bothered

32. Are you bothered by hunger epigastric pain (pain localized to the region of the upper abdomen immediately below the ribs due to hunger)?

- a) Not bothered
- b) Not so bothered
- c) Slightly bothered
- d) Bothered
- e) Strongly bothered
- f) Intolerably bothered

33. Are you bothered by an epigastric burning sensation (burning in region of the upper abdomen immediately below the ribs)?

- a) Not bothered
- b) Not so bothered
- c) Slightly bothered
- d) Bothered
- e) Strongly bothered
- f) Intolerably bothered

34. Are you bothered by early satiation (feeling full after eating a little)?

- a) Not bothered

- b) Not so bothered
 - c) Slightly bothered
 - d) Bothered
 - e) Strongly bothered
 - f) Intolerably bothered
35. Are you bothered by post-prandial long-lasting epigastric fullness or nausea (fullness/nausea after eating in the region of the upper abdomen immediately below the rib)?
- a) Not bothered
 - b) Not so bothered
 - c) Slightly bothered
 - d) Bothered
 - e) Strongly bothered
 - f) Intolerably bothered
36. Are you bothered by epigastric bloating (bloating in region of the upper abdominal immediately below the ribs)?
- a) Not bothered
 - b) Not so bothered
 - c) Slightly bothered
 - d) Bothered
 - e) Strongly bothered
 - f) Intolerably bothered
37. Are you bothered by a feeling of incomplete defecation?
- g) Not bothered
 - h) Not so bothered
 - i) Slightly bothered
 - j) Bothered
 - k) Strongly bothered
 - l) Intolerably bothered
38. Are you bothered by constipation or hard stool?
- a) Not bothered
 - b) Not so bothered
 - c) Slightly bothered
 - d) Bothered
 - e) Strongly bothered
 - f) Intolerably bothered
39. Are you bothered by stress-related constipation?
- a) Not bothered
 - b) Not so bothered
 - c) Slightly bothered

- d) Bothered
- e) Strongly bothered
- f) Intolerably bothered

40. Are you bothered by fecal urgency?

- a) Not bothered
- b) Not so bothered
- c) Slightly bothered
- d) Bothered
- e) Strongly bothered
- f) Intolerably bothered

41. Are you bothered by diarrhea soft stool?

- a) Not bothered
- b) Not so bothered
- c) Slightly bothered
- d) Bothered
- e) Strongly bothered
- f) Intolerably bothered

42. Are you bothered by stress-related diarrhea?

- a) Not bothered
- b) Not so bothered
- c) Slightly bothered
- d) Bothered
- e) Strongly bothered
- f) Intolerably bothered

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