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Migraine Headaches: Are they an issue at Carroll College?

Brandon Saiki
Carroll College, Helena, MT

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Migraine Headaches:

Are they an issue at Carroll College?

Brandon A. Saiki

Carroll College

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This thesis is dedicated to my close friends and peers at Carroll College who
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always known to embody the strength, character, and spirit of a Fighting Saint.
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Abstract

Migraine headaches have a significant impact on many college and university students. College students are younger and often healthier than older adults, but sometimes lead stressful lifestyles that may contribute to an increased risk of headaches. A cross-sectional survey was administered at Carroll College in Helena, MT, USA during the fall semester of 2012, to determine overall migraine prevalence, as well as prevalence in students sleeping less than 6 hours per night, reporting high levels of stress, and viewing electronic screens more than 10 hours per day. Among the 1,508 enrolled students at time of study, 546 surveys were administered and returned. Migraine headache prevalence among Carroll students was estimated at 50.2% compared to an average of 22-25% estimated in other college populations. Migraine prevalence was 1.31 times higher among students who slept less than 6 hours each night and 1.16 times greater among students reporting constant and/or high levels of stress. Prevalence was the same among students with varying hours of exposure to electronic screens. The research suggested sleep education and stress relief methods for matriculating freshmen may be beneficial for reducing rates of migraines among students. Further research is needed before statistical associations between migraines and risk factors like sleep deprivation, stress, or use of electronics can be drawn. Furthermore, effects of migraines on ADLs like performing personal hygiene practices, ambulation, and housework should be further evaluated. Data concerning migraines from similar private institutions in Montana would allow for comparisons between undergraduate students of colleges within the region.

Keywords: migraine; headache; college student; university student; academic performance; quality of life; symptoms
Introduction

Prevalence of Headaches in the United States

Across the United States, the most frequently reported symptom to a primary care provider is a headache (Bigal, Bigal, Betti, Bordini & Speciali, 2001). Headaches are so common and pervasive that it is widely believed that almost all people experience a headache at least once in their lives (Ryan & Ryan, 1978). Furthermore, research has shown that between 50-70% of the U.S. population has suffered from symptoms such as throbbing pain, photophobia, or phonophobia as a result of a headache (Andrasik, Holroyd & Abell, 1979). While headaches are common, the majority of people in the United States only experience transient headaches (Koellner, 1987).

Transient headaches are headaches that have no significant, discernible impact on an individual’s daily lifestyle. This form of headache is never painful enough for an individual to develop symptoms that preclude seeking out professional medical treatment (Koellner, 1987).

Conversely, the large majority of individuals who contact a primary care provider are often diagnosed with a migraine and/or muscle contraction headache (Koellner, 1987). Lance, Curran, and Anthony (1965), found that at one clinic specializing in the study and treatment of headaches, 94% of the patients surveyed were diagnosed with either a migraine and/or muscle contraction headache.

Previous research has estimated that between 11-29% of individuals who suffer migraine headaches will do so for the rest of their life; furthermore, 11% of the total population of migraine headache sufferers may be subjected to the onset of a migraine at any time (Rasmussen, Jensen, Schroll & Olesen, 1991; Stewart, Lipton, Celentano &
Migraine headaches can be so severe and debilitating that the World Health Organization (WHO) found in a survey, that migraine headaches were considered one of the most debilitating, chronic disorders (Menkin, Munsat & Toole, 2000).

**Associated Health Outcomes**

Regardless of cause, the consequences of migraine headaches can be severe. Migraine headaches can be especially debilitating and have significant consequences on daily life (Souza-e-Silva & Rocha-Filho, 2011). For example, they have been associated with reduced quality of life, moodiness, irregular behavior, lowered physical capacity, and decreased health perception (Levor, Cohen, Naliboff, McArthur & Heuser, 1986; Bigal et al., 2001).

Migraine headaches have direct and indirect economic implications as well. Direct costs include those associated with medical care billing and transportation costs, while indirect costs include lost productivity from sick days or missed school days (Lipton, Diamond, Reed, Diamond & Stewart, 2001; Lipton, Bigal, Scher & Stewart, 2003; Falavigna et al., 2010). Overall productivity within the workplace and in the classroom can also be significantly diminished (Ferrari, 1998; Bigal et al., 2001).

In the U.S. alone, migraines cost the country $1.4 to $17 billion annually (Souza-e-Silva & Rocha-Filho, 2011). The reason for the large range in cost is because the true impacts of migraine headaches are very difficult to measure. A simple measure of missed workdays may not truly reflect the actual loss in productivity. Many migraine headache sufferers attend work, but may perform much less efficiently. This is known as “presenteeism” (Lucas, 2004).
The Classification of Headaches

Up until 1988, the medical profession used the criteria set forth by the Ad Hoc Committee on Classification of Headache in order to diagnose headaches (Koellner, 1987). This standardized criterion was used to establish 15 different types of headaches. Of the different types, migraine headaches, muscle contraction headaches, or a combination of both were found to be the most common (Lance et al., 1965).

From a foundational standpoint, headaches are often broadly classified as either vascular or migraine. Migraine headaches are classical, ophthalmoplegic, or are designated as common and complicated (Koellner, 1987). On the other hand, vascular headaches are classified into cluster, toxic vascular, and hypertensive headaches (Koellner, 1987). Nevertheless, among the most collective forms of vascular headaches is the common or the classical form of the migraine headache (Ryan & Ryan, 1978; Lance, 1982).

Current criteria are more detailed and offer more distinct operational definitions than the previous system (Kunkel, 1993). Although the IHS outlined all of the different types of headaches in its publication in 1988 and its updated version in 2004, only the migraine headache will be reviewed here.

History and Diagnosis of the Migraine Headache

Under the original diagnosis criteria in 1962, migraines were designated as either classical or common. Both a classical and common migraine headache was characterized as unilateral and was believed to affect the frontotemporal region of the brain (Ad Hoc Committee, 1962). Both forms were associated with a dull, but aching pain that became
increasingly piercing and throbbing as the concentration of pain increased within the body.

On the surface, the common and the classical migraine are very similar in nature. The difference lies in the prodrome phase of the migraine and the duration in which the migraine exists, which is discussed below.

When the IHS revised the classification system, the basic migraine terminology was revised as well. A classic migraine was thereafter referred to as *migraine with aura* and a common migraine was referred to as *migraine without aura*. Each form came with its own specified, detailed criteria.

An individual is diagnosed with migraine without aura if he or she undergoes five separate migraine attacks that last a duration of 4 to 72 hours and possess at least two of the following defining characteristics: (1) a unilateral location of pain, (2) pulsation, (3) pain characterized as either moderate or severe, or (4) exacerbation via routine activities or activities of daily living (ADLs). The individual must also suffer from at least one common symptom associated with migraine without aura such as nausea and/or vomiting, an irregular intolerance to the perception of light, or a fear of loud noises or sounds.

In order to be diagnosed with migraine with aura, an individual must experience at least two headaches that meet the standardized criteria for migraine without aura, but the individual must also be subjected to additional symptoms. These individuals experience at least three of the proceeding diagnostic criteria: (1) reversible aura symptoms suggesting possible dysfunction of the cerebral cortex or brainstem, (2) at least one successive aura symptom that gradually progresses over the course of more than four minutes or two or more successive symptoms, (3) no aura symptom with a duration
greater than one hour, and/or (4) a headache with symptoms of aura that are followed successively with an interval of less than one hour with no symptoms at all (Saper, Silberstein, Gordon, Hamel & Swidan, 1999).

Notably, both migraine without aura and migraine with aura have four phases. The onset of these phases can either be independent of one another or can be blended among the other phases. These phases, in order of common succession, are prodrone, aura, headache, and postdrome (Saper et al., 1999).

The prodrone phase typically is associated with symptoms that precede the onset of the headache. This can typically occur anywhere from a few hours to even a few days prior. Generally, these symptoms are either characterized as neurological, autonomic, or mental (Saper et al., 1999). Neurological symptoms can be anything from an increased case of photophobia or phonophobia to an increase in sensitivity towards certain smells. Autonomic symptoms include, but are not limited to: vasoconstriction of the peripheral artery and/or an irregular rate of constipation, diarrhea, or urination (Saper et al., 1999). Finally, mental symptoms may vary widely among individuals, but may include mood swings, depression, bouts of anger, and even cases of euphoria (Saper et al., 1999).

As for the aura phase, the onset is generally 15-20 minutes before the commencement of the headache and can even occur simultaneously (Saper et al., 1999). However, in some cases, the aura can arise without a headache. This is referred to as “migraine aura without headache” or “migraine equivalents” or an “acephalgic migraine” (Kunkel, 2005). This type of migraine is characterized with symptoms suggesting migrainous auras, but the symptoms are not followed by the onset of a headache (Kunkel, 2005).
The IHS (2004) defines an aura as a “recurrent disorder manifesting in attacks of reversible focal neurological symptoms that usually develop gradually over 5 to 20 minutes and last for less than 60 minutes.” Specifically, these symptoms are generally visual in nature and can include a sensitivity to light or flashes of light and scotomata (Saper et al., 1999).

The headache phase is often the most painful and can last anywhere between four hours to multiple days (Saper et al., 1999). Although traditionally it was thought that migraine headaches occurred in a specific location in the frontotemporal region of the brain, research has shown that there is not a specific location in which that pain exists. In roughly 60% of cases, the pain is unilateral (Saper et al., 1999). In all other cases, the pain is bilateral. While most individuals suffer some sort of pain during their migraine, some are fortunate to not experience any pain at all. Common symptoms can range from visual disturbances to gastrointestinal issues and may compromise the autonomic, motor, and sensory functions of the body (Saper et al., 1999).

Lastly, individuals in the postdrome phase often have symptoms that are characterized by fatigue, weariness, weakness, aches and pains, and problems with concentration even in performing routine activities or ADLs (Saper et al., 1999).

**Migraine Headache Epidemiology**

The exact cause of migraine headaches remains unknown. Nevertheless, numerous risk factors have been identified or suggested as possible causes (Diamond & Dalessio, 1982; Lance, 1982). These include, but are not limited to: diet, amount of sleep, consumption of alcohol, the amount of time spent in front of a computer, TV, or other electronic screen, and stress (Saper, 1983; Peatfield, 1995; Lance & Goudsby, 1998).
Migraine headaches can also be attributed to genetics and family history. In fact, individuals with a family history of migraines are almost 45-50% more likely to experience migraine headaches (Laurence, 1987; Stewart, Staffa, Lipton & Ottmann, 1997). Laurence (1987) noted that children with both biological parents experiencing migraines have up to a 70% chance of developing migraines as well.

Recent findings in population-based studies have also suggested that Caucasians and lower socioeconomic groups are more likely to have migraine headaches than other races or higher socioeconomic classes (Stewart, Lipton & Liberman, 1996; Lipton et al., 2001; Perry Carson et al., 2004). Further research is needed to give more credence to the relationship between race, socioeconomic status, and/or genetic history as it relates to the prevalence of migraine headaches.

Beyond these findings, the International Association for the Study of Pain (IASP) (1986), identified stress as a significant precipitator of migraine headaches. One study suggested that almost half of the migraine headaches suffered by individuals were a result of stressful events or situations (Henryk-Gutt & Rees, 1973).

Migraine headaches have also been linked to other external factors such as gender. Research has shown that the prevalence of migraine headaches among women can vary between 5-25%, while that number is significantly lower for men at 2-10% (Stewart, Linet, Celentano, Van Natta & Ziegler, 1991; Lipton, Stewart, Diamond, Diamond & Reed, 2001; Perry Carson et al, 2004). In fact, in a number of different research studies, researchers found that females were roughly 2.5 times more likely to experience a migraine headache than their male counterparts (Rasmussen, Jensen, Schroll
& Olesen, 1992). Nevertheless, both men and women have been found to have a high likelihood of experiencing a disability from a migraine headache (Lipton et al., 2001).

The Effect of Migraines on College and University Students

Although college students are a younger and generally healthier group of adults, students lead stressful lifestyles that may increase risk of migraine headaches. Fortunately, just like older adults, the majority of students only suffer from a tension-type headache (Koellner, 1987). According to the National Headache Foundation (2009), the general cause of these types of headaches is a result of neurological or chemical imbalances in the brain or the tightening of muscles around the posterior portion of the neck or scalp.

Nevertheless, college and university students can also be especially vulnerable to migraine headaches. Stress, lack of sleep, alcohol consumption, consumption of certain foods, exposure to loud or sharp noises, menstruation in women, environmental conditions, hunger, and other lifestyle factors that students experience, may have significant impacts on vulnerability to headaches (Martin, Milech & Nathan, 1993; Newman, Lipton & Solomon, 1993; Peatfield, 1995; Lance & Goudsby, 1998).

In one study, researchers found that fatigue or a sign of weariness after a full night’s rest was associated with a migraine headache in men (Rasmussen, 1993). Other research has suggested that individuals who suffer from migraine headaches respond and cope with the stress of daily life in a different way than do non-headache individuals (Ehde & Holm, 1992).

Regardless of cause, migraine headaches can have significant consequences on college and university populations. In a review of primary literature, six out of seven
studies found an association between migraines and reduced academic performance due to missed school days, impaired ability to focus, reduced productivity, and reduced overall function (Bigal et al., 2001; Demirkikan et al., 2006, Falavigna et al., 2010; Oztora et al., 2011; Smitherman, McDermott & Buchanan, 2011; Timothy, Mava, Bashir & Bwala, 2012). Only one study could not find a causal relationship between migraines and poor academic performance (Souza-e-Silva & Rocha-Filho, 2011) (Table 1).

Table 1. Summary of studies linking migraine headaches to academic performance in college and university populations.

<table>
<thead>
<tr>
<th>Study / Year</th>
<th>Population Sample Size</th>
<th>Outcome Measured</th>
<th>Overall Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Souza-e-Silva &amp; Rocha-Filho, 2011</td>
<td>344 students</td>
<td>1-year prevalence of headaches, implications, and connections between headaches and academic performance in a university population</td>
<td>Prevalence of headaches in the university population: 87.2%. Prevalence of migraine headaches: 48.5%. Over 3 months, 8.5% sought emergency services, 30.8% missed class, and 30.8% had a reduction in their productive capacity because of headache.</td>
</tr>
<tr>
<td>Smitherman et al., 2011</td>
<td>391 students</td>
<td>Impact of migraines on college students in terms of quality of life, functional impairment, and comorbid psychiatric symptoms.</td>
<td>Compared to those not screened positive for migraines, the migraine positive-group reported reduced quality of life on 5 out of 6 domains, higher frequency of missed school days (2.74 vs. 1.36), impaired functioning at home (2.84 vs. 1.21 days), and medical visits (1.86 vs. 0.95).</td>
</tr>
<tr>
<td>Oztora et al., 2011</td>
<td>3,694 students</td>
<td>Determination of prevalence of migraine headaches and the accompanying morbidities associated</td>
<td>1,613 students had at least 2 headaches over a period of three months. 266 or 7.2% of the subjects were diagnosed with a migraine-type headache based on criteria set forth in the ID-M migraine test. Of the migraine group, 27.1% were male and 72.9% were female. No correlation could be made between adolescent and adult groups and prevalence of migraines.</td>
</tr>
<tr>
<td>Falavigna et al., 2010</td>
<td>1,273 undergraduate students (1,092 meet inclusion criteria)</td>
<td>Determination of prevalence, characteristics, and impact of headaches among university students</td>
<td>74.5% had at least one headache in the last three months. Migraine was the headache type with the most reported disability (46.7%). This result is significant because there are migration-based school days among patients with headache suffers over the course of the three-month study.</td>
</tr>
<tr>
<td>Timothy et al., 2012</td>
<td>1,090 students from 5 Science and 5 Art based faculties</td>
<td>Evaluation of the impact of migraine headaches on academic performance</td>
<td>35% of these studied had less than a 25% reduction in academic performance due to a migraine attack. 45% had between 25% and 50% reduction in academics. 12% had 50-75% while 9.5% had greater than 75% reduction in academic performance as a result of a migraine headache.</td>
</tr>
<tr>
<td>Bigal et al., 2001</td>
<td>1,022 students</td>
<td>Determination of the prevalence of migraine and tension-type headaches in a university population and its impact on academic performance and quality of life</td>
<td>25% of students had migraine headaches. 62.7% of those who had migraines reported a decrease in productivity while studying. Migraine students also missed more school.</td>
</tr>
<tr>
<td>Demirkikan et al., 2006</td>
<td>1,029 students</td>
<td>Estimation of the prevalence of migraine and the disability and treatments of university students in Turkey</td>
<td>12.4% of students reported migraine headaches. 41.4% of students with migraines had severe degrees of disability. Migraine attacks were associated with considerable handicap in activities of daily living (ADLs).</td>
</tr>
</tbody>
</table>

There also appeared to be an association between prevalence of migraine headaches and disability. The severity of the headache was shown to have considerable influence in a person’s ability to perform ADLs (Demirkikan et al., 2006; Oztora et al., 2011). These episodes led students with migraines to seek emergency services more often
than students without migraines, resulting in a greater frequency of visits to a hospital or a clinic (Smitherman et al., 2011; Souza-e-Silva & Rocha-Filho, 2011).

Yet amidst these results, there have been few studies published on the effects and the prevalence of migraine headaches in colleges in the U.S., and even fewer studies regarding migraine headaches in smaller private, liberal arts institutions.

Statement of Purpose

The purpose of this study was to estimate the prevalence of migraine headaches in the student population at Carroll College in Helena, MT, USA and to examine possible triggers leading to migraine headaches. This included amount of sleep, amount of time spent on an electronic device, and level of stress. The secondary purpose of this study was to examine qualitative data and defining characteristics of students reporting migraine headaches. These included a student’s perception about migraine headaches and the effect they have on academic performance such as decreased GPA, absenteeism, failure of a course, the need to retake or reschedule an exam, and effect on the ability to perform ADLs.

Hypotheses

1. Migraine prevalence at Carroll College will not differ from the average migraine prevalence estimated for other college and university populations in the U.S.

2. Migraine prevalence will not differ among students at Carroll who sleep less than 6 hours each night and those who sleep more than 6 hours each night.

3. Migraine prevalence will not differ among Carroll students that are exposed to less than 10 hours of electronic screen time each week and those who are exposed to more than 10 hours of electronic screen time each week.
4. Migraine prevalence will not differ among Carroll students who report up to occasional stress and those who report constant and/or high levels of stress.

Methods

Setting

This study was conducted at Carroll College in Helena, MT, USA. Carroll was founded in 1909 and exists as a private, Catholic, diocesan institution in the ecumenical tradition of the Second Vatican Council. It is categorized as a 4-year liberal arts and pre-professional college with over 60 majors, minors, and pre-professional programs. It traditionally ranks as one of the finest colleges in the western region of the United States and is affiliated with the NAIA and the Frontier Conference. The Fighting Saints boasted an undergraduate enrollment of 1,386 and a total enrollment of 1,508 for the fall semester of 2012 at the time of the survey. It is accredited under the authority of the Northwest Commission on Colleges and Universities in Redmond, Washington.

Instruments

A cross-sectional survey was administered to gather data on migraine headaches among Carroll College students (Appendix A). It was designed to collect general quantitative data.

The survey included 17 different questions aimed at gathering demographic and baseline information so as to evaluate which trigger factors may be effectual in those experiencing migraine headaches.

The questions specifically pertained to the severity of a migraine headache, location of onset, and possible trigger factors such as sleep patterns, screen time, and stress levels. Outcomes of migraine headaches included missed school days, rescheduling
or retaking an exam, failure of a course, decreased GPA, and/or reduced ability to perform ADLs.

**Study Design**

Following approval by the Carroll College Institutional Review Board (IRB) for a study involving human subjects, a cross-sectional survey was administered to student volunteers in 23 academic courses on campus (Appendix B). This yielded 546 respondents enrolled at Carroll College for the fall semester of academic calendar year 2012-2013.

Courses offered during the fall semester of 2012 were randomly selected to participate in the survey. In order to include freshman, sophomores, juniors, and seniors, classes were pooled according to the primary targeted audience of the course. Once the class was randomly selected among the four pools, the instructor was contacted to receive permission to administer the survey. Upon receiving permission, the survey was administered to all students on the class roster that were in attendance on the day of the survey.

Students were informed of their right to abstain and that completion of parts or any of the survey was entirely voluntary. No identifiable information of the participants was collected and no incentive was given to participants to complete the survey. Furthermore, no training regarding the characteristics of migraines was provided prior to administration of the survey. The intent was to obtain a population threshold of at least 30% or 452 students of the total college enrollment of 1,508 students for the fall semester of academic calendar year 2012-2013.
Definitions

- Migraines headaches were defined as “Vascular headaches associated with changes in the size of the arteries within and outside of the brain resulting in the influx of some neuropeptides mediating the attacks of severe headache” (Timothy et al., 2012).

- A college student was defined as a Carroll College student who was enrolled in any capacity (full-time, part-time, or other) for the fall semester of academic calendar year of 2012-2013.

Data / Statistical Analysis

Data from the cross-sectional surveys were entered into a Microsoft Excel spreadsheet in order to calculate prevalence. Data were sorted and categorized onto separate sheets according to whether or not the respondent had ever experienced a migraine headache. Raw counts of 16 out of the 17 questions of the cross-sectional survey were computed via a pivot table so that prevalence ratios could be performed to compare migraine prevalence at Carroll to other colleges. They were also used to examine prevalence of migraine headaches as related to sleep patterns, electronic screen time, and stress.

Prevalence ratios were used in order to test the four hypotheses of the study:

Hypothesis #1:

In order to compare data of Carroll College to other cross-sectional studies on migraine headaches among college students, a prevalence ratio was computed. The prevalence of migraine headaches among the respondents of the survey at Carroll College was divided by the average prevalence of migraine headaches among college and
university populations found in the primary literature (22-25%) (Bicakci, Bozedemi, Over, Saatci & Sarica, 2008). Due to the range of average prevalence, a range was computed for the prevalence ratio.

Hypothesis #2:

A prevalence ratio was also calculated to compare prevalence of migraine headaches in students at Carroll College sleeping less than 6 hours each night to those sleeping more than 6 hours per night. Prevalence rates for each group were found by dividing the number of students with migraines in each sleep group by the total number in each group.

Hypothesis #3:

Similarly, a prevalence ratio was calculated to compare prevalence of migraine headaches in those who were exposed to more than 10 hours of screen time versus those who viewed less than 10 hours of screen time per week. Prevalence of migraine headache sufferers with greater than 10 hours of screen time per week was divided by the prevalence of migraine headache sufferers with less than 10 hours of screen time per week in order to find the prevalence ratio.

Hypothesis #4:

Lastly, prevalence of migraine headaches was assessed as it related to the level of stress of students at Carroll College. Levels of stress were categorized between those who were stress-free or experienced any level of stress that was only occasional or intermittent to those who experienced constant and/or high levels of stress. In order to compute the prevalence ratio, the prevalence of migraine headache sufferers with constant and/or high
stress was divided by the prevalence of migraine headache sufferers who reported less than or occasional stress.

Of those who had experienced a migraine headache, migraine headache frequency, a mean, and a median of pain severity were reported. Qualitative data were compiled regarding student perception about migraine headaches, effect on academic performance such as decreased GPA, absenteeism, failure of a course, and the need to retake or reschedule an exam. Finally, qualitative data were provided as to whether migraine headache sufferers believed that a migraine had an adverse effect on the ability to perform ADLs.

**Results**

The primary purpose of the study was to estimate the prevalence of migraine headaches among Carroll College students compared to the average prevalence of migraine headaches in other college and university populations found in the primary literature. Additionally, prevalence rates were compared for students with migraine headaches to examine three possible trigger factors: sleep time, electronic screen time, and stress.

There were a total of 546 students in this study comprising 36.2% of the total enrollment of the college at the time of the survey. Two hundred two students were identified as male, 342 as female, and 2 provided no answer. Five hundred thirty four students stated that their current enrollment at Carroll College for the fall semester of 2012 was full time, 6 students were enrolled as part time, 2 were auditing the respective surveyed course, and 4 marked “Other.” The “Other” designation was used to describe non-traditional students who were enrolled as a post-baccalaureate student, a senior
citizen, a student enrolled in college courses, but still in high school, a student enrolled in courses as part of the pastoral ministry, or a student pursuing continuing education (CE) credits.

Of the students surveyed, 30.8% were freshman, 20.0% were sophomores, 27.5% were juniors, and 20.1% were seniors (including fifth-year seniors). Only 1.6% of students marked “Other” indicating that they were not registered as a traditional undergraduate student at Carroll.

Among those surveyed, 50.2% stated that they had experienced a migraine headache. Of all females, 55.6% reported a migraine compared to 41.1% of male respondents. These data suggested that 1.3 times more females than males experienced migraines at Carroll College between the spring semester of academic calendar year 2011-2012 and fall semester of academic calendar year 2012-2013.

Notably, for the fall semester of 2012, Carroll College reported 41% males and 59% females among the total enrolled population. Among the students who reported a gender on the survey, 37% were male and 63% reported female. This distribution is fairly close to the overall distribution among the campus and thus the findings of the study may be considered to be representative of the campus at-large.

A prevalence ratio was found by comparing the prevalence rate of migraine headaches at Carroll College (50.2%) and the average prevalence rate of migraine headaches in college and university populations of 22-25% (Bicakci, Bozedemi, Over, Saatci & Sarica, 2008). The prevalence ratio was found to be a range between 2.28-2.01.

The prevalence of students reporting a migraine headache and sleeping less than 6 hours per night was 57.7% compared to 44.2% of students who reported a migraine and
slept more than 6 hours per night. The prevalence ratio indicated that those who slept less than 6 hours each night were 1.31 times more likely to experience a migraine.

Notably, in assessing qualitative data, an overwhelming 74.6% perceived that lack of sleep contributed negatively to their migraine headache. In addition, of the 197 individuals who stated lack of sleep was problematic, 74.5% of those were females.

The prevalence rate in migraine headache sufferers who viewed less than 10 hours of electronic screen time was 50.2% versus a prevalence of 50.5% for those who viewed greater than 10 hours of electronic screen time each week. This yielded a prevalence ratio of 0.99. Therefore, no significant difference was observed.

Nevertheless, females in the migraine headache group reported a much lower amount of time spent on or watching an electronic device per week. Of all females reporting a migraine headache, 51.6% viewed less than 10 hours of electronic screen time per week compared to 39.8% for males reporting a migraine. On the other hand, 61.4% of males with migraine headaches reported greater than 10 hours of screen time per week as compared to 47.4% for females.

A final prevalence ratio was used to examine stress. Prevalence among migraine headache sufferers who reported up to occasional stress was 45.8% versus those who reported constant and/or high levels of stress with a prevalence of 53.0%. The prevalence ratio indicated that those who experienced more constant, high levels of stress were 1.16 times more likely to experience a migraine headache.

Among the students who reported that they had experienced a migraine headache, 79.6% stated the frequency of their migraine headaches was once a month or less. Only
18.6% stated that they suffered a migraine several times a month. A mere 3.3% of the students stated they suffered from migraines several times in a single week.

The calculated mean of migraine headache pain on a scale of 1-10 among the respondents was a 6.39 with a median of 7. Nearly 7 out of every 10 students who reported experiencing a migraine stated that the severity of their headache was between a 6 and 8 on the pain scale from 1-10 (Figure 1).

![Severity of Pain](image)

*Figure 1. Histogram of severity of pain reported by migraine headache sufferers on a scale of 1-10, with a 10 reported as worst possible pain.*

In considering how migraine headaches may affect academic performance, two questions on the survey inquired about missed school days and other academic burdens as a result of a migraine. Both questions had a specific time frame of one academic calendar year from the spring to the fall semester of 2012.

The majority of students stated that they did not miss any school days over the last year as a result of a migraine headache. No student reported missing more than 11 days. Nevertheless, nearly a quarter of students reported missing between 1-5 school days over the last year. As for other academic consequences, students noted that in some cases,
Migraine headaches caused them to have to retake or reschedule exams and caused a decrease in grade point average (GPA). Nevertheless, the majority of students stated that migraine headaches had little impact on their academic performance.

As for how migraine headaches affect quality of life, just over half of the respondents stated that migraine headaches reduced their ability to perform ADLs such as personal hygiene practices, dressing, ambulation, sleeping, housework, or using electronic devices.

**Discussion**

The primary purpose of the study was to enhance our understanding of the prevalence of migraine headaches among Carroll College students as it related to other college and university populations. The study was also intended to assess prevalence of migraine headaches as they related to sleep time, hours spent viewing an electronic screen, and level of stress.

This study builds on the primary literature as it relates to the effect of migraine headaches on college and university populations. In the proceeding section, the major findings of the cross-sectional survey are analyzed and discussed, along with limitations of research.

**Hypothesis #1: Prevalence of Migraines at Carroll College**

The results of the cross-sectional survey fail to support the null hypothesis that migraine headaches at Carroll College will not differ from the average prevalence of migraine headaches found in college and university populations in the primary literature.

Research has found that while the prevalence of migraine headaches is often greatest among 30-35 year olds, they are still frequent among both adolescents and
university students (Zarifoglu, Siva & Hayran, 1998; Zarifoglu, Karli & Taskapilioglu, 2007; Robbins & Lipton, 2010). The Carroll College student population would appear to follow that trend and even appears to have a greater prevalence of migraine headache sufferers than that of the national average.

Among the 546 students surveyed, 50.2% of the respondents stated that they had experienced a migraine headache. This finding was surprising because although it was in line with expectations that migraine headaches are frequent among college-aged adults, it reflected a remarkable departure in rate of prevalence from the average findings of the primary literature of 22-25% (Bicakci, Bozedemi, Over, Saatci & Sarica, 2008). The prevalence ratio was found to be between 2.28-2.01, which strongly suggests that the prevalence of migraine headaches among Carroll College students is at least two times greater than that of the average findings of migraine headaches among college and university populations.

With that said, a number of different studies have found a wide range of prevalence in varied college or university populations across the world. In one study of an undergraduate population in Greece, only 2.4% of students reported a migraine headache (Mitsikostas al., 1996). In another study in Southern Brazil, only 6.9% of 1,092 students stated that they had experienced a migraine headache (Falavigna et al., 2010). This was similar to a Norwegian study in which they reported 7.0% prevalence among 5,847 students (Zwart, Dyb, Holmen, Stovner & Sand, 2004). In a Croatian study among 314 students, 8.9% reported a migraine (Galinović, Vuković, Troselj, Antić & Demarin, 2009). Among 1,000 students in five science and art faculties in northeastern Nigeria, only 10.5% of students reported a migraine headache (Timothy et al., 2012). In Turkey,
the demonstrated prevalence of migraine headaches among undergraduates was 12.4% (Demirkiran et al., 2006).

All of these findings are well below the findings of the present study among Carroll students or those from the U.S. They are in line, however, with one study completed by Souza & Roche-Filho (2010), in which 48.5% reported a migraine headache.

One possible explanation for the disparity in findings of the current study versus the primary literature could be ambiguity in the question asked or lack of knowledge of what truly defines a migraine headache. No information or training about migraine headaches was provided for the survey respondent before the administration of the survey.

Migraine headaches are usually unilateral and are characterized by a severity in pain ranging from moderate to severe. When asked what was the possible range of severity of pain in students who reported a migraine headache, 29 out of the 274 students stated the severity of their migraine was anywhere from 1-3 out of a 10-point pain scale. Ninety-two students were reported pain between 4-6 and 153 of the students reported pain in the range of 7-10. The median was a 7 and the mean a 6.39. It is possible that students believed that they had experienced a migraine when perhaps it was simply a more severe tension-type headache. Tension-type headaches are often much more manageable than migraines and so a report of pain between 1 and 3 on the pain scale would possibly suggest a different type of headache than a migraine.

Nevertheless, the findings of the prevalence ratio did suggest a larger prevalence of migraine headaches among Carroll students versus the average findings of similar
studies. With 546 students completing the survey out of a total of 1,508 students enrolled for the fall semester of 2012 at the time of the survey, the data pool is large enough to suggest the results may be indicative of the Carroll College population at-large.

Notably, there were a greater number of females than males that were found to have a migraine headache among the studied population. Of the total females reporting, 55.6% reported a migraine headache compared to 41.1% of the male respondents. The ratio of females to males was 1.3, which is in line with the findings of the primary literature.

One of the most common findings in migraine headache studies regardless of age is that women are more susceptible to migraines than males (Osuntokun et al., 1987; Stewart et al., 1992; Stovner, Zwart, Hagen, Terwindt, & Pascual, 2006). It is important to note, however, that research has shown prepubescent males are more likely to experience a migraine than females (Stewart et al., 1991; Rasmussen, 1995). Nevertheless, that prevalence dramatically shifts after the onset of puberty, presumably as a result of the onset of menarche, which drives the incidence rate up in females (Lucas, 2004). Many researchers have been able to draw a correlation between menarche and the onset of a migraine headache, albeit the exact mechanism continues to be unknown (Lucas, 2004).

Nevertheless, it has been found that the female to male ratio of migraine prevalence will continue to increase until the early 40s in females and then decrease thereafter (Edmeads et al., 1993; Lipton et al., 2001). The suggested reasons for the later reversal are the development of ovarian failure, the lack of influence in hormonal cycling in older women, and the effects of aging (Silberstein & Merriam, 1997).
Hypothesis #2: Sleep Time

The findings of the present study also rejected the null hypothesis regarding migraine headaches and sleep time. Prevalence of migraine headaches among Carroll College students did vary between migraine headache sufferers that slept less than 6 hours versus those who slept more than 6 hours each night. A prevalence ratio of 1.31 was computed suggesting those sleeping less than 6 hours a night were 1.31 times more likely to report a migraine than those sleeping more than 6 hours a night. Furthermore, in a qualitative question that asked migraine headache sufferers if they believed sleep affected their migraine, an overwhelming 74.6% stated that lack of sleep was consequential to their migraine. Of those reporting that inadequate sleep affected their migraine headache, 74.5% were female.

The American Academy of Sleep Medicine (2012) notes that the amount of sleep needed each evening varies by individual, but most adults need approximately 7-8 hours of sleep each night in order to be “well rested.” Failure to obtain adequate sleep can lead to excessive daytime sleepiness, moodiness, decreased performance as a result of lack of concentration, energy, restlessness, or other factors, and reduced health perception (AASM, 2012)

Based on the findings of the study, further research should be conducted in order to perform a test that could examine correlation between sleep time and migraine headaches among college students.

Hypothesis #3: Electronic Screen Time

In the case of the cross-sectional study, the results failed to reject the null hypothesis that screen time had no effect on a migraine headache. The prevalence did not
differ among students with migraine headaches that watched less than 10 hours of screen time versus students with migraine headaches that watched more than 10 hours of screen time per week. The prevalence ratio of 0.99, suggested that the prevalence between the two groups were essentially the same.

Of course with college students, a certain amount of electronic screen time per week is a given. The pervasive use of technology among college and university populations has become an integrated part of the academic curriculum. Students are essentially forced to spend time on computers due to the expectations of teachers to turn in electronic copies of homework assignments, projects, or essays. More and more, teachers are also using electronic grading methods, requiring exclusive research via the Internet and electronic journal databases, and some instructors contact students exclusively via email.

Unfortunately, a one-time cross-sectional survey cannot suggest a correlation between migraine headaches and electronic screen time. A better method would be to conduct a retrospective or prospective cohort study. However, with a found prevalence ratio in this study of 0.99, it may be more worthwhile to further examine the effects of sleep time or stress or some other possible precipitant.

Hypothesis #4: Stress

The data rejected the null hypothesis that the prevalence would be the same among migraine headache sufferers who reported up to occasional stress versus constant and/or high levels of stress. A prevalence ratio of 1.16, suggested that those who suffer from migraines have a greater, more constant level of stress in their lives.
Notably, stress can be quite individualistic and people manage to cope with stress in many different ways. Nevertheless, with the findings of the prevalence ratio, further research should examine whether a correlation can be assessed between migraine headaches and severity of stress.

**Migraine Headaches and Academic Performance**

Although academic performance was not a testable hypothesis in this cross-sectional study, questions were asked in order to get an impression or profile of the effects of migraine headaches on academics at Carroll College. Two questions were asked regarding academic performance with the first asking about the number of days missed and the second asking about possible academic burdens associated with migraine headaches (retakes, absenteeism, failure in subjects, or decreased GPA).

The majority of students who stated they had experienced a migraine headache reported no missed school days over the last two semesters as a result of migraine headaches (62.5%). Only 27.6% of students reported missing at least one day of class with only 7 students stating they missed between 6-10 days and none remarking that they missed more than 11.

Notably, these numbers may be significantly underreported as a result of the stigmatization that is often associated with truancy (Goadsby, Lipton & Ferrari, 2002; Ojini, Okubadejo & Danesi, 2009; Timothy et al., 2011).

When asked about academic burdens, the majority of students stated that there were none. However, a much larger proportion of females than males stated that they were absent from courses as a result of a migraine headache. Twenty-four females remarked that their GPA suffered and 11 stated that they were forced to either retake or
reschedule an exam. As for males, only 16 stated they were absent from courses, 4 reported a lower GPA, and 2 had to retake an exam. Similar to the question about “absentism”, these numbers may also be underreported or a student may not be wholesomely aware of the effect that the migraine is having on their academic performance.

Nevertheless, it appears that academic performance and migraine headaches could be evaluated in order to assess whether there is a correlation. As noted earlier, in a review of primary literature, six out of seven studies did find that academic performance was reduced as a result of migraine headaches (Bigal et al., 2001; Demirkikan et al., 2006, Falavigna et al., 2010; Oztora et al., 2011; Smitherman et al., 2011; Timothy et al., 2012). Only one study was unable to draw a correlation between migraines and poor academic performance (Souza-e-Silva & Rocha-Filho, 2011).

Summary

Although no correlations can be made between specific trigger factors in this study and the prevalence or onset of migraines, there does appear to be a larger prevalence of migraine headaches among students at Carroll (50.2%) than that traditionally found in the primary literature of similarly conducted studies (22-25%). There also was a larger prevalence of migraine headache sufferers who slept less than 6 hours per night (57.7%) as compared to those who slept more than 6 hours a night (44.2%). A larger prevalence was also found in migraine headache sufferers who experienced a more constant and/or high level of stress (53.0% vs. 45.8% for those who reported being stress-free or having no more than occasional stress). Prevalence of migraine headaches as it related to varying hours of electronic screen time watched was
statistically insignificant. The prevalence ratio of 0.99 among those who viewed less than 10 hours of electronic screen time and those who viewed more than 10 hours of electronic screen time, suggested that prevalence among the two groups was statistically the same.

As a result of the findings, even where inconclusive, suggestions can be made as to how an individual student can help manage his or her migraine headaches. A common belief is that people feel they have very little control over the onset of a migraine or its severity, and in that way it can be very defeating. But there are ways to try and help prevent the migraine from ever happening and the following suggestions offer the opportunity to empower one’s self and take a proactive stance.

**Ways to Manage Migraines**

1. Headache Journal / Diary

   A headache journal or diary is one of the most effective ways to develop a better understanding of possible trigger factors, ways to reduce pain, and the effects that a migraine headache may have on daily life.

   A single snapshot in time of one particular migraine does not tell the whole story. But by recording information over a period of time, an individual can become more aware as to whether the pain is unilateral or bilateral, whether it occurs more on weekdays or weekends, or even the actual location where the majority of migraines begin (i.e. school, work, home, etc.).

   The diary can also be used to identify the severity of pain of each migraine headache on a 10-point scale and to write down all steps taken to either reduce or eliminate the pain. If an individual is using medication to combat the migraine, it can be
valuable to write down notes on side effects and overall response in order that a primary care physician may identify the right medication or treatment that is best suited for the individual.

While the information may not seem that relevant or useful at first, the truth is that if completed regularly and diligently, a headache journal could help an individual get a better grasp on the onset and occurrence of migraine headaches in the future. For instance, if the headache journal helps an individual realize that the consumption of beer seems to be closely associated with the onset of a migraine, he or she may be more conscientious in avoiding alcohol or at least limiting the intake.

The most valuable part of a headache journal or diary is that it can give a much better understanding of one’s own specific migraine pattern. As a result, it can lead to solutions that an individual may use with his or her primary care provider in order to more effectively manage migraine headaches.

2. Reduce Stress

Without question, better management of headaches requires lifestyle changes of which some may be much more difficult than others. For example, it may be easy to cut out cheese from a diet, but reducing the consumption of alcohol may not only have health implications, but social implications as well.

Furthermore, for any college student at a rigorous academic institution, it can be very difficult to avoid stress. Nevertheless, certain lifestyle changes can be impactful enough that it could create the necessary motivation to make changes that will ultimately reduce migraine pain.
Some students may state that their migraines are a result of genetic history and therefore, there is nothing to be done about it. While an individual cannot voluntarily alter their genes, lifestyle changes can still be made that may help to reduce or eliminate certain precipitators of migraines. Some may work better for others or not at all, which is why the use of a diary or journal can be especially useful.

As stated earlier, stress is often considered to be the pinnacle of trigger factors when it comes to migraine headaches (Henryk-Gutt & Rees, 1973; IASP, 1986). Although stress is essentially an inherent part of being human, finding ways to relieve stress can be especially beneficial not just for managing migraine headaches, but also for improving overall health.

Some of the basic ways to managing stress starts with exercising more regularly, but not to the point of creating fatigue. In other words, a hard work out three times a week is not required. It is more about regularity than anything else, so a nice jog, a swim, or even a brisk walk may be beneficial. Of course, a good night’s rest and a full night’s rest are also important. Of all the trigger factors in the present study, lack of sleep (less than 6 hours) appeared to have the greatest effect as it related to prevalence of migraine headaches in college students at Carroll.

Regularity in mealtimes is also important. It can sometimes be difficult with a hectic, busy schedule or class times that conflict with normal eating schedules. In that case, small, healthy snacks can be useful.

Eating breakfast is also a must. Results of a study showed that those who frequently consumed breakfast had less stress and fewer cognitive failures (Chaplin & Smith, 2011). It can be tempting to skip breakfast in order to sleep later or a person just
may feel they do not have the time; however, breakfast is necessary to ensure that essential vitamins and minerals are consumed and it helps to avoid fatigue over the course of the day.

Other useful suggestions to reduce stress are to avoid environmental factors that are shown to have an adverse effect on migraine headache sufferers. This includes glaring or flashing lights, high-pitched noises, and/or odorous perfumes, which all have been shown to trigger migraines in individuals (Salmans, 2006).

3. Cut out the foods that trigger migraines

Above all else, it is within every individual’s best interest to eat healthy and consume appropriately portioned meals. Nevertheless, even some foods that can offer health benefits, may be affecting the onset of a migraine headache. Of all the foods and drinks that have been identified as possible precipitants of migraine headaches, none are absolutely required for the continuation of life. In a lot of different cases, a substitute that is just as appetizing or thirst quenching can be found to take its place.

Of course, the very first step is to identify the different type of foods that may be possible trigger factors. In an open-ended question on the cross-sectional survey, students identified foods and drinks such as eggs, chocolate, cheese, nuts, coffee, hot dogs, red wine, red onions, yogurt, and overall sugary or processed foods as possible triggers. Again, the headache diary can be very useful to explore and identify different foods that may be triggering migraines and whether particular substitutes have the same effect.

According to Sandel (2006), a food is considered a trigger factor if it leads to the onset of a migraine headache within one day of consumption and occurs at least half the times in which it is eaten. It is important to be careful not to limit a diet too excessively
based off of misguided information. The consumption of food at lunch and the onset of a migraine three hours later do not necessarily mean that the certain food was the culprit. For example, in one finding noted by Sandel (2006), some individuals who are just on the cusp of a migraine headache develop a certain craving for sugary food. Therefore, an individual may consume a piece of chocolate. The following day when the migraine headache finally develops, it is logical to think that the piece of chocolate had something to do with it, when in fact it did not. The chocolate may have only been a signal that a migraine was fast approaching (Sandel, 2006).

Once certain foods have been identified as possible precipitants, an individual should attempt to avoid them as much as possible, at least when most susceptible to the onset of migraine symptoms. If the particular food is one that was often enjoyed before, he or she should begin looking for positive alternatives. For instance, if coffee is almost a critical part of one’s daily routine, then look for decaffeinated coffee or consider switching to an herbal tea. If nuts appear to maybe be a causal factor, see if it is a particular nut such as a peanut. In that case, there are plenty of alternatives such as cashews or almonds.

Being conscientious of food triggers may also mean that it is time to become a “label reader.” If monosodium glutamate (MSG) or high levels of sugar are a migraine trigger, then individuals should get in the habit of looking at ingredients and the nutrition facts. It can be astonishing how prevalent food additives are in many common foods. Food additives can be more difficult to identify as triggers, which is why detailed notes in the journal can be especially important in order to start drawing correlations not just between foods, but also between ingredients.
Along the lines of becoming a label reader, do not hesitate to ask questions. Talk to the primary care provider about suggestions and when eating out, ask questions as to how food is being prepared. Admittedly, most waiters or servers will not know all the ingredients of the food that is being served. However, it is the right of the customer and a part of being proactive to know what exactly is being consumed.

4. Review medications

This suggestion should be prefaced first and foremost by stating that no changes should ever be made without first consulting an individual’s primary care provider. However, especially if an individual is just starting a new medication, it may be very useful to keep track of how the body is responding to this change. This includes all medications and not just those that may be used specifically to treat migraine headaches. Research has been found that birth control pills may be related to headaches (Sandel, 2006). Recent research has found that women with migraine with aura have a greater likelihood of stroke than women who have never experienced a migraine and that the use of birth control pills may accentuate that risk (Sandel, 2006).

The bottom line is that some people simply will not be able to stop the onset of a migraine headache simply by avoiding certain trigger factors. Nevertheless, these suggestions can be beneficial to some and can give a person better control over his or her condition. In the case where less intrusive means appear to have little to no discernible effect, consultation with a primary care provider may be necessary so as to discuss possible medical treatment options.
Recommendations and Looking Ahead

This study conducted among Carroll College students is the just the “tip-of-the-iceberg” in terms of where it can go from here. The research was severely limited by time and methodology. The cross-sectional surveys did however, offer insight into prevalence and were useful in identifying relationships that can now be better studied via a future cohort or randomly controlled study. Furthermore, cross-sectional surveys are advantageous in that they are inexpensive and easy to conduct. There was no follow up and no identifiable information needed.

This cross-sectional study provided enough data in order to suggest that sleep education could be beneficial for incoming freshman or transfer students. As a college student, it is sometimes difficult to consistently sleep seven to eight hours each night. Nevertheless, by educating students at the onset of their college career of the dangers and side effects of sleep deprivation, good habits can be instilled early. Students that are more knowledgeable about the possible side effects can be more conscientious about how their lack of sleep may be adversely affecting their education and possibly their migraine headaches.

At the same time, cross-sectional studies have a significant number of limitations. One limitation of a cross-sectional study is that it cannot detect the ways in which hidden variables may bias results. Furthermore, cross-sectional studies do not offer any true explanation for the results of the data, but rather offer suggestions about correlations. There is no way to know for sure via this present study how influential a lack of sleep is on migraine headache sufferers at Carroll. Nevertheless, this study has set the stage for
further research either here at Carroll College or in other neighboring private institutions within the state of Montana.

In retrospect, the survey may have tried to take on too many factors in too few questions and as a result, there was not enough specific data to draw strong associations between a number of different variables and migraine headaches. Furthermore, the hypotheses that were a part of this study were not easily testable given the construction of the survey and the data received.

Nevertheless, the findings of the prevalence of migraine headaches among Carroll College students warrant further investigation. With over half of the respondents stating they had experienced a migraine headache, it is worth further detailed examination to see how pervasive this issue really is.

The obvious next step in research would be to complete a cohort study at Carroll using diagnostic criteria set forth by the IHS. A randomly controlled study would also be beneficial, but it could be difficult to create buy-in for such an experiment. With such a small total enrollment within the college, it could be challenging to compile enough participants to reach a population threshold that could be considered to be representative of the campus at-large.

At the same time, a cohort study may also be challenging because of the amount of time needed to complete it. Nevertheless, it would be extremely advantageous and would give a clearer indication of the association between the exposure and the outcome. Moreover, it would allow for a direct calculation of an incidence rate between migraine headache sufferers versus a non-migraine headache group. Also, better statistical analysis
could be performed than what was used in this study since a risk or rate ratio could be employed in a cohort.

The clear drawback is that it would require multiple follow-ups in order to be truly effective, as the primary investigator(s) would need to reassess exposure of migraine headaches over a number of different periods.

A future, long-term project would be to design a cohort study consisting of undergraduate college students among the three private institutions in the state of Montana: Carroll College, Rocky Mountain College in Billings, and the University of Great Falls. Periodic follow-up would be required in order to assess current exposure. A two or three year study among undergraduate students could be very substantial and offer great insight as to the prevalence and possible precipitants of migraine headaches not only at a specific college or university in question, but also between the three institutions. Besides the issue of time, however, is the large amount of resources that would be required to pull it off. In the meantime, similar research to the one conducted within this paper, could be completed at the other two academic institutions in order to get a baseline prevalence of migraines headaches at the respective school.

**Conclusion**

The findings of the study led to the rejection of the null hypothesis that prevalence of migraine headaches among Carroll College students will not differ from the average prevalence of similar migraine headache studies of college and university populations. With 50.2% of the reporting students stating that they had experienced a migraine headache and a prevalence ratio between 2.28-2.01, it would appear that Carroll students
experience a greater number of migraine headaches than the average college student body.

Although the prevalence is greater than expected from the primary literature, it is in line with expectations in that college students are vulnerable to the onset of migraine headaches. The majority of studies have focused on older age groups between the ages of 30-65 because this is a more typical range in which migraines are most pervasive in individuals. Nevertheless, more and more research is suggesting that adolescents and young adults may be just as vulnerable (Zarifoglu, Siva & Hayran, 1998; Zarifoglu, Karli & Taskapilioglu, 2007; Robbins & Lipton, 2010).

College and university populations are comprised of both older adolescents and young adults and it is important that the necessary resources be available to students to ensure that their health and academic wellbeing is secured. Migraines can be debilitating for students and even if a student still attends courses, they are less likely to be as effective or focused on the lecture or practical material.

The study rejected the null hypothesis that migraine prevalence will not differ among students at Carroll who sleep less than 6 hours each night and those who sleep more than 6 hours each night. With a prevalence ratio of 1.31, the data suggests that students at Carroll who sleep less than 6 hours each night and have migraine headaches are 1.31 times more likely to experience a migraine than those with migraines that sleep more than 6 hours.

The data failed to reject the null hypothesis that prevalence will not differ among students who suffer from migraine headaches and watch less than 10 hours of electronic
screen time per week versus those who suffer from migraine headaches and watch more than 10 hours of electronic screen time per week.

Nevertheless, although the findings failed to reject the null hypothesis, other studies in the primary literature have shown that screen time can be associated with the onset of a migraine headache (Saper, 1983; National Headache Foundation, 2009). For this reason, it may be beneficial to take another look at whether electronic screen time has any influence on migraine headaches among Carroll College students. However, this study found a prevalence ratio of 0.99, which suggests that prevalence among the two groups was statistically the same.

Lastly, the fourth hypothesis of this study was rejected. Prevalence did differ among students who suffered from migraine headaches and were either stress-free or had up to occasional stress versus migraine headache sufferers who experienced constant and/or high levels of stress. With a prevalence ratio of 1.16, the data suggested that students with higher, more constant levels of stress were 1.16 times more likely to experience a migraine headache.

In the end, better education and awareness is critical to preventing the onset of migraine headaches or ensuring that proper rehabilitation and treatment is given to individual migraine headache sufferers. Further research at Carroll that focuses on better testable hypotheses or the design of a cohort study among the three private institutions in the state of Montana, would greatly improve on this research and can be used to either support or refute the findings of this investigation.
References


MIGRAINE HEADACHES: ARE THEY AN ISSUE AT CARROLL COLLEGE?


Appendix A

Migraine Headache Cross-Sectional Survey
Migraine Headache Cross-Sectional Survey

Thank you for taking the time to complete this survey. Please complete it as honestly and as thoroughly as possible. If a question does not apply, please leave it blank. If you have already completed this questionnaire, please do not take it again.

--- Brandon Saiki
Principal Investigator

1. What is your current enrollment at Carroll College for Fall Semester 2012?
   - Full-Time
   - Part-Time
   - Audit Only
   - Other (Please Specify):

2. What is your current year in college?
   - Freshman
   - Sophomore
   - Junior
   - Senior
   - Other (Please Specify):

3. Male or Female?
   - Male
   - Female

4. What is your cumulative GPA as of the Fall Semester 2012?
   - 0.0-1.49
   - 1.50-2.49
   - 2.50-2.99
   - 3.00-3.49
   - 3.50-4.00

5. Have you ever experienced a migraine headache? (If No, select "No" and answer Questions #14-17 ONLY)
   - Yes
   - No

6. If so, how frequently do you experience migraine headaches?
   - Daily
   - Several times a week
   - Several times a month
   - Once a month
   - Less frequently

7. Range of severity of your migraine headaches on a scale of 1-10 ("Ten" being the worst).

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8. Where are you when the migraine headaches generally occur most often? (Select all that apply.)
   - School
   - Home
   - Work
   - Shopping
   - Don't notice a difference
9. Do certain foods or skipping meals affect your headache? If so, what foods?

10. Does a lack of sleep affect your migraine headache?
   - [ ] Yes
   - [ ] No

11. How many days have you missed from school due to migraines (Spring Semester 2012 – Fall Semester 2012)?
   - [ ] None
   - [ ] >1 day
   - [ ] 1-2 days
   - [ ] 3-5 days
   - [ ] 6-10 days
   - [ ] 11+ days

12. Which of these burdens have occurred due to migraine headaches over the last year? (Circle all that apply).
   - [ ] Had to retake / reschedule exam
   - [ ] Absenteeism
   - [ ] Failure in subjects
   - [ ] Lower GPA
   - [ ] None

13. Have migraine headaches reduced your ability to perform activities of daily living (personal hygiene, dressing, walking, sleeping, housework, use of electronics, etc.)? (Circle One)
   - [ ] Yes
   - [ ] No

14. Select the following that best describes your level of stress.
   - [ ] Overwhelming
   - [ ] Constant, but manageable
   - [ ] Intense, but occasional
   - [ ] Minimal
   - [ ] Stress-Free

15. On average, how many hours of sleep do you get each evening?
   - [ ] 0-2 hours
   - [ ] 3-4 hours
   - [ ] 5-6 hours
   - [ ] 7-8 hours
   - [ ] 9+ hours

16. How would you best characterize the amount of time spent on or watching an electronic device?
   - [ ] 0-5 hours
   - [ ] 6-10 hours
   - [ ] 11-15 hours
   - [ ] 16-20 hours
   - [ ] 21+ hours

17. How often do you eat junk food, fast food, or other processed foods?
   - [ ] Daily
   - [ ] Several times a week
   - [ ] Several times a month
   - [ ] Once a month
   - [ ] Less frequently
Appendix B

Cross-Sectional Survey – Class List
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Instructor</th>
<th>Days</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA-100-A</td>
<td>Introduction to Business</td>
<td>A. Ryerson</td>
<td>Monday</td>
<td>6:00pm-9:00pm</td>
<td>Simperman Hall 101</td>
</tr>
<tr>
<td>BA-375-B</td>
<td>Fundamentals of Management</td>
<td>B. Wilson</td>
<td>Monday / Wednesday / Friday</td>
<td>11:00am-11:50am</td>
<td>Simperman Hall 331</td>
</tr>
<tr>
<td>BI-102-A</td>
<td>Human Biology</td>
<td>B. Sheafor</td>
<td>Monday / Wednesday / Friday</td>
<td>9:00am-9:50am</td>
<td>O’Connell Hall 102</td>
</tr>
<tr>
<td>CH-353-A</td>
<td>Biochemistry</td>
<td>D. Gretch</td>
<td>Tuesday</td>
<td>8:00am-12:00pm</td>
<td>Fortin Center 213</td>
</tr>
<tr>
<td>CH-353-LA</td>
<td>Biochemistry Lab</td>
<td>D. Gretch</td>
<td>Tuesday</td>
<td>2:15pm-6:15pm</td>
<td>Fortin Center 213</td>
</tr>
<tr>
<td>CO-215-A</td>
<td>Introduction to Public Relations</td>
<td>M. Long</td>
<td>Wednesday</td>
<td>6:00pm-9:00pm</td>
<td>St. Charles Hall 045</td>
</tr>
<tr>
<td>CS-330-A</td>
<td>Computer Networking I</td>
<td>D. Marshall</td>
<td>Monday / Wednesday / Friday</td>
<td>10:00am-10:50am</td>
<td>Simperman Hall 120</td>
</tr>
<tr>
<td>DNC-128-A</td>
<td>Dance I: Elements of Dance</td>
<td>S. Mulcahy</td>
<td>Tuesday / Thursday</td>
<td>3:45pm-5:00pm</td>
<td>CUBE – Dance Studio</td>
</tr>
<tr>
<td>ENGR-105-A</td>
<td>Introduction to Engineering</td>
<td>G. Fischer</td>
<td>Tuesday</td>
<td>3:45pm-4:35pm</td>
<td>Civil Engineering Building 201</td>
</tr>
<tr>
<td>ENGR-105-B</td>
<td>Introduction to Engineering</td>
<td>G. Fischer</td>
<td>Tuesday</td>
<td>9:30am-10:20am</td>
<td>Civil Engineering Building 201</td>
</tr>
</tbody>
</table>
Wednesday – 12:00pm-12:50pm
Simperman Hall 114

ENGR-313-A: Hydrology – W. Weight
Tuesday / Thursday – 11:00am-12:15pm
Civil Engineering Building 201

Monday / Wednesday / Friday – 10:00am-10:50am
KTVH News Station

HI-221-A: History of the United States – R. Swartout
Monday / Wednesday / Friday – 11:00am-11:50am
O’Connell Hall 101

HS-230-A: Introduction to Epidemiology – J. Lowell
Tuesday / Thursday – 9:30am-10:45pm
Simperman Hall 114

LAS-101-E: Alpha Seminar – N. Caulliez
Monday / Wednesday / Friday – 1:00pm-1:50pm
KTVH News Station

Monday / Wednesday / Friday – 1:00pm-1:50pm
Simperman Hall 114

MA-207-B: Elementary Statistics – J. Oberweiser
Monday / Wednesday / Friday – 2:00pm-2:50pm
Simperman Hall 114

NU-308-A: Pathophysiology & Pharmacology – M. Brosnan
Monday – 2:15pm-5:15pm
Simperman Hall 404

PHIL-203-A: Islam: Philosophy/Culture – B. Ferst
Wednesday – 6:30pm-9:00pm
St. Charles Hall 140

PSY-105-A: General Psychology – B. Elison (C. Collins at time of survey)
Monday / Wednesday / Friday – 8:00am-8:50am
Simperman Hall 101
PSY-414-A: Physiological Psychology – C. Collins
Tuesday / Thursday – 9:30am-10:45am
Simperman Hall 108

SO-309-A: Crime & Criminology – D. McCanna
Monday / Wednesday / Friday – 1:00pm-1:50pm
O’Connell Hall 106