**Literature Review and Generation of Hypothesis**

**Prevalence of Low Back Pain- General Public**

* Back pain, especially low back pain is a frequent health problem in the general population with a lifetime prevalence reported to be greater than 80%[1-4]
* There is substantial information on low back pain prevalence and estimates of the point prevalence range from 1.0% to 58.1% and 1 year prevalence from 0.8% to 82.5%[5]
* Systematic review has demonstrated mean and median prevalence of low back pain was higher in women compared to men[5]

**Prevalence of Low Back Pain in Similar Populations**

* Low back pain appears to be somewhat more common in endurance sports that specifically load the low back during training and competition[6]
* Dalichau and Scheele[7]discussed the sports-related physical requirement profile responsible for back pain. High physical loads, repetitive mechanical strain, and static or dynamic extreme body positions increase the risk of spinal overload and overuse[8]
* Belavy ́ et al. examined intervertebral disc degeneration and/or spinal abnormalities in specific athletic populations. Thoracic and lumbar intervertebral disc or spinal damage is more common in several different types of sports including those involving repetitive loading of the spine during motion or load extremes and in sports in which the spine is subject to high-impact loads with sometimes unpredictable landing forces[9]

**-Transition**-

Recreational backpacking is an activity that has similar stressors to the musculoskeletal system specifically the spine due to carrying loads over a period of time occasionally on uneven or steep terrain. However, attention to the prevalence of back pain in this population has been limited.

**Population of Backpackers in US (taken from Colorodian magazine article. Couldn’t find peer reviewed but Ill keep looking)**

* The American Camper Report said 42.5 million Americans went camping in 2011. Of those, 10 percent represented backcountry/backpacking campers
* Thirteen percent of the backcountry/backpacking campers fell into [the 18 to 34 age group, the largest demographic](http://outdoorindustry.org/images/researchfiles/SpecialReportOnCamping2012.pdf?179). The age 55-plus group was the next largest demographic at 12 percent.
* According to Dennis Lewon, editor-in-chief of Backpacker Magazine, a 2012 Leisure Trends report counted more than 1 million 18- to 24-year-old backpackers, about the same number of mountain bikers and whitewater kayakers in that age group, combined.

**Current Research in backpackers**

* **Children, adolescents, college students**
  + In adolescents, the overall risk of LBP is similar to adults, with prevalence rates as high as 70–80% by 20 years of age[10]
  + In adolescents, mechanical load is a lifestyle factor that has been studied with respect to risk for low back pain[11]
  + Study by Heuscher et al. suggest that increasing reported backpack weight is associated with increased prevalence of annual low back pain[12]
  + Lindstrom-Hazel reviewed 11 epidemiologic studies published between 2003 and 2007 and reported that 10 of 11 investigators did find association of backpack use and back pain [13]
  + As compared with adolescents who had no back pain, adolescents with back pain carried significantly heavier backpacks that represented a significantly greater percentage of their body weights[14]
  + Of 1122 backpack users, 74.4% were classified as having back pain [14]
  + Overall, 37% of the children reported back pain. Backpacks were used by 97% of children[15]
  + Of the children who reported back pain, 34% limited their activity due to the pain, 14% use medication for pain relief, and 82% believed their backpack either caused or worsened their pain[15]
  + In a sample of 3,498 students nonspecific mechanical back pain was found to be highly prevalent, and the reported severity and chronicity of pain were high[16]
  + 346 patients included in this study, only 1 child attributed back pain to wearing a backpack. Three patients stated that their back pain was made worse by carrying their backpack. A phone survey revealed that 80% of the patients in this study wore a backpack for school purposes. The authors found that school-age children with back pain severe enough to require orthopedic evaluation rarely attribute their pain to wearing a backpack[17]
  + Although heavy backpacks are not clearly established as a cause of back pain in children, the evidence suggests that reducing the load to 10% of body weight maintains normal posture and lung function in children. Ways to reduce the load include using a properly sized backpack that is snug to the middle of the back and has padded, broad straps and a waistband to transfer some of the load from the spine to the pelvis and reducing the carrying time[18]

**Reports of back pain in backpackers/military**

* + Common injuries reported from long-distance hikers are musculoskeletal injuries which include acute joint pain, numbness, back pain, tendonitis, stress fractures, and rucksack palsy [19]
  + A study by Reynolds used 218 light infantry soldiers on a 100-mile march carrying an average of 103 lb each. They reported 78 (36%) of their participants complaining of injuries, with only 4 listed as back strains. [20] However this report of is very low even for the physically fit soldiers. Related studies in injury reporting conclude that possible reasons for low reports are for fear of discipline[21] and the belief that pain was an ordinary consequence of the activity [22]
  + Individuals that suffered acute musculoskeletal and soft tissue injuries while hiking with a backpack were recorded and compared to individuals that did not suffer injuries. One thousand two hundred and one individuals were included in the final analysis. Twenty-six individuals of this population suffered reportable musculoskeletal and soft tissue injuries while hiking with a pack[23]
  + In one study, 50% of the soldiers who were unable to complete a strenuous 20-km walk reported problems associated with the back[24]

**Education to remedy and prevent back pain**

* Hikers who purchase their backpacks off the Internet as new or used items limit their ability to be fitted properly. An improperly fitted pack could cause injuries to hikers that require time off from the trip[19]

**Project Description**

A high prevalence rate of back pain among the general population, has resulted in extensive research investigating the prevalence of back pain in populations that have a significant musculoskeletal demand on the spinal column. Currently there is a lack of information regarding the prevalence of back pain specifically among recreational backpackers. This is surprising considering this activity has several commonalities to other studies in the literature that examine back pain with regards to increased muscle demand, spinal loading, repetitive motion and posture. With regards to recreational backpackers, musculoskeletal injuries that include back pain can be significant enough to terminate an excursion therefore interfering with an individual’s quality of life. Therefore, investigation of the prevalence of back pain and factors that contribute could provide meaningful insight into the extent that back pain affects this population and could provide foundational ground work for future studies in prevention, intervention and increased participation. The aim of this study is to look at the prevalence of back pain among recreational backpackers. Factors such as experience, level of disability, load and education with fitting a backpack will be included and results will be assessed for correlation. Additionally, due to heterogeneity in the literature with regards to the specific definition of back pain we include separation of cervical, mid back and low back pain for accurate analysis and additional correlations.

**Hypothesis:**

1. Due to high prevalence’s of back pain found in the general public and in additional populations where frequent loading and repetitive recruitment of low back musculature occurs, we hypothesize that the prevalence of back pain in recreational backpackers will be comparable to the prevalence found in other populations.
2. Specifically the lumbar spine with have the highest prevalence compared to thoracic and cervical spine
3. Individuals that have been properly fit for their backpack will have less back pain

**Other Hypothesis:**

1. Individuals that make more frequent adjustments to their pack with regards to load distribution and strapping will report less back pain
2. Individuals that carry heavier loads will report increased back pain
3. Individuals that spend increased time backpacking will demonstrate back pain in comparison to those who spend less
4. Individuals that have a regular fitness routine will demonstrate less back pain

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