Running and Injuries

“Approximately 30 million Americans run for recreation or competition. The rate of injury is significant. Each year between ¼ and ½ of runners will sustain an injury that is severe enough to cause a change in practice or performance.”

-Novacheck

Research Questions

1. How does sex relate to injury in runners?

2. How does athleticism relate to injury in runners?

3. How does body composition relate to injury in runners?

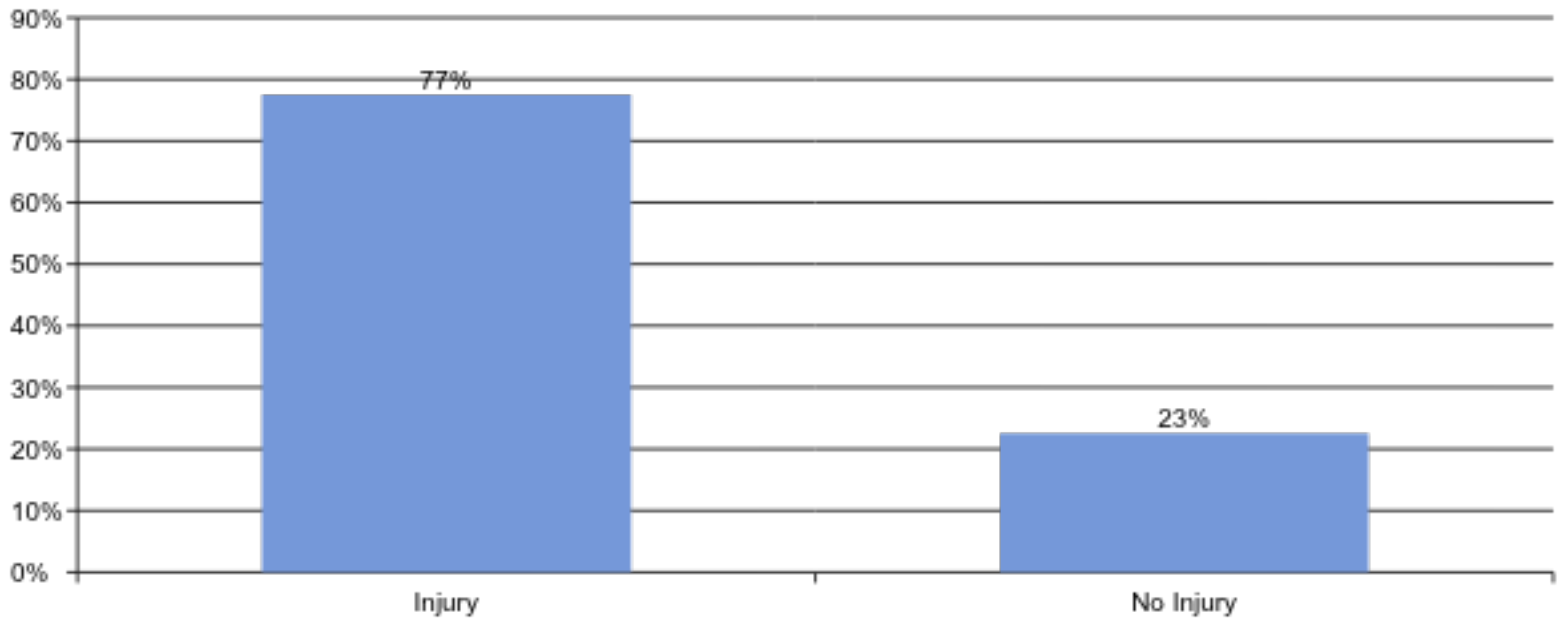
With the aid of measurement tools and an in-depth survey, our sample of runners from the Spring Tune-up 8k/15k provided the basis for our study.

Our sample was representative of the entire race

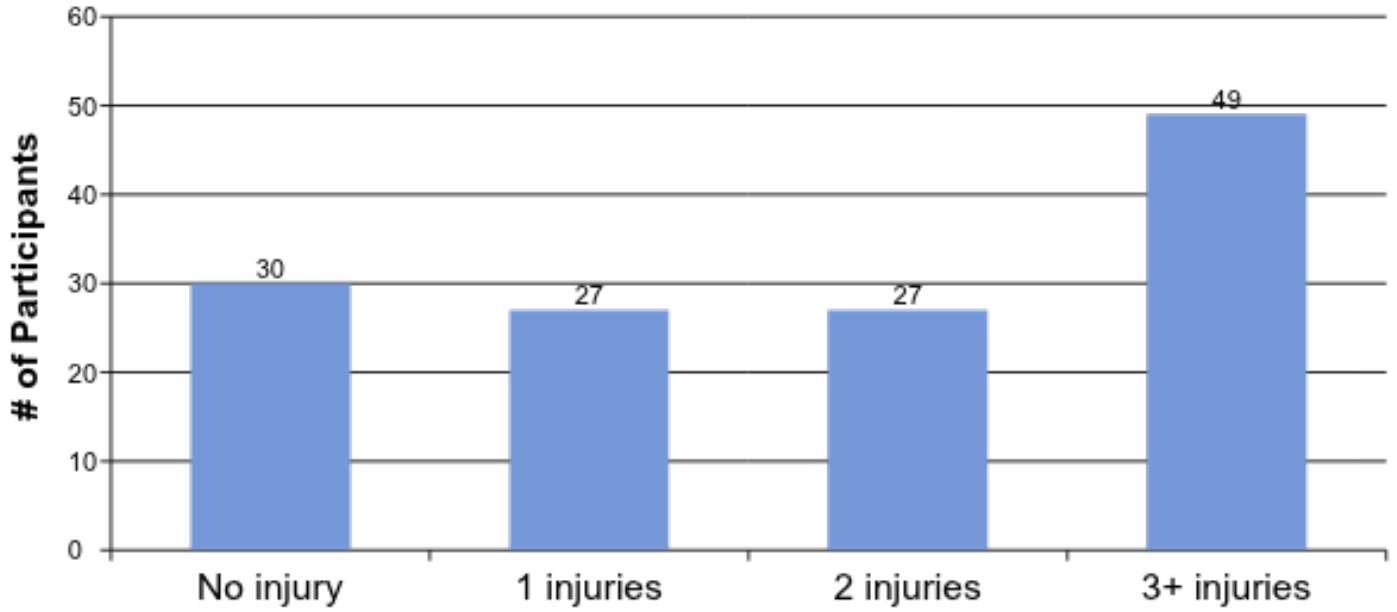
Sex	Race	Survey
Male	46.66%	51.35%
Female	53.34%	48.65%

Race Distance	Average Survey Time(minutes)	Average Overall Race Time (minutes)	Average Survey Age	Average Overall Age
15k	86.62	88.29	37.44	40.00
8k	46.93	54.20	38.40	39.81
All Racers	64.82	69.25	37.97	39.89

The majority of participants had experienced at least one injury



Many participants had experienced three or more injuries

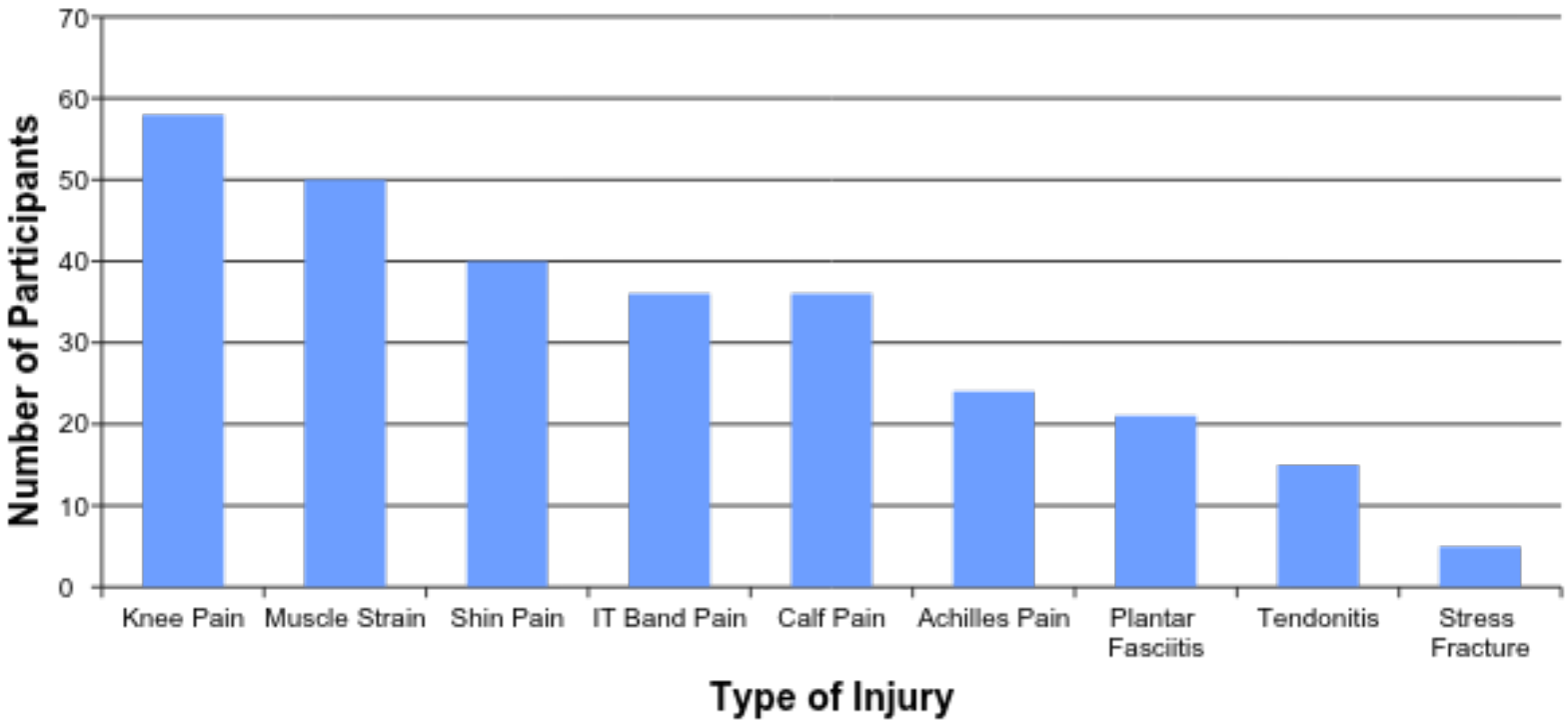


Past research on stress-related injuries states that most injuries are below-the-knee

"The most common repetitive stress injuries were similar to those of other studies: medial tibial stress syndrome, iliotibial band syndrome, patellofemoral pain syndrome, and Achilles tendinopathies."

-- *Foot Strike and Injury Rates in Endurance Runners: A Retrospective Study*

Muscle strain and knee pain were the most common injuries



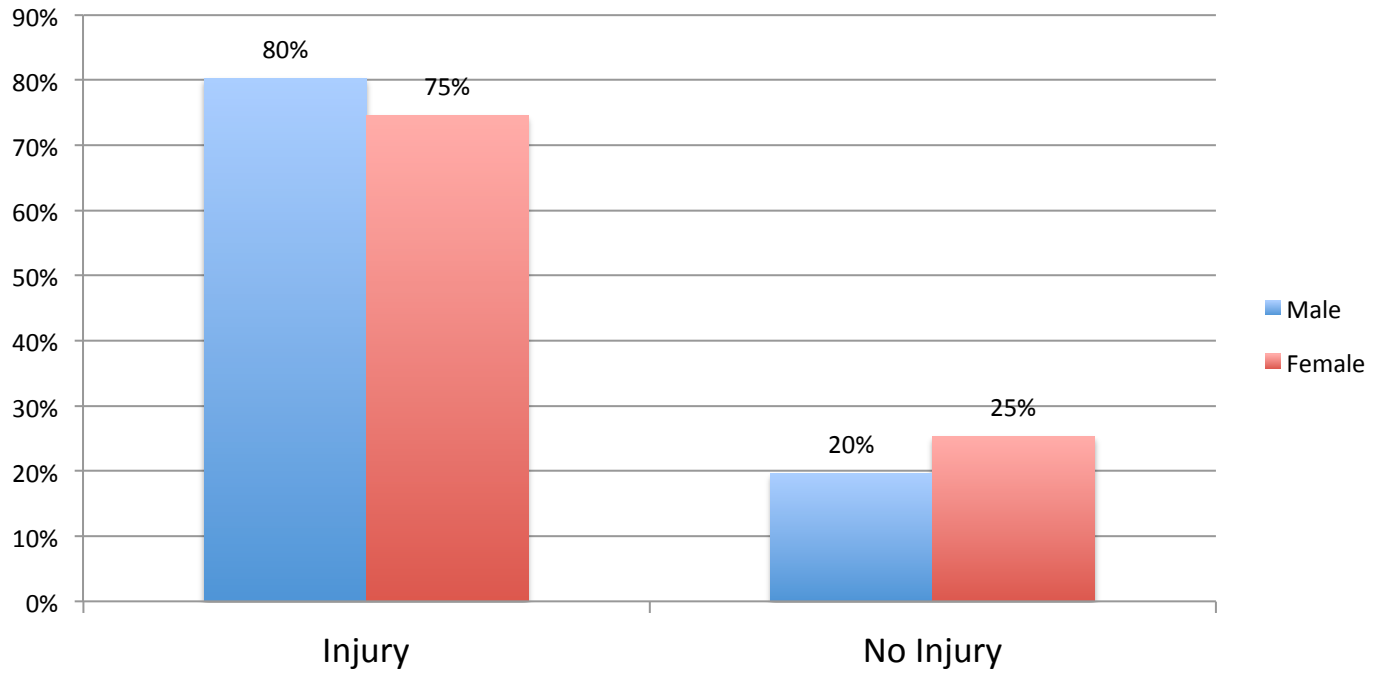
How does sex relate to injury in runners?

Past research on physiological sex differences in the context of running related injuries

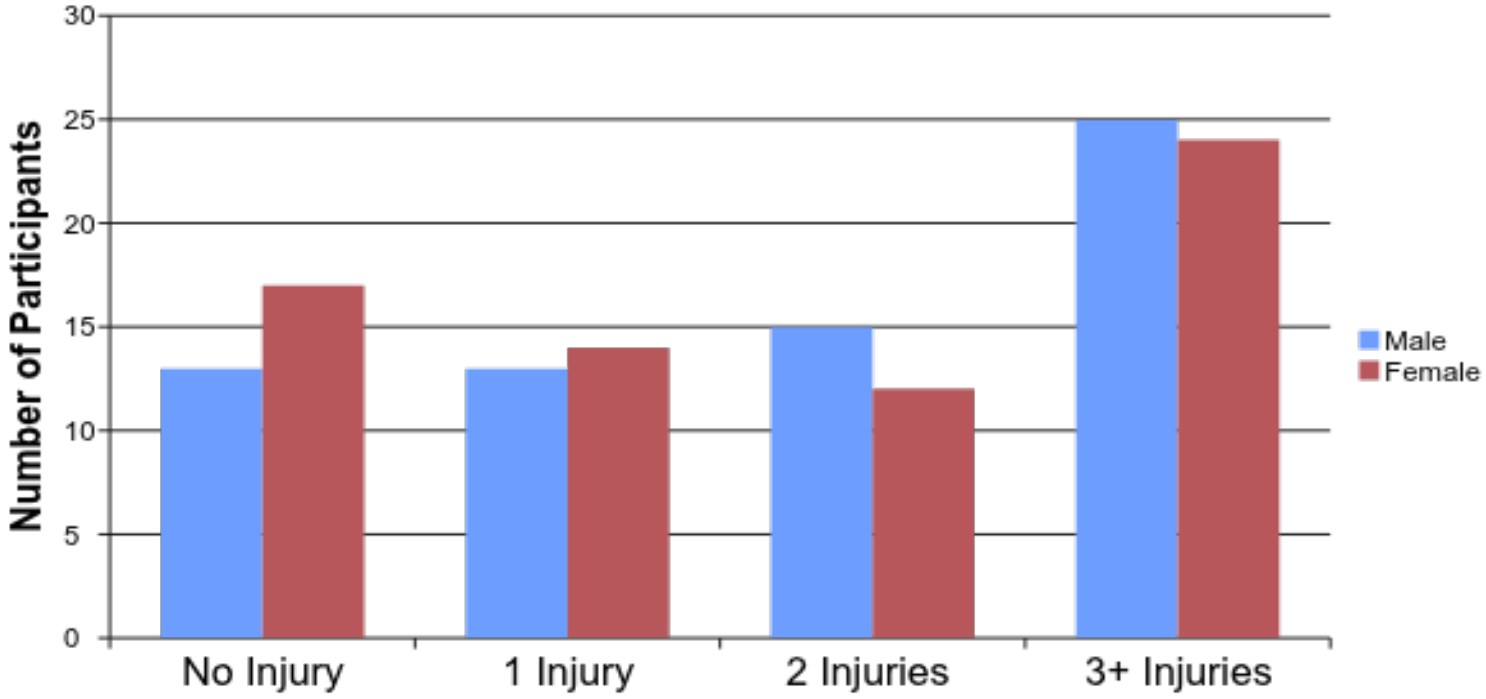
"The pelves of modern males and females differ in shape and relative dimensions because the female pelvis must adapt to the demands of both bipedalism and childbirth, whereas males must only cope with the mechanics of bipedal locomotion. It is generally assumed that efficient bipedalism requires a narrow pelvis, whereas a wider pelvis is more advantageous for childbirth."

-- *The Evolutionary Origins of Obstructed Labor: Bipedalism, Encephalization, and the Human Obstetric Dilemma*

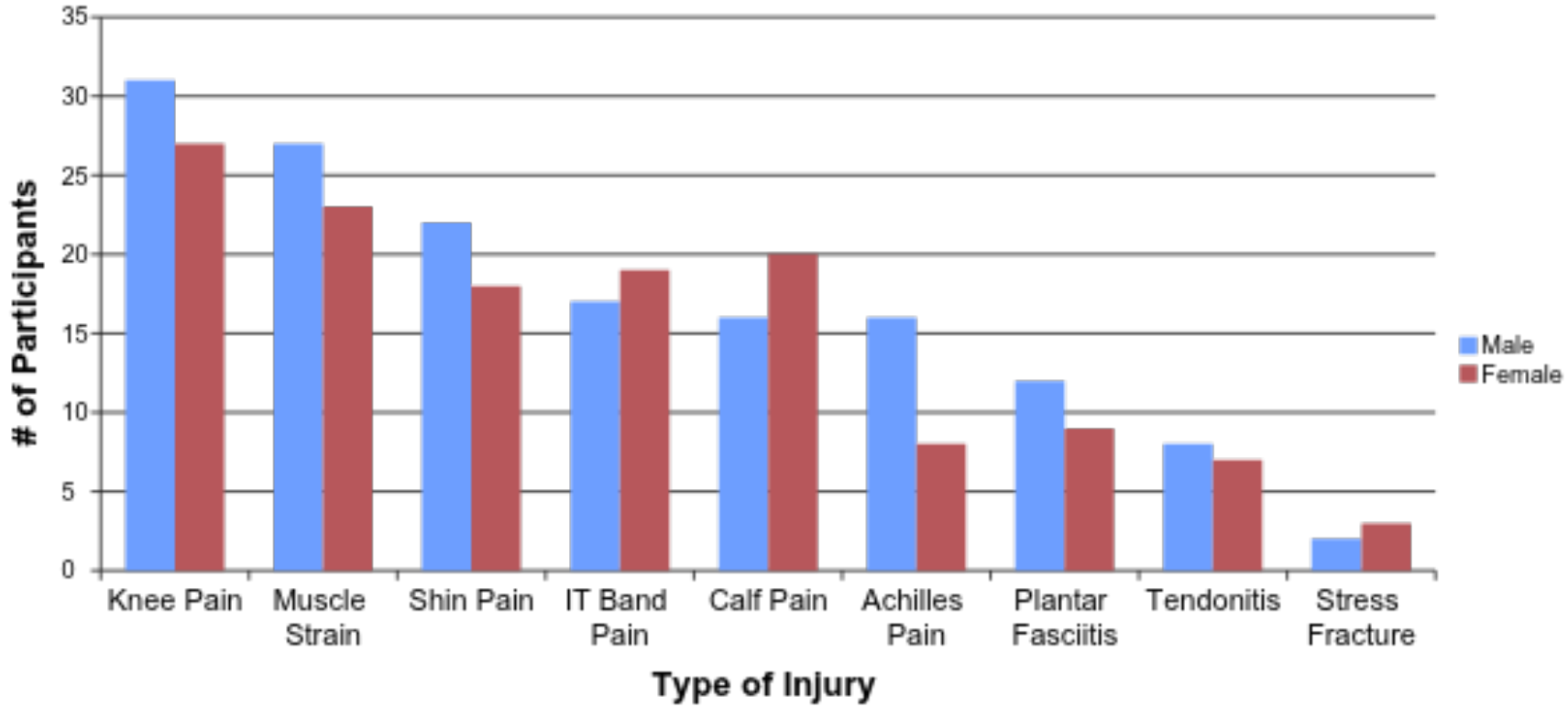
Males and females experienced injury at approximately the same rate



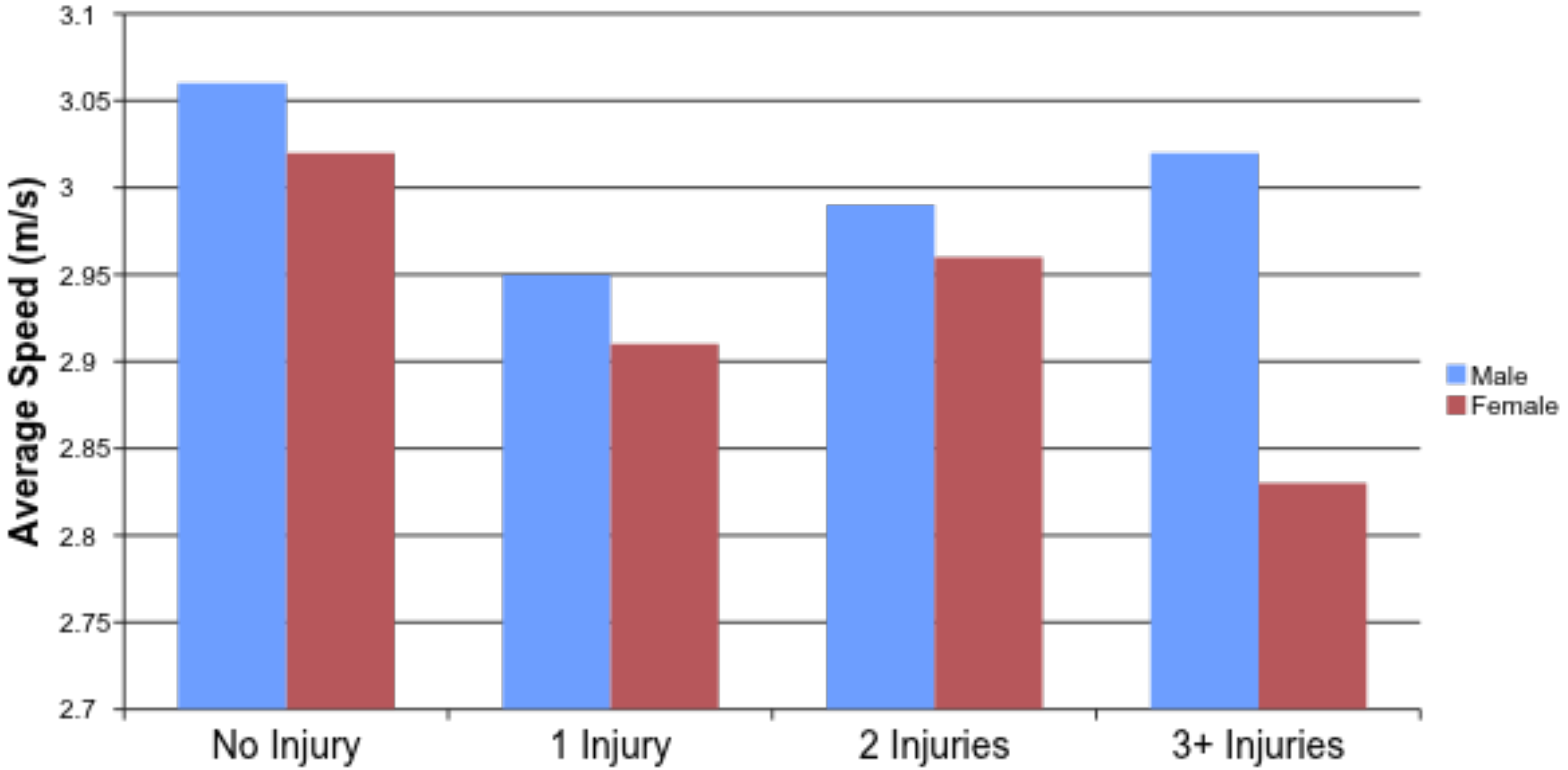
The number of injuries experienced by the participants did not vary significantly by sex



There are no significant differences in types of injuries between males and females with the exception of achilles pain



Injury-free participants ran the fastest. Females decreased in speed with more injuries, while males experienced an increase in speed



How does athleticism relate to injury in runners?

Past research says childhood inactivity is positively associated with injury

"Being active for less than 8.5 years was positively associated with injury in both sexes for tibial stress syndrome; and women with a body mass index less than 21 kg/m^2 were at a significantly higher risk for tibial stress fractures and spinal injuries."

-- A retrospective case-control analysis of 2002 running injuries

Participants who participated in running sports as children are considered to be “athletic” in this study

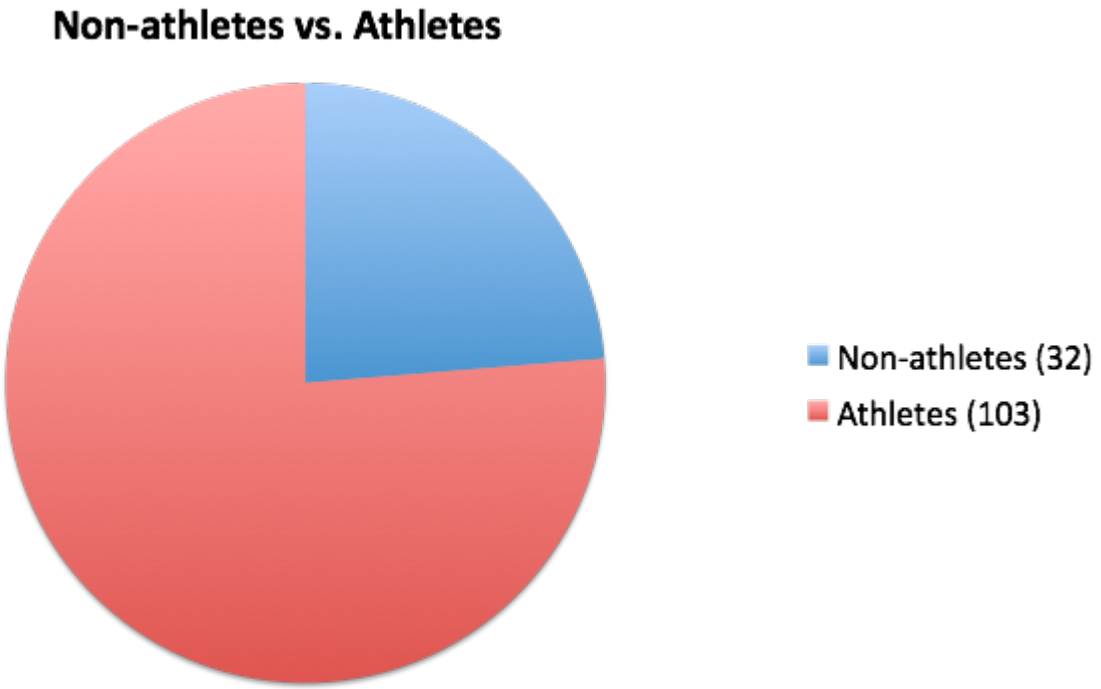
Running Sports:

Track
Cross Country
Field Hockey
Lacrosse
Soccer
Basketball
Football
Tennis

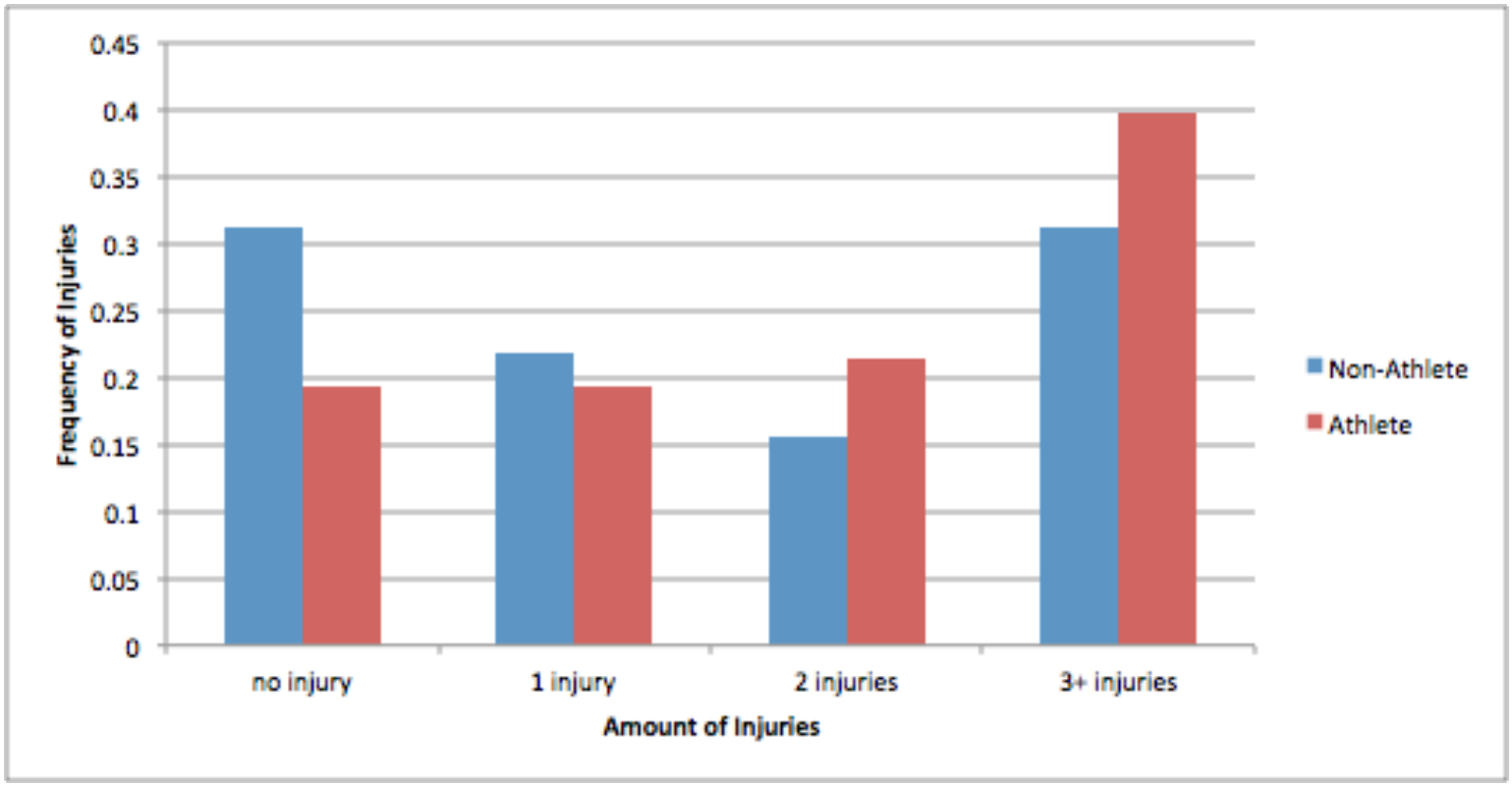
Non-Running Sports:

Gymnastics
Softball
Baseball
Swimming
Volleyball

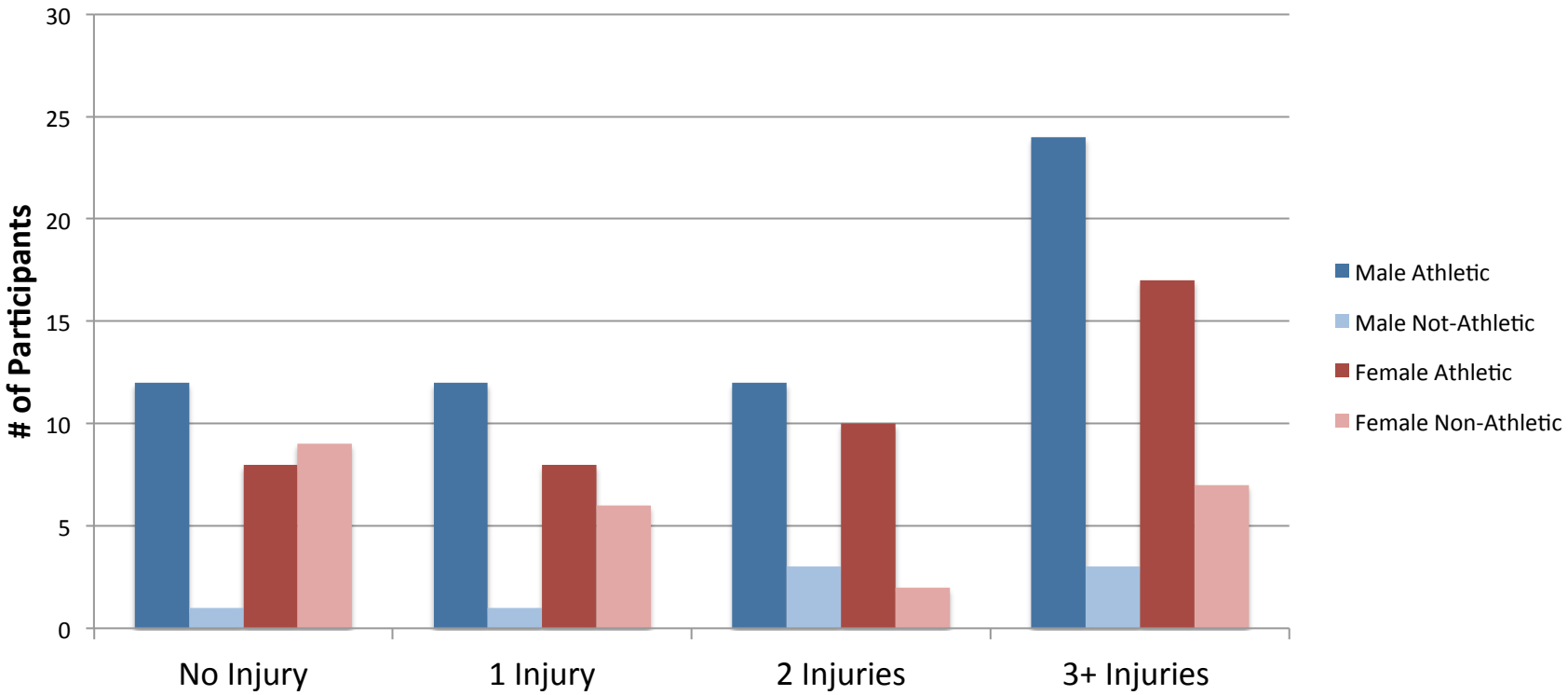
There were more “athletes” in our study than “non-athletes”



“Non-athletes” experienced fewer injuries than “athletes”



Non-athletic women are more predisposed to injury



How does body composition relate to injury in runners?

Past research on the correlation between injury rates and weight, height, and BMI

In 2000, Graham et al. researched injury rate and prevention for Australian male army recruits. They were being trained and therefore were running/exercising extensively.

Though the primary focus of the study was to observe the effect of stretching on injury rate, a multivariate analysis was used → this encompassed the measurement of other factors such as body weight, height and BMI.

No statistically-significant correlation was found between BMI and injury rate.

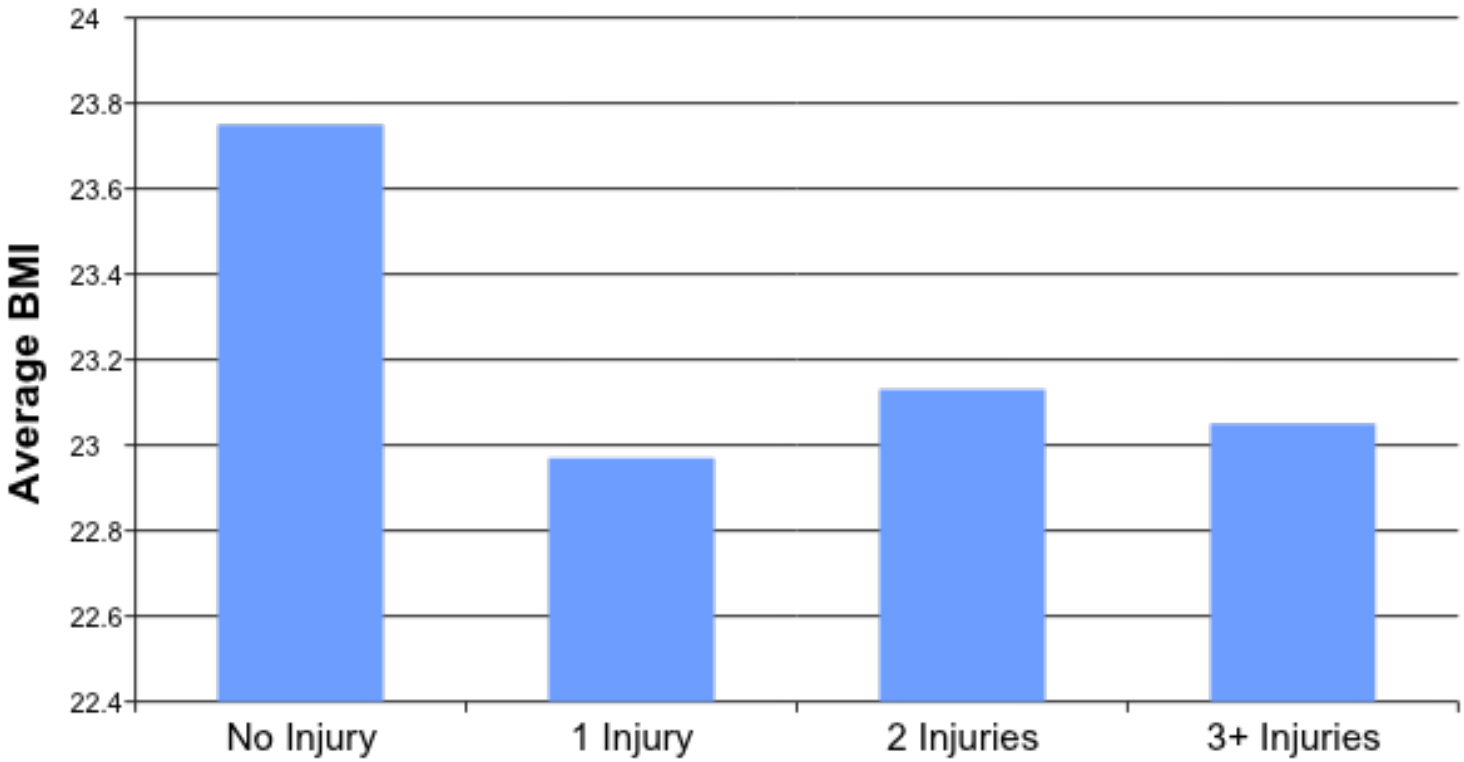
Past research shows that there is reason to believe that BMI is related to injury in runners

"Force on the achilles tendon is estimated to be approximately 6-8 times a person's body weight and patellofemoral contact forces are between 7 to 11 times a person's body weight."

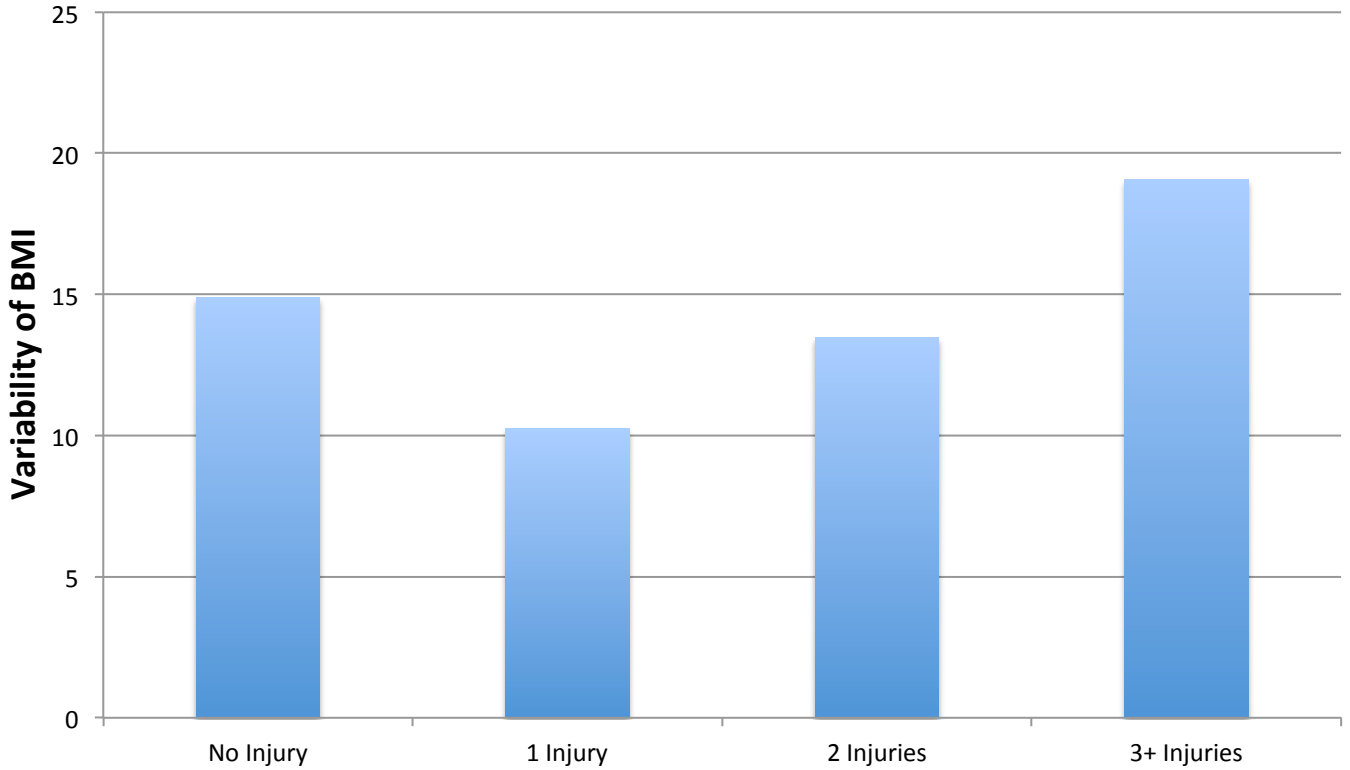
-*Biomechanics of Running*, Novacheck

…. Because this theory conflicts with the previous statement, we decided to research the relationship in the context of our own data/study.

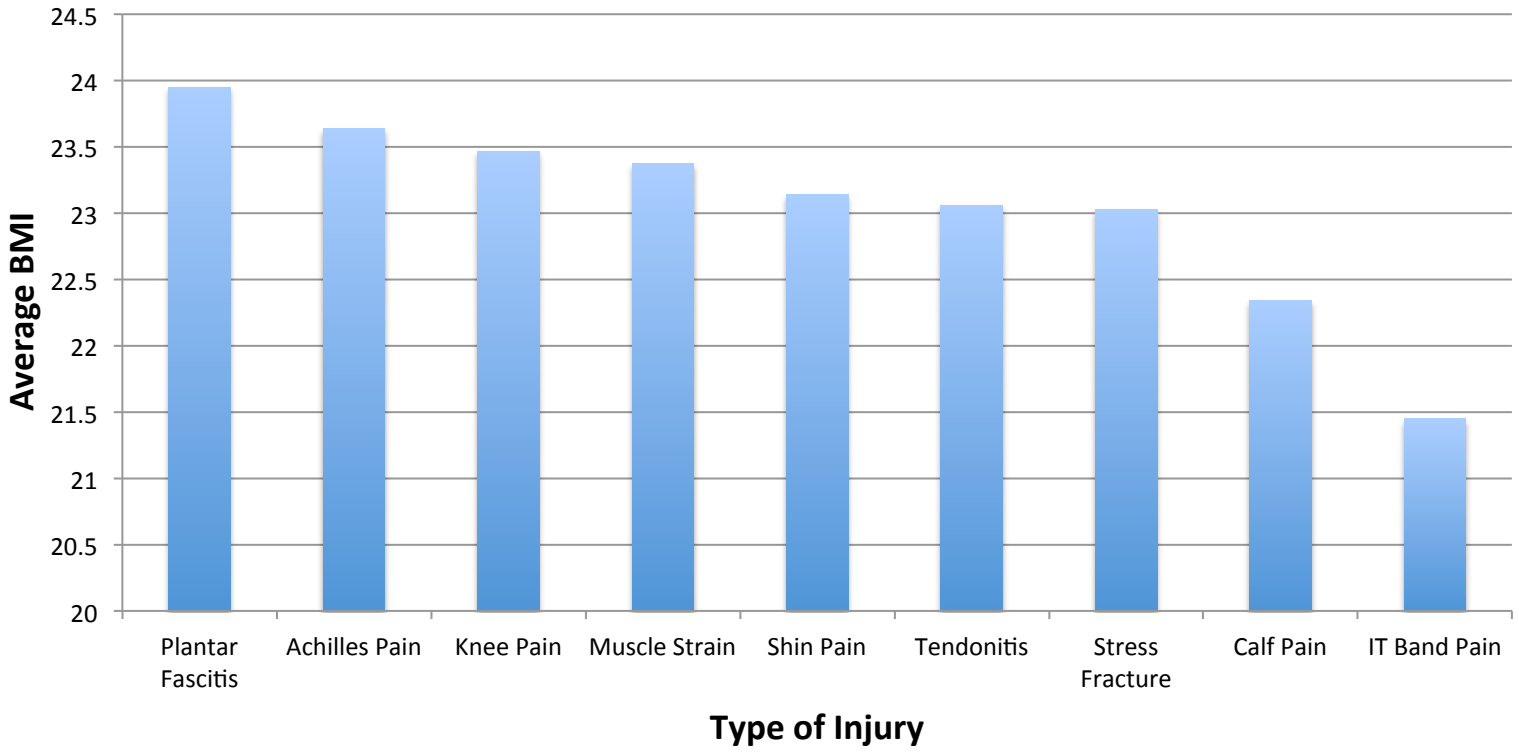
Participants with no injuries had the highest average BMI



Most BMI variance in participants with three or more injuries



BMI varies across different types of injuries



“Even a slight biomechanical abnormality can induce injury”

What does this mean for runners overall? Why do we care? Importance? Steps we can take? Further studies?

Questions?

References

Daoud, ADAM, Daniel Lieberman, GARY Geissler, Frank Wang, and Jason Saretsky. "Foot Strike and Injury Rates in Endurance Runners: A Retrospective Study." MEDICINE & SCIENCE IN SPORTS & EXERCISEÒ 44 (2012): 1325-1334. Print.

Graham, Bruce J., Robert D. Herbert, John D. Kirwan, and Rodney P. Pope. "A Randomized Trial of Pre Exercise Stretching for Prevention of Lower Limb Injury." *Medicine & Science in Sports & Exercise*. Official Journal of the American College of Sports Medicine, 2000. Web. 23 Apr. 2014.

Novacheck, Tom F. "The biomechanics of running." Gait & Posture 7.1 (1998): 77-95. Print.

Taunton, Jack E., Michael B. Ryan, D. B. Clement, Donald C. McKenzie, and D. R. Lloyd-Smith. "A Retrospective Case-control Analysis of 2002 Running Injuries." *British Journal of Sports Medicine*. British Association of Sport & Exercise Medicine, 8 Aug. 2001. Web. 23 Apr. 2014.

Wittman, Anna Blackburn, and L Lewis Wall. "The Evolutionary Origins of Obstructed Labor: Bipedalism, Encephalization, and the Human Obstetric Dilemma."Obstetrical & Gynecological Survey 62.11 (2007): 739-748. Print.