ABSTRACT

LUND, KAITLYN E. Running Shoe Experience. (Under the direction of Dr. Trevor Little).

Running is one of the most popular sports worldwide. While considerable research has been conducted on how various aspects of running shoes may affect a runner, research on why runners wear the shoes they choose is limited. Every shoe design has different functional characteristics that influence the user feel and performance during running. Running shoe manufacturers do not possess a reliable method with which to purposely customize and prescribe these characteristics to meet the requirements of a specific user group. They could add significant value to the industry and potentially minimize the prevalence of injuries that are suffered by modern runners (Clifton et al., 2011).

This research aimed to determine if more detailed shoe market segmentation is possible for runners. The survey of 1,472 runners determined that runners are primarily concerned with their perceived comfort in a shoe as this factor was chosen the most frequently. Comfort was also the top issue that participants had when a shoe did not meet their expectations. Runners responded that they would primarily prefer to know what type of stability a pair of running shoes would work for best when it comes to content and recommendations. In conclusion, more research would be recommended on the topic; and it is possible to define comprehensive shoe market segmentation for runners. Customization of running shoes to correctly fit runners faithfully has the prospect of being the next big running shoes innovation.
Running Shoe Experience

by
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_______________________________
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DEDICATION

This thesis is dedicated to my parents, for all of their hard work and continual sacrifice to allow me the opportunity to succeed. Thank you for your love and support.
BIOGRAPHY

Kaitlyn Elizabeth Lund was born on December 4, 1993 in Hickory, North Carolina; and grew up in nearby Granite Falls. She is the oldest daughter of Bryan Alan Lund and Sherry Oxford Lund, and sister to Adam Jacob Lund and Laura Ashley Lund. After graduating from South Caldwell High School in the spring of 2012, Kaitlyn began her education at North Carolina State University. Kaitlyn graduated from the Wilson College of Textiles at North Carolina State University in May of 2017 and received a Bachelor of Science in Textile Technology with a concentration in Medical Textiles. During her time as an undergraduate at North Carolina State University, Kaitlyn was a member of the NCSU Dance Company, NC State Club Swimming, and Phi Psi Professional Textile Fraternity where she served as Vice President for 2016. During her summers as an undergraduate student, Kaitlyn interned with BSN medical and Hanesbrands in the product development and research and development departments. During the academic year she worked for NC State Student Media and spent 2 semesters on preliminary undergraduate research for Dr. Minyoung Suh. Upon acceptance into graduate school at North Carolina State University, Kaitlyn worked as a tutor for the Academic Support Program for Student-Athletes for the duration of the fall 2017 semester. After this, Kaitlyn was awarded Graduate Teaching Assistantships for her 3 remaining semesters. She worked as a lab technician in the knitting and spinning labs at the Wilson College of Textiles. Kaitlyn spent the summer of 2018 interning at Bob Barker Company with their product management and development team. In order to improve her understanding of process improvement and project management, Kaitlyn also completed lean six sigma training in the spring of 2018. She received her green belt certification in February 2019. Kaitlyn plans to fulfill her academic requirements and graduate with a Master of Science in Textiles degree in May 2019.
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CHAPTER 1: INTRODUCTION

1.1. Background of the Study

Running is a popular sport and is appreciated by all ages. It was listed as the most popular outdoor activity among Americans in 2018 when measured by both number of participants and by number of total annual outings (Outdoor Foundation, 2018). Brands for running shoes such as, but not limited to, Adidas, Asics, Brooks, Hoka One One, Mizuno, New Balance, Nike, On, Reebok, Saucony, and Under Armour, have provided a variety of performance shoes aimed to match to runners. While considerable research has been conducted on how various aspects of running shoes may affect a runner, research on why runners wear the shoes they select is limited. Every shoe design has different functional characteristics that influence the user feel and performance during running.

Serious runners have a commitment that goes beyond just exercising for good health. Generally, the more they run, the more they feel connected to their inner-selves, the more clearly they see themselves, and the easier they see the tasks ahead (Gleiser, 2016). Currently, facets that influence runners, at different levels of involvement, to purchase shoes for running have not been wholly explored or understood in academia. In response, a main goal of this research study is to investigate the factors that could influence the runner’s purchase intentions of running shoes.

1.2. Purpose of Study

The purpose of this study was to investigate factors in running shoes that are important to runners as well as the brand of shoe. This research would determine if more detailed shoe market segmentation is possible for runners together with additional recommendations for documentation that better matches the runner to the running shoe.
1.3. Research Objectives

The objectives of this research were:

1. To investigate if runners with similar running habits purchase specific brands.
2. To investigate the most common buying habits of runners.
   2.1. To investigate what resources runners consult before deciding on a pair of shoes.
3. To investigate the aspects of running shoes that are not meeting runners’ expectations.
4. To investigate when runners decide to replace their shoes.
5. To investigate the most prevalent running-related injuries and causes.
6. To investigate if content and recommendations related to running shoes could be improved upon.

1.4. Significance of Study

This research is important for three reasons:

1. To contribute to the knowledge of runners’ purchasing trends involving running shoes along with motivations.
2. To determine possible important factors of running shoes required by runners at different levels of commitment.
3. To facilitate a better understanding of runners’ expectations in running shoes and running shoe content and recommendations.

1.5. Research Design

This study utilized both qualitative and quantitative research through the form of a survey. While the topics of runners and how certain aspects of running shoes perform have been studied extensively in the fields of sports science and kinesiology, the experience of runners with
running shoes has not been explored. It is for this reason that following a mixed methods research design helped to facilitate the research’s overall direction.
CHAPTER 2: LITERATURE REVIEW

Running is one of the most popular and practiced sports worldwide. A study conducted in the United States from 2009 to 2017 found running to be the most popular outdoor activity with 55.9 million participants in 2017 (Statista, 2018). In 2017, about 24% of Americans stated that exercise was the primary reason for them to start running (Statista, 2018). Nearly 80% of American runners continue to run to stay healthy or to stay in shape (Statista, 2018). Relieving stress and having fun were claimed to be the top reasons as to why people continue to run in the United States (Statista, 2018).

2.1. Running Approach

Not all runners have been running consistently for years. In a survey conducted by Running Shoes Guru, they asked how long ago their respondents started running. In order to avoid confusion, they asked if a participant took a break from running and started up again, how long it had been since they got back into a regular routine. While most runners responded “3-4 years”, the second and third most popular answers (as they were tied at 14%) were “26+ years” and “1-2 years”, respectively (Paul, 2018). This suggests that there are many runners that have been able to consistently run for years, but equally as many who have not. This worldwide survey consisted of over 2,500 runners and found that 43% run an average of 11-25 miles a week (Statista, 2018). Although not all runners may compete, entering a race or run in a particular event is a major motivation to continue practicing the sport. In the survey, 36% of survey respondents said that their favorite race distance was a half-marathon (Statista, 2018).

2.1.1. Health Benefits of Running

Running, even 5 to 10 minutes a day at slow speeds <6 mph, is associated with markedly reduced risks of death from all causes and cardiovascular disease (Lee et al.,
The study that made these claims found that during a mean follow-up of 15 years, 3,413 all-cause and 1,217 cardiovascular deaths occurred. Approximately 24% of adults participated in running in this population. Compared with nonrunners, runners had 30% and 45% lower adjusted risks of all-cause and cardiovascular mortality, respectively. They also had a 3-year life expectancy benefit (Lee et al., 2014).

A Harvard study also found that running can add three years to a person’s life, as will many other forms of cardiovascular exercise (Tello, 2017). The authors previously published data from over 55,000 people that were followed over the span of 15 years. This benefit was seen with as little as 5 to 10 minutes a day of running, even at paces as slow as six miles per hour. These results were compiled after accounting for age, sex, weight, and other health risk variables (like high blood pressure, diabetes, smoking, and alcohol consumption) (Tello, 2017).

2.1.2. Why Do People Run?

When asked why they run, almost 50% of respondents in a survey conducted in 2017 by Running Shoes Guru answered that they run to stay fit and healthy (Paul, 2018). The second and third most popular choices were to push themselves and improve their mental well-being (Paul, 2018). Another survey, published in 1982, was conducted with middle-aged non-elite marathon runners where they were questioned as to their reasons for attempting a marathon, the perceived outcomes from running a marathon, and their experiences while running (Summers et al., 1982). While most runners began running to improve physical fitness, personal challenge was the main reason for attempting a marathon. Running the marathon was a very positive experience for the participants, producing feelings of deep personal awareness and satisfaction (Summers et al., 1982).
Regardless of the decades between the conducted surveys, similar motivations were found in runners.

Outside online interviewed various professional runners to question the reason(s) they run (Outside Online, 2018). Laura Thweatt, a professional marathoner, stated how she loves the simplicity of running and how it can be done almost anywhere by almost anyone (Outside Online, 2018). Noah Droddy, a professional runner, detailed how “running was the thing I knew I was best at, and it kept drawing me in. What I love about it is that you get out what you put in. If you’re committed to doing the work, you will see tangible results. Not everything in life is like that. Running is also such a great way to see your community, get to know your body, and push yourself every day. I love the experiences it leads to and the people you can meet” (Outside Online, 2018). Jared Ward, another professional runner, chatted about how he could push himself with running: “I’d been used to sports where there is a winner and a loser, but with running I could always win by pushing harder and faster. I love the feeling of moving fast, and I also love the idea of seeing how long I can push through when the fatigue sets in. I seek freedom in terms of mind over body, and I’m trying to push my body further than it wants. I think we all love freedom, right? It’s just me out there, and it’s only my shoes between me and the pavement” (Outside Online, 2018).

2.2. Brief History of Running Shoes

The running shoe is a relatively new invention at just over 200 years old (LA Research Project: Running Shoes, n.d.). Adolf Dassler is credited as the father of the modern running shoe. He began making shoes in 1920 with shoe designs with spikes made specifically for certain running distances (LA Research Project: Running Shoes, n.d.). This was the first time
that designs focused on whether the runner was sprinting or running distance. By 1936, his
designs were internationally acknowledged and worn by athletes such as Jesse Owens. In 1948,
Dassler founded a company that would soon split off and become what is known today as Adidas
(LA Research Project: Running Shoes, n.d.). A year later in Japan, Kihachiro Onitsuka created
what would become ASICS (LA Research Project: Running Shoes, n.d.).

Throughout this post war period the demand for leisure footwear grew. The fitness craze
of the 1930s meant sneakers became associated with sports and leisure activities. In 1936 the
U.S. basketball team adopted the Converse Chucks as the official shoe. In the same year,
Dassler’s running shoes were worn at the Berlin Olympics. By the 1950s famous runners were
supplied shoes for free. At the discretion of the athlete, they either wore socks or not. This
would imply the shoe was a very tight fit.

Demand for specialized shoes helped Nike get their start in the running shoe industry.
Their first big innovation came in 1972 when rubber was poured into a kitchen waffle iron by
one of the founding employees, Bill Bowerman. This was the birth of the waffle sole, as well as
the best-selling running shoe in the country (LA Research Project: Running Shoes, n.d.). During
the late 20th century, NASA was not only making strides for the space program, but was also
working with Nike to develop the first air cushioned athletic shoe. Frank Rudy from NASA
brought the idea of bags filled with pressurized gas that compress under impact to Nike (LA
Research Project: Running Shoes, n.d.). The bags absorb shock and cushion the foot. The
cushion was placed in the soles of Nike shoes and is still used today (LA Research Project:
Running Shoes, n.d.).

In 1973 track athlete Steve Profontane became the first major track person to wear Nike
running shoes. When the aerobics explosion took place, Reebok saw the market potential and
began to make trainers in softer materials and in colors appropriate for a variety of tastes (LA Research Project: Running Shoes, n.d.). The shoes were also less rigid in construction. The 1976 Montreal Olympics was the first time an athlete was photographed endorsing his running shoes after winning the 10,000 meter race (6.2 miles) (LA Research Project: Running Shoes, n.d.).

During the 1970s running shoes were designed based not only on the type of running the person did, but the running style the runner had. Pronation is a natural motion of the feet during walking and running (Bumgardner, 2018). A person’s gait can show a pattern of neutral pronation, overpronation, or supination (underpronation). These were the three running styles for which shoes were designed. Another advancement that running shoes received during the 1970s was the use of ethylene vinyl acetate, also referred to as EVA. This material added an air cushion to the design of a running shoe, providing runners with extra cushion and shock absorption when they ran (LA Research Project: Running Shoes, n.d.).

In 1977, Brooks Vantage became the first mass-market running shoe with an EVA midsole and “varus wedge” said to control pronation (Douglas, 2014). New Balance 990 became the first $100 running shoe in 1982, while 1986 saw Adidas stitching in an electronic pedometer (Douglas, 2014). This was the first attempt to meld electronics with running shoes. Reebok released a running shoe in 1991 that had air chambers in the upper that were said to allow for a customized fit (Douglas, 2014).

The first version of the Nike free was released in 2004 and is now seen as an early minimalist model, with the bulk of sales being attributed to non-runners (Douglas, 2014). The next year saw the release of the Vibram Fivefingers, a shoe originally made for outdoor activities. In 2009, Hoka One One released their first maximally cushioned shoe (Douglas,
2014). Not long after, in 2014, companies began competing to introduce the lightest road racing flat in the market. Today there are many running shoe companies marketing shoes to suit all styles, surfaces, distances, and speed.

2.3. Running Injuries

Running injuries usually occur when a runner pushes their body too hard. WebMD was utilized as a resource to compile the top running-related injuries (WebMD, n.d.):

1. **Runner’s knee** is claimed to be a common overuse injury as it has several different causes. It often occurs when the kneecap is out of alignment or the cartilage on a kneecap wears down (WebMD, n.d.).

2. A **stress fracture** is a small crack in a bone that causes pain and discomfort. It typically affects runners in the shins and feet as it is often due to working too hard (WebMD, n.d.).

3. **Shin splints** occur in the front or inside of the lower leg along the shin bone. The pain is common after changing a workout, such as running longer distances or increasing the number of days a person runs too quickly (WebMD, n.d.).

4. **Achilles tendinopathy**, also known as tendinitis, is the inflammation of the Achilles tendon. It causes pain and stiffness in the area of the tendon, especially in the morning and with activity. It is usually caused by repetitive stress to the tendon. Adding too much distance to a running routine can cause it. Tight calf muscles can also contribute (WebMD, n.d.).

5. **Muscle pull and/or strain** is often caused by overstretching a muscle. If a muscle is pulled, one may feel a popping sensation when the muscle tears (WebMD, n.d.).
6. An **ankle sprain** is the accidental stretching or tearing of ligaments surrounding the ankle. This often occurs when the foot twists or rolls inward (WebMD, n.d.).

7. **Plantar fasciitis** is an inflammation of the plantar fascia. This is the thick band of tissue in the bottom of the foot that extends from the heel to the toes (WebMD, n.d.).

8. **IT (iliotibial) band syndrome** causes pain on the outside of the knee. The IT band is a ligament that runs along the outside of the thigh, from the top of the hip to the outside of the knee. It occurs when this ligament thickens and rubs the knee bone, causing inflammation (WebMD, n.d.).

9. **Blisters** are fluid-filled sacks on the surface of the skin. They are caused by friction between shoes, socks, and/or skin (WebMD, n.d.).

10. **Temperature-related injuries** include sunburn, heat exhaustion, frostbite, and hypothermia (WebMD, n.d.).

11. Another injury that can occur from running is **hip flexor strain and/or tendinitis**. It can become irritated due to overuse, muscle weakness, and muscle tightness, causing tenderness and pain. Athletes with hip flexor tendonitis often complain of “clicking” in the hip and pain while running or walking (WebMD, n.d.).

Pronation is a natural motion of the feet during walking and running. A person’s gait can show a pattern of neutral pronation, overpronation, or supination (underpronation). Examples can be seen in Figure 1. The stresses of overpronating or supinating have been linked to a greater risk of injuries. Motion control shoes and orthotics may be recommended if someone is an overpronator, while flexible and cushioned shoes are better for people who supinate (Bumgarder, 2018).
2.4. Buying Habits

In 2017, the athletic footwear industry in the United States generated 19.6 billion U.S. dollars in revenue (Statista, 2018). The top 5 running shoes brands found in a survey obtained by Statista in late 2017 were Asics, Brooks, Nike, Saucony, and Hoka One One (Statista, 2018). This is the same survey that is referenced earlier from Running Shoes Guru. Comparing favorite brand of running shoes by average weekly mileage in the survey can be seen in Figure 2 (Luda, 2018).
In the questionnaire, a quarter of the survey respondents said that they spent between $101 and $120 U.S. dollars on their last pair of running shoes (Statista, 2018). Almost half (47%) answered between $80 and $120 (Luda, 2018). When purchasing a new pair of running shoes, runners do not only look at price. They seek out comfort. The survey indicated this and found that 38% sought out comfort, 26% based their purchase on personal experience with that brand, 17% were guided by reviews, 7% chose a pair based on the brand alone, and 5% focused on recommendations (Luda, 2018).

2.5. Running Shoe Design

Various features of the design of running shoes have been known to affect the performance and safety of athletes (Frederick, 1984). The performance-related effects of shoe design on traction and on the economy of locomotion were reviewed in a paper by E.C. Frederick. Traction measurements in various types of running shoes and on various surfaces appeared to be adequate for all but running on wet asphalt roads. Future designs were recommended to improve traction for those conditions (Frederick, 1984). The cost of carrying similar weights is much lower for walking or for running when the weight is carried nearer the body's center of mass. Cushioning and other features of shoe design besides weight were shown
to have significant effects on the economy of locomotion. Top designs for maximizing running performance were recommended to provide sufficient traction, minimal weight, and maximum cushioning (Frederick, 1984). While the study was conducted in 1984, recent studies have found similar results with the latest shoe designs.

The optimum balance still remains to be found for the design of shoes regarding cushioning, durability, and injury prevention (Chambon et al., 2014). For the past 40 years, running shoes have been prescribed on the basis of matching shoe features to foot morphology in order to prevent running-related injuries (RRI) (Napier & Willy, 2018). Still, many studies have found that this does not seem to prevent RRIs. In contrast, a recent investigation found that motion control shoes protected against injury in experienced runners who had pronated feet (Napier & Willy, 2018). There are likely important methodological reasons for the discrepancies between these studies. However, the lack of conclusive evidence leaves more to be desired in both the running and scientific communities.

Alternative shoe recommendation models have emerged. While minimalist shoes have historically received the most attention from researchers, clinicians, and runners, the more recent paradigms of maximalism, zero-drop shoes, and choosing a shoe based on comfort appear to be gaining in popularity. Figure 3 demonstrates this clockwise from top left: traditional (Brooks Epinephrine 18), minimalist (New Balance Minimus Trail 10), zero-drop (Altra Torin 2.5) and maximalist (Hoka Bondi 6) (Napier & Willy, 2018). Runners, like the rest of the population, have anatomical, physiological, and kinematic differences (Clifton et al., 2011). Despite the lack of proof from the research, the market is inundated by claims from global footwear companies about the advantages of their products. These claims are often full of vague terms, which waver between the medical and sportswear industries. Words such as "zoom", "fast", "elite", and
"launch pad" are used among others suggesting direct benefits from shoes, such as "better" and "safer" (Arnold, 2015). In 2012, a class-action lawsuit was made against Vibram USA, the company that makes FiveFingers running shoes. These are the glove-like footwear in the middle of the "natural" or "barefoot" running phenomenon (Arnold, 2015). The case was based on unsupported and deceptive claims of "strengthened foot and leg muscles", "reduced risk of injury", and improved "balance and agility" and "spinal posture" from wearing the shoes (Arnold, 2015). Vibram USA settled, offering refunds to customers and discontinuing the use of these claims. Similarly, promises of more toned buttocks from walking in Reebok's EasyTone shoes were found to be deceptive and misleading by the U.S. Federal Trade Commission (Arnold, 2015). Reebok was required to pay the U.S. $25 million in customer refunds. The company was also banned from making unsubstantiated health and fitness claims relating to its "toning" footwear (Arnold, 2015). If running shoe manufacturers had a reliable method with which to purposely customize and prescribe these characteristics to meet the requirements of a specific user group, they could add significant value to the industry, potentially minimize the prevalence of injuries that are suffered by modern runners, and limit and/or avoid more preventable lawsuits (Clifton et al., 2011).
2.5.1. What Comfort Means to the Industry

Comfort is important to consumers, as it has become the most important attribute that they seek in apparel. However, how does this translate into industry terms? In Figure 4, an example of a system for clothing comfort and functional apparel design evaluation can be seen. From Level 1 to 5, the information flows from market requirements to technical specifications. A system such as this focuses on market demand for new products that satisfy the requirements of consumers in relation to comfort, ease of care, and the maintenance of appearance. However, if you reverse how you look at the levels from 5 to 1, then the information begins with the technical side and becomes more sensory and subjective. “Utilizing this knowledge and understanding of the physical mechanisms, psychophysical mechanisms, and psychological preferences of
consumers on various sensory perceptions, one can develop predictive tools using either statistical or mathematical models for product development purposes” (Li, 2001). This is what the industry is trying to do more of today, as manufacturers can prepare better using predictive tools such as statistical or mathematical models. It can help them save time and money by responding to the market demand more quickly and with a greater confidence.

Figure 4. Clothing Comfort and Functional Design Evaluation System (Li, 2001).
CHAPTER 3: METHODOLOGY

3.1. Purpose of Study

The purpose of this study was to investigate factors in running shoes that are important to runners as well as the brand of shoe. This study investigated runners’ buying habits along with motivations and other factors that are potentially influential in their level of commitment with different types of running shoes. Elements of running and various running shoes that were explored included: running approach, buying habits, expectations, shoe uses, injuries, and content and recommendations for running shoes.

3.2. Research Questions

The following six research questions guided the design of the current study:

**RQ1:** Are runners with similar running habits purchasing specific brands?

**RQ2:** What are the most common buying habits of runners?

**RQ2a:** What resources are runners consulting before deciding on a pair of shoes?

**RQ3:** What aspects of running shoes are not meeting runners’ expectations?

**RQ4:** What factors do runners use to determine when to replace their shoes?

**RQ5:** What are the most prevalent running-related injuries and their causes?

**RQ6:** What form of content and recommendations would runners like to have available before deciding on a pair of running shoes?

3.3. Research Design

A survey (Appendix A) was conducted to collect data for this study. An IRB approval (Appendices B & C) was obtained through North Carolina State University prior to the survey distribution. Qualtrics, an online survey software and questionnaire tool, was used to create the
online survey. Respondents were provided with the web-link directing them to the anonymous questionnaire. The survey took approximately 5-10 minutes for participants to complete. Qualtrics automatically recorded and stored the responses for data analysis. The data collection took place over a seven-week duration from the end of November 2018 to the middle of January 2019.

The target population of this study consisted of runners from age 15 and older. Running often begins at an age younger than 18. The purpose of surveying 15-17 year olds was to capture the experiences of high school age runners. A snowball method was used to recruit a convenience sample to participate in the survey. A survey link was posted to social media, as well as sent to several running mailing lists in North Carolina. The goal was to obtain approximately 1,000 completed surveys. During the data collection process, ongoing monitoring was implemented to delete incomplete surveys and respondents that selected that they would not like to participate in the study.

3.4. Survey Instrument

There were multiple sections to the survey. The first section gathered the necessary demographics for the survey to determine the estimated age range of the respondents and if they wear male or female running shoes. The second section focused on the running approach of the participants. It measured their running habits for training, exercising, and competing. The third section focused on the buying habits of runners to measure their brand regularity, what they focus on when purchasing shoes, and the resources they consult before buying. The fourth section inquires if and how previous shoes have not met their expectations. It also questions if they purchase shoes meant for certain gait patterns or not. The fifth section inquires the factors that drive runners to replace their shoes as well as their uses. The sixth section examined the
different types of injuries that could befall runners in addition to their causes. The last section invited participants to give their opinions on what content and recommendations they would like to see with running shoes.

3.5. Data Analysis

The goal was to obtain approximately 1,000 completed surveys. When the survey link was deactivated, 1,478 responses were recorded. Of these, 1,472 chose to participate in the survey. Participants were also given the option to skip questions in the survey, so all surveys that were submitted after the final question were kept. Any in-progress surveys that were not submitted were deleted automatically by Qualtrics when the survey was closed on January 22nd, 2019.

A Python script was utilized to clean and reformat the data collected from the survey. The Python script used the XML file provided by Qualtrics and parsed it using the ElementTree package. Once the file was read in, irrelevant fields were filtered. From here, questions with multiple response options were split into distinct columns through the use of pattern matching. Once processing was complete, the data was written out to a CSV file. After the file was opened in Excel, the data was compiled and analyzed using its built-in capabilities. All free response information was gathered and grouped based on relevant categories to visualize the responses cohesively.
CHAPTER 4: RESULTS

4.1. Summary

A total of 1,472 valid surveys were included to address the six research questions in this study. This chapter consists of seven major sections. The first is an overview of respondents’ characteristics, followed by the next six sections consisting of the results, organized per the research questions. All data from the survey was analyzed using descriptive statistics. The tables consist of frequency distributions.

4.2. Sample Characteristics

Frequency analyses were conducted to compile the sample profile. The demographic characteristics of the sample are summarized in Table 1. Among the final sample, over half of the respondents wore female running shoes (57.1%). Participants were asked at what age they started running and how many years they have been running since. In order to avoid confusion, they were asked if they took a break from running and started up again, at what age they returned to a regular running routine. Respondents averaged just over 11 years of running consistently.

The age range distribution of the participants (based on the calculation of their responses to the age they started running and how many years it has been since that point) varied with over one-fourth (29.7%) being in the estimated age range of 35-44, another 23% being in the range of 45-54, 20.4% in the range of 25-34, 12.9% in the range of 15-24, and the remaining 14.1% were aged about 55 and older. Therefore, the sample profile provided enough data to be applicable for a variety of ages and gender of running shoes. Female running shoes were most prevalent, and the majority of responses were from individuals in the 35-44 age range. Participants averaged 11 years of consistent running experience.
4.3. RQ1: Running Approach

In addition to demographic characteristics, respondents’ were asked for details about their running routine. These can be seen in Table 2 and address RQ1. “Road and/or paved surface” (80.2%) was the surface run on the most with “sidewalk” at 38.3% and “woodland trail, grass, and/or dirt” at 32.5%. Responses involving running on treadmills, track, rocky trail/gravel, sand, and other were compiled and comprised the last 24.3% of the responses. In terms of average weekly running mileage, half of the respondents (50.7%) answered “11 to 25 miles”, 21% answered “less than 11 miles”, 19.8% answered “26-40 miles”, and 8.4% answered with “40+ miles” weekly. To assess the competitive nature/habits of the respondents, they were asked their usual race distance and how many organized races they run each year on average. The usual race distance chosen by respondents (32.3%) was “5K (3.1 mi)”. “Half-marathon (13.1 mi)” was the second-highest choice at 29.9%. Most respondents (26%) answered that they run in “3-4” organized races each year, 20.1% answered “5-6” organized races per year, 17.1% answered “1-2”, and the last compiled 38.6% of respondents answered that they run in at least 7 races a year. Consequently, the running routine data collected consisted of types of running surfaces, weekly miles completed, and competition races entered. Most runners used a road and/or paved surface.
and completed 11-25 miles a week. The participants in this survey are serious and dedicated runners.

**Table 2. Running Approach.**

<table>
<thead>
<tr>
<th>Running Surfaces</th>
<th>Answer</th>
<th>Response Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Road and/or paved surface</td>
<td>80.2%</td>
</tr>
<tr>
<td></td>
<td>Sidewalk</td>
<td>38.3%</td>
</tr>
<tr>
<td></td>
<td>Woodland trail, grass, and/or dirt</td>
<td>32.5%</td>
</tr>
<tr>
<td></td>
<td>Treadmill, Track, Rocky trail/gravel, Sand,</td>
<td>24.3%</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average Weekly Running Mileage</th>
<th>Answer</th>
<th>Response Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Less than 10 miles</td>
<td>21%</td>
</tr>
<tr>
<td></td>
<td>11-25 miles</td>
<td>50.7%</td>
</tr>
<tr>
<td></td>
<td>26-40 miles</td>
<td>19.8%</td>
</tr>
<tr>
<td></td>
<td>40+ miles</td>
<td>8.4%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Usual Race Distance</th>
<th>Answer</th>
<th>Response Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Track (under 5K/3.1 mi)</td>
<td>3.2%</td>
</tr>
<tr>
<td></td>
<td>5K (3.1 mi)</td>
<td>32.3%</td>
</tr>
<tr>
<td></td>
<td>10K (6.2 mi)</td>
<td>10.6%</td>
</tr>
<tr>
<td></td>
<td>11-20K (over 6.2 mi, but under 13.1 mi)</td>
<td>3.9%</td>
</tr>
<tr>
<td></td>
<td>Half-marathon (13.1 mi)</td>
<td>29.9%</td>
</tr>
<tr>
<td></td>
<td>Marathon (26.2 mi)</td>
<td>11.7%</td>
</tr>
<tr>
<td></td>
<td>Ultra-marathon (over 26.2 mi)</td>
<td>8.4%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average Number of Organized Races</th>
<th>Answer</th>
<th>Response Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-2</td>
<td>17.1%</td>
</tr>
<tr>
<td></td>
<td>3-4</td>
<td>26%</td>
</tr>
<tr>
<td></td>
<td>5-6</td>
<td>20.1%</td>
</tr>
<tr>
<td></td>
<td>7+</td>
<td>38.6%</td>
</tr>
</tbody>
</table>

Table 3 demonstrates more survey results related to RQ1. It shows that regardless of average weekly distance, Brooks’ shoes were the top choice among participants. Saucony was consistently chosen as the second most common option among runners averaging at least 11 miles a week. Asics showed up in the top three of all mileage ranges except the 26-40 miles range where Hoka One One claimed the third spot. Nike made an appearance as well, as the third top brand for runners who average less than 10 miles a week. Overall, all participants preferred Brooks’ shoes. This shoe was preferred even though distances completed were different.
Table 3. Weekly Mileage vs. Favorite Brand.

<table>
<thead>
<tr>
<th>Average Weekly Mileage</th>
<th>Top 3 Favorite Brands</th>
<th>Response Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 10 miles (&lt;16 km)</td>
<td>Brooks</td>
<td>25.6%</td>
</tr>
<tr>
<td></td>
<td>Asics</td>
<td>13.9%</td>
</tr>
<tr>
<td></td>
<td>Nike</td>
<td>12.9%</td>
</tr>
<tr>
<td>11-25 miles (16-40 km)</td>
<td>Brooks</td>
<td>32.2%</td>
</tr>
<tr>
<td></td>
<td>Saucony</td>
<td>13%</td>
</tr>
<tr>
<td></td>
<td>Asics</td>
<td>11%</td>
</tr>
<tr>
<td>26-40 miles (41-64 km)</td>
<td>Brooks</td>
<td>17.8%</td>
</tr>
<tr>
<td></td>
<td>Saucony</td>
<td>12.3%</td>
</tr>
<tr>
<td></td>
<td>Hoka One One</td>
<td>10.6%</td>
</tr>
<tr>
<td>40+ miles (&gt;64km)</td>
<td>Brooks</td>
<td>18.7%</td>
</tr>
<tr>
<td></td>
<td>Saucony</td>
<td>17.1%</td>
</tr>
<tr>
<td></td>
<td>Asics</td>
<td>13.9%</td>
</tr>
</tbody>
</table>

4.4. RQ2: Buying Habits

Buying habits were measured by a number of items within the questionnaire. These results address RQ2 and RQ2a. Respondents answered that they use an average of 2 pairs (32.1%) of running shoes each year. 22% of respondents use 3 pairs, 15.9% use 4 pairs, and 15.2% only use 1 pair a year on average. To determine the most used brands of running shoes, respondents were asked which brands they used in the past year. Almost half (46.6%) of the respondents chose Brooks, with Saucony at 27.5% and Asics at 26.9%. Nike was chosen 25.2% of the time by respondents and New Balance came in at 20.8%. These top responses were almost completely mirrored in the respondents’ answers to their favorite running shoe brand. Brooks’ shoes were chosen again as the top choice with 26.9%. Saucony had 12.6% and Asics had 10.4%, while Nike came in at 9.6%. The difference is that instead of New Balance being chosen as a top choice, Hoka One One came in fifth with 7.3%. The compiled responses can be seen in Table 4. In summation, the results of buying habits revealed that Brooks’ shoes were the most often used and preferred brand.
### Table 4. Shoes Used Each Year and Brands.

<table>
<thead>
<tr>
<th>Pairs of Running Shoes Used Annually (average)</th>
<th>Answer</th>
<th>Response Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>15.2%</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>32.1%</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>22.0%</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>15.9%</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>6.7%</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>4.0%</td>
</tr>
<tr>
<td></td>
<td>7+</td>
<td>4.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Top 5 Running Shoe Brands Used (in the past year)</th>
<th>Brand</th>
<th>Response Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Brooks</td>
<td>46.6%</td>
</tr>
<tr>
<td></td>
<td>Saucony</td>
<td>27.5%</td>
</tr>
<tr>
<td></td>
<td>Asics</td>
<td>26.9%</td>
</tr>
<tr>
<td></td>
<td>Nike</td>
<td>25.2%</td>
</tr>
<tr>
<td></td>
<td>New Balance</td>
<td>20.8%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Top 5 Favorite Running Shoe Brands</th>
<th>Brand</th>
<th>Response Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Brooks</td>
<td>26.9%</td>
</tr>
<tr>
<td></td>
<td>Saucony</td>
<td>12.6%</td>
</tr>
<tr>
<td></td>
<td>Asics</td>
<td>10.4%</td>
</tr>
<tr>
<td></td>
<td>Nike</td>
<td>9.6%</td>
</tr>
<tr>
<td></td>
<td>Hoka One One</td>
<td>7.3%</td>
</tr>
</tbody>
</table>

Before making a running shoe purchase, people often refer to a resource. Respondents were asked what resources they have consulted before deciding on a pair of running shoes. Most (61.5%) were repeat purchases, but 56.2% of respondents consult a salesperson of some degree before making a purchasing decision. Online guides and/or online recommendations made up 42.9% and online reviews consisted of 41.9%. Along with consulting resources, runners consider multiple factors when determining what running shoe is best for them. Respondents were asked the top five factors that they consider when buying running shoes. Comfort was chosen as the top factor (87.1%), with support (52%) and cushion (51.2%) chosen by over half of the respondents as well. Price came in fourth with 49.7% and brand (36.8%) was chosen as the fifth most popular factor. Of their top five choices, respondents were also asked to choose the factor that was the most important to them. Comfort was the top choice, with over half of the
participants (53.5%) choosing it. The rest of the top responses mirrored the top five of the previous question: support was 15.6%, cushion was 8.2%, price was 4.4%, and brand was the last of the top five with 3.3%. The following Table 5 shows the top responses collected.

Consequently, it was determined that participants prefer to make their shoe purchases based on recommendations from salespersons if not just repeating a previous purchase. The runners also chose comfort above other aspects of their running shoes.

Table 5. Resources and Shoe Factors.

<table>
<thead>
<tr>
<th>Top Resources Consulted</th>
<th>Answer</th>
<th>Response Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Repeat previous purchase</td>
<td>61.5%</td>
</tr>
<tr>
<td></td>
<td>Salesperson</td>
<td>56.2%</td>
</tr>
<tr>
<td></td>
<td>Online guide and/or recommendations</td>
<td>42.9%</td>
</tr>
<tr>
<td></td>
<td>Online reviews</td>
<td>41.9%</td>
</tr>
<tr>
<td></td>
<td>Word of mouth and/or running colleague</td>
<td>35.8%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Top 5 Factors Considered</th>
<th>Answer</th>
<th>Response Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Comfort</td>
<td>87.1%</td>
</tr>
<tr>
<td></td>
<td>Support</td>
<td>52.0%</td>
</tr>
<tr>
<td></td>
<td>Cushion</td>
<td>51.2%</td>
</tr>
<tr>
<td></td>
<td>Price</td>
<td>49.7%</td>
</tr>
<tr>
<td></td>
<td>Brand</td>
<td>36.8%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Top Factors Chosen from Top 5 Factors</th>
<th>Answer</th>
<th>Response Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Comfort</td>
<td>53.5%</td>
</tr>
<tr>
<td></td>
<td>Support</td>
<td>15.6%</td>
</tr>
<tr>
<td></td>
<td>Cushion</td>
<td>8.2%</td>
</tr>
<tr>
<td></td>
<td>Price</td>
<td>4.4%</td>
</tr>
<tr>
<td></td>
<td>Brand</td>
<td>3.3%</td>
</tr>
</tbody>
</table>

Running shoes can be purchased in-store and online. In order to determine how runners are purchasing their shoes, respondents were asked where they purchase their running shoes.

Almost half of the questionnaires indicated that respondents only purchase their shoes in-store (47.3%). Those that purchase their shoes both online and in-store came in at 26.8% and online only was 25.9%. Participants were then questioned about the average price range that they purchase shoes in. The top response was the $101-$120 range at 35.4%, with $81-$100 at 24.3%
and $121-$140 at 20%. The following Table 6 shows the total responses collected for location of purchase and average price ranges. Therefore, in-store purchases were the most preferred by the participants. Also, most runners spent $101-$120 on their running shoes.

Table 6. Location of Purchase and Money Spent.

<table>
<thead>
<tr>
<th>Answer</th>
<th>Response Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location of Running Shoe Purchases</td>
<td></td>
</tr>
<tr>
<td>In-store only</td>
<td>47.3%</td>
</tr>
<tr>
<td>Online only</td>
<td>25.9%</td>
</tr>
<tr>
<td>Both in-store and online</td>
<td>26.8%</td>
</tr>
<tr>
<td>Money Spent on Running Shoes (average in 2018 US dollars)</td>
<td></td>
</tr>
<tr>
<td>Less than $40</td>
<td>0.8%</td>
</tr>
<tr>
<td>$40-$80</td>
<td>13.0%</td>
</tr>
<tr>
<td>$81-$100</td>
<td>24.3%</td>
</tr>
<tr>
<td>$101-$120</td>
<td>35.4%</td>
</tr>
<tr>
<td>$121-$140</td>
<td>20.0%</td>
</tr>
<tr>
<td>$141-$180</td>
<td>5.8%</td>
</tr>
<tr>
<td>Over $180</td>
<td>0.5%</td>
</tr>
</tbody>
</table>

4.5. RQ3: Running Shoe Expectations

Expectations are not always met after a runner purchases a pair of running shoes. The questionnaire asked if participants have ever run in a pair of shoes that did not meet their expectations. These results investigate RQ3 and can be seen in Table 7. Out of the respondents, 84.4% answered that they have encountered shoes that did not meet their expectations. As a follow-up question to those that answered “Yes”, participants were then asked what expectations were not met. This was a free response question, so the responses were cleaned and classified into nine categories. Comfort and fit are subjective and were therefore the expectations that were not met the most (55.5%). Support and stability can also be subjective and were mentioned 19.6% of the time, while quality and durability were mentioned in 17.6% of the responses. Consequently, it was determined that many participants have purchased shoes that did not meet their anticipated expectations. Since the question had no guided answers, categories created to
The received data showed that comfort and fit were most often the responses of expectations not met in running shoes.

**Table 7. Running Shoe Expectations.**

<table>
<thead>
<tr>
<th>If Have Run In Shoes That Did Not Meet Expectations</th>
<th>Answer</th>
<th>Response Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>84.4%</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>15.6%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shoe Expectations That Were Not Met</th>
<th>Answer</th>
<th>Response Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comfort and Fit</td>
<td>55.5%</td>
<td></td>
</tr>
<tr>
<td>Support and Stability</td>
<td>19.6%</td>
<td></td>
</tr>
<tr>
<td>Quality and Durability</td>
<td>17.6%</td>
<td></td>
</tr>
<tr>
<td>Injury and Pain</td>
<td>16.2%</td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td>12.7%</td>
<td></td>
</tr>
<tr>
<td>Cushion</td>
<td>9.7%</td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>6.4%</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>3.7%</td>
<td></td>
</tr>
<tr>
<td>Price</td>
<td>0.4%</td>
<td></td>
</tr>
</tbody>
</table>

Participants were presented with a reference picture (Figure 1) showing examples of different gait patterns. Using this, participants were then asked what their gait pattern is when they run. Over half of respondents answered that they have a neutral gait (52.9%), while 24.6% claimed to overpronate and 14.1% claimed to supinate. These results can be seen in Table 8.

When questioned if their gait pattern affects the type of running shoe they purchase, the majority of respondents answered “yes” (70.1%). Over half of the participants believe they have a neutral gait and that their gait pattern affects their shoe purchases.

**Table 8. Gait Patterns.**

<table>
<thead>
<tr>
<th>Perceived Gait Pattern</th>
<th>Answer</th>
<th>Response Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neutral</td>
<td>52.9%</td>
<td></td>
</tr>
<tr>
<td>Overpronation</td>
<td>24.6%</td>
<td></td>
</tr>
<tr>
<td>Supination (underpronation)</td>
<td>14.1%</td>
<td></td>
</tr>
<tr>
<td>I don’t know</td>
<td>8.4%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>If Gait Pattern Affects Participants’ Shoe Purchases</th>
<th>Answer</th>
<th>Response Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>70.1%</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>29.9%</td>
<td></td>
</tr>
</tbody>
</table>
4.6. RQ4: Running Shoe Use

The life of a pair of running shoes may vary and many runners have different reasons for deciding to replace their shoes. Participants were asked what factors they take into consideration when determining the time to replace their running shoes. This addresses RQ4 and can be seen in Table 9. Almost half of the participants (48.3%) responded that they replace their shoes after the tread starts to look bare and/or worn and 40.5% after having run a certain distance in them (such as 300 miles). Numerous runners’ feet begin to hurt from running when their shoes have worn out, as 32.2% of respondents answered this. Consequently, runners primarily use tread wear as a determining factor on when to replace shoes.

Those that claim they replace their shoes after having run a certain distance in them were then asked how many miles (on average) they run in their shoes. The majority of the respondents (41.9%) run 300-399 miles in their shoes, while 28.7% run 400-499 miles and 14.4% run 200-299 miles in their shoes. However, runners may use their shoes for more than running. Respondents were asked what they specifically use their shoes for. While running was selected 98.6% of the time by respondents, walking came in second with 37.1%. Everyday use was the third most common response with 17.6%. Summarily, the participants replace their running shoes when they have run between 300-399 miles in their shoes. Most participants also used their shoes primarily for running.
Injuries can be common in running-related activities. Respondents were asked if they have ever received an injury due to running and, if so, what it was related to. This section addresses RQ5 and the top results can be seen in Table 10. Overuse of body was chosen 65.9% of the time, while ill-fitting shoes (18.8%) and running surface (14.1%) were much farther behind. These reflect the responses to the following question that ask the exact injuries they have experienced from running. The most common responses (58.4%) involved blisters and/or bunions, with IT band syndrome (36.9%) and shin splints (36.1%) coming in a close second and third. Not far behind, muscle pull, strain, and/or cramps received 35.1% and runner’s knee received 30.7%. Therefore, most running injuries reported resulted from overuse. When asked about specific injuries, most often the response was blisters and/or bunions.

Table 9. Shoe Usage.

<table>
<thead>
<tr>
<th>When Runners Replace Their Shoes</th>
<th>Answer</th>
<th>Response Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tread starts to look bare and/or worn</td>
<td>48.3%</td>
<td></td>
</tr>
<tr>
<td>After having run a certain distance in them (such as 300 mi)</td>
<td>40.5%</td>
<td></td>
</tr>
<tr>
<td>Feet start to hurt from running</td>
<td>32.2%</td>
<td></td>
</tr>
<tr>
<td>Shoes starting to fall apart, have holes, lose cushioning, etc.</td>
<td>28.1%</td>
<td></td>
</tr>
<tr>
<td>Knees start to hurt from running</td>
<td>23.1%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average Mileage on Running Shoes Before Replacing</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>100-199</td>
<td>1.5%</td>
</tr>
<tr>
<td>200-299</td>
<td>14.4%</td>
</tr>
<tr>
<td>300-399</td>
<td>41.9%</td>
</tr>
<tr>
<td>400-499</td>
<td>28.7%</td>
</tr>
<tr>
<td>500+</td>
<td>13.5%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Top Running Shoe Uses</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Running</td>
<td>98.6%</td>
</tr>
<tr>
<td>Walking</td>
<td>37.1%</td>
</tr>
<tr>
<td>Everyday use</td>
<td>17.6%</td>
</tr>
<tr>
<td>Hiking</td>
<td>14.7%</td>
</tr>
<tr>
<td>Biking</td>
<td>8.0%</td>
</tr>
</tbody>
</table>

4.7. RQ5: Running Injuries

Injuries can be common in running-related activities. Respondents were asked if they have ever received an injury due to running and, if so, what it was related to. This section addresses RQ5 and the top results can be seen in Table 10. Overuse of body was chosen 65.9% of the time, while ill-fitting shoes (18.8%) and running surface (14.1%) were much farther behind. These reflect the responses to the following question that ask the exact injuries they have experienced from running. The most common responses (58.4%) involved blisters and/or bunions, with IT band syndrome (36.9%) and shin splints (36.1%) coming in a close second and third. Not far behind, muscle pull, strain, and/or cramps received 35.1% and runner’s knee received 30.7%. Therefore, most running injuries reported resulted from overuse. When asked about specific injuries, most often the response was blisters and/or bunions.
Table 10. Running Injuries and Causes.

<table>
<thead>
<tr>
<th>Top Causes of Running-Related Injury</th>
<th>Answer</th>
<th>Respondent Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overuse of body</td>
<td>65.9%</td>
</tr>
<tr>
<td></td>
<td>Ill-fitting shoes</td>
<td>18.8%</td>
</tr>
<tr>
<td></td>
<td>Running surface</td>
<td>14.1%</td>
</tr>
<tr>
<td></td>
<td>Overuse of shoes</td>
<td>11.5%</td>
</tr>
<tr>
<td></td>
<td>Trip and/or fall</td>
<td>1.6%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Top Injuries Experienced from Running</th>
<th>Answer</th>
<th>Respondent Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Blisters and/or bunions</td>
<td>58.4%</td>
</tr>
<tr>
<td></td>
<td>IT band syndrome</td>
<td>36.9%</td>
</tr>
<tr>
<td></td>
<td>Shin splints</td>
<td>36.1%</td>
</tr>
<tr>
<td></td>
<td>Muscle pull, strain, and/or cramps</td>
<td>35.1%</td>
</tr>
<tr>
<td></td>
<td>Runner’s knee</td>
<td>30.7%</td>
</tr>
</tbody>
</table>

4.8. RQ6: Content and Recommendations

Runners’ expectations of content and recommendations around running shoes can differ. To see what additional recommendations for documentation could better match the runner to the running shoe, a final question concerning this was asked on the survey. This answers RQ6 and can be seen in Table 11. Just over half of the respondents (50.3%) wanted to know the type of stability that the shoes work for best. The types of surfaces recommended for the shoe to perform the best on was chosen 42.3% of the time and the description of type and/or amount of cushion in the shoe was selected by 41.4% of the respondents. An overall description of the fit of the shoe was selected at 36.6%. In conclusion, the participants were most interested in the stability of the shoe in relation to what type of running for which it was designed.
Table 11. Running Shoe Content and Recommendations.

<table>
<thead>
<tr>
<th>Running Shoe Content and Recommendations</th>
<th>Answer</th>
<th>Response Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type of stability that the shoes work best for</td>
<td>50.3%</td>
</tr>
<tr>
<td></td>
<td>Types of surfaces recommended for the shoe to perform the best</td>
<td>42.3%</td>
</tr>
<tr>
<td></td>
<td>Description of type and/or amount of cushion in the shoe and why</td>
<td>41.4%</td>
</tr>
<tr>
<td></td>
<td>Mileage recommendation for shoes</td>
<td>40.4%</td>
</tr>
<tr>
<td></td>
<td>Description of fit</td>
<td>36.6%</td>
</tr>
</tbody>
</table>
CHAPTER 5: CONCLUSIONS AND DISCUSSION

Running shoe comfort perception has been discussed over the past few decades, but the relationship between comfort and running shoe factors is not well established due to the subjectivity of the concept. This research aimed to determine if more detailed shoe market segmentation is possible for runners. The survey of 1,472 runners determined that runners are primarily concerned with their perceived comfort in a shoe as this factor was chosen the most frequently. Comfort was also the top issue that participants described when a shoe did not meet their expectations. Runners responded that they would primarily prefer to know what type of stability a pair of running shoes would work for best in regards to content and recommendations.

Based on the most often reported responses, the typical runner from the survey is a 40 year old who wears women’s Brooks running shoes and has been running consistently for 11 years. This runner primarily runs on roads and/or paved surfaces for 11-25 miles every week. They run at least 7 races a year, largely 5Ks. In this time frame, they use at least 2 pairs of shoes. While the runner tends to purchase their shoes in-store, they have a habit of repeating a previous purchase when they do not ask a salesperson for advice. Comfort is the biggest factor in this runner’s shoe purchase decision and they spend between $101 and $120 on running shoes. If a pair of shoes does not meet their expectations, it was due to comfort and fit. They look for shoes aimed towards runners with a neutral gait and do not replace their shoes until the tread looks bare and/or worn, or if they have run 300 to 399 miles in them. This runner tends to injure themselves due to overuse of body and frequently deals with blisters and/or bunions. In regards to running shoe content and recommendations, this runner would prefer to know what type of stability the pair of shoes they are wanting to purchase would work for best.
In conclusion, more research would be recommended on the topic; and it is possible to define comprehensive shoe market segmentation for runners. Shoe manufacturers assume the left and right feet to be of equal size and this is not the case, as this is just one of the aspects that differ from runner to runner. Customization of running shoes to correctly fit runners faithfully has the prospect of being the next big running shoes innovation.

5.1. Limitations

The snowball method was used to collect data in this study. Although the snowball method was used to widely capture a niche population in a relatively short amount of time, this method produced non-probabilistic sampling. Given limited time and financial constraints, this method was considered to be most appropriate. However, if time, technical resources, and the financial situation permitted, a more probabilistic sampling method may have provided an added comprehensive analysis to determine further market segmentation of runners.

The survey method of distributing online potentially caused some respondents to misinterpret questions. Due to the inability to provide a reward for survey completion, the survey also relied on runners who would participate for free. The length of the survey used in this study could be the cause for some respondents prematurely terminating their surveys. This analysis also assumes that all responses to the survey were complete and truthful.

5.2. Recommendations for Future Research

To ensure a higher number of completed surveys and greater participant commitment, future research should include a shorter, more focused survey. It could also employ a larger sample size so as to give more reliable results with greater precision and power. Future research could replicate the study using a simple random sample from the general population. Additionally, the data could be analyzed more extensively with a focus on inferential statistics.
In a future survey, more of the questions could be free response in order to facilitate detailed responses. In-person interviews with focus groups could be enlightening as well.
6. REFERENCES


7. APPENDICES
Consent

North Carolina State University
INFORMED CONSENT FORM for RESEARCH

Title of Study: Running Shoe Experience (14323)
Principal Investigator: Katy Lund
Faculty Sponsor: Trevor Little

What are some general things you should know about research studies?
You are being asked to take part in a research study. Your participation in this study is voluntary. You have the right to be a part of this study, to choose not to participate, or to stop participating at any time without penalty. The purpose of this research study is to gain a better understanding of how runners choose their running shoes.

You are not guaranteed any personal benefits from being in a study. Research studies also may pose risks to those who participate. In this consent form you will find specific details about the research in which you are being asked to participate. If you do not understand something in this form it is your right to ask the researcher for clarification or more information. If at any time you have questions about your participation, do not hesitate to contact the researcher(s) named above or the NC State IRB office as noted below.

What is the purpose of this study?
The purpose of the study is to determine how runners choose their running shoes. The information will be used to determine how to segment the market and develop better runner shoe profiles.

Am I eligible to be a participant in this study?
In order to be a participant in this study you must be at least 18 years old or at least 15 years old and have parental/guardian consent.
You cannot participate in this study if you are not at least 15 years old.

**What will happen if you take part in the study?**
If you agree to participate in this study, you will be asked to answer questions about your experience with running shoes.

**Risks and Benefits**
There are minimal risks associated with participation in this research. There are no direct benefits to your participation in the research. The indirect benefits are improvements to athletic shoes that could have a widespread benefit to society at large.

**Confidentiality**
The information in the study records will be kept confidential to the full extent allowed by law. Data will be stored securely on an NC State managed computer. No reference will be made in oral or written reports which could link you to the study. Individual data with individually identifiable details removed may be made available to the public as required by some journal and funding agency data sharing policies.

**Compensation**
For participating in this study you will not receive compensation. If you withdraw from the study prior to its completion, your answers will not be recorded.

**What if you are a NCSU student?**
Participation in this study is not a course requirement and your participation or lack thereof, will not affect your class standing or grades at NC State.

**What if you are a NCSU employee?**
Participation in this study is not a requirement of your employment at NCSU, and your participation or lack thereof, will not affect your job.

**What if you have questions about this study?**
If you have questions at any time about the study itself or the procedures implemented in this study, you may contact the researcher: Katy Lund at kelund2@ncsu.edu

**What if you have questions about your rights as a research participant?**
If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in research have been violated during the course of this project, you may contact the NC State IRB Office via email at irb-director@ncsu.edu or via phone at 1.919.515.4514. You can also find out more information about research, why you would or would not want to be in research, questions to ask as a research participant, and more information about your rights by going to this website:
http://go.ncsu.edu/research-participant

This survey asks for runners’ experience with running shoes. The information provided will be used to determine if correlations can be made to segment the market and develop runner profiles.

Participation in this survey is strictly voluntary and you may refuse to participate or discontinue participation at any time. The survey should take about 5-10 minutes to complete. All data is kept and analyzed anonymously without any personal identifiers.

Continuing with the survey is an indication of your willingness to participate and that you are at least 18 years old.

Consent To Participate
“I have read and understand the above information and consent form on the previous page. I agree to participate in this study with the understanding that I may choose not to participate or to stop participating at any time without penalty or loss of benefits to which I am otherwise entitled.”

- Yes, I am 18 or older and I consent to be in this research.
- No, I am not 18 but I assent to be in this research (continue to parental/guardian permission).
- No, I would not like to continue.

PARENTAL/GUARDIAN PERMISSION

Please have a parent or guardian present to complete the following section of the survey.

This survey asks for runners’ experience with running shoes. The information provided will be used to determine if correlations can be made to segment the market and develop
runner profiles.

Participation in this survey is strictly voluntary and you may refuse to participate or discontinue participation at any time. The survey should take about 5-10 minutes to complete. All data is kept and analyzed anonymously without any personal identifiers.

Minor is at least 15 years of age and has parental/guardian permission to continue with the survey.

Continuing with the survey is an indication of your willingness for the minor to participate and that they are at least 15 years old.

Consent To Participate
"I have read and understand the above information and consent form on the first page. I give permission for this minor to participate in this study with the understanding that they may choose not to participate or to stop participating at any time without penalty or loss of benefits to which they are otherwise entitled."

☐ Yes, I give this minor permission to continue.
☐ No, I do not give this minor permission to continue.

Demographics

What type of running shoes do you wear?

☐ Female running shoes
☐ Male running shoes

At what age did you begin to run regularly?
(If you’ve had a break from running and started up again, at what age did you return to a regular running routine?)

As of December 2018, how many years have you been running regularly?
(If you’ve had a break from running and started up again, how many years since you began your regular running routine?)

Running Logistics

What do you run on the most?

☐ Road/paved surface
☐ Sidewalk
☐ Woodland trail/grass/dirt
☐ Sand
☐ Track
☐ Treadmill
☐ Other __________

What is your average weekly running mileage?

☐ Less than 10 miles
☐ 11 to 25 miles
☐ 26-40 miles
☐ 40+ miles

What is your usual race distance?

☐ Track (under 5K/3.1 mi)
☐ 5K (3.1 mi)
☐ 10K (6.2 mi)
☐ 11-20K (over 6.2 mi, but under 13.1 mi)
☐ Half-marathon (13.1 mi)
☐ Marathon (26.2 mi)
☐ Ultra-marathon (over 26.2 mi)
☐ I do not participate in races.
On average, how many organized races do you run each year?

- 1-2
- 3-4
- 5-6
- 7-8
- 9-10
- 11-12
- More than 12
- I do not participate in races

**Buying Habits**

On average, how many pairs of running shoes do you use each year?

---

Which running shoe brand(s) have you used in the past year?

- Adidas
- Altra
- Asics
- Avia
- Brooks
- Hoka One One
- Merrell
- Mizuno
- New Balance
- Newton
- Nike
- On
3/1/2019

Quatrirs Survey Software

- Puma
- Saucony
- Sketchers
- Skora
- Reebok
- Under Armour
- Other

From the running shoe brands you've used, what is your favorite?

- Adidas
- Altra
- Asics
- Avia
- Brooks
- Hoka One One
- Merrell
- Mizuno
- New Balance
- Newton
- Nike
- On
- Puma
- Saucony
- Sketchers
- Skora
- Reebok
- Under Armour
- Other
- I do not have a favorite running shoe brand
What resources have you consulted before deciding on a pair of running shoes?

☐ Doctor/athletic specialist
☐ Family member or friend
☐ Online guide and/or recommendations
☐ Online reviews
☐ Repeat previous purchase
☐ Salesperson
☐ Word of mouth/running colleague
☐ Other
☐ I do not consult any resources

What are the top 5 factors you consider when buying running shoes?

☐ Brand
☐ Color
☐ Comfort
☐ Cushion
☐ Design
☐ Minimalist
☐ Price
☐ Recommendations (running colleague, friend, online, etc.)
☐ Reviews
☐ Specialty (track, racing flats, trail, etc.)
☐ Support
☐ Weight
☐ Other

Of your top 5 choices, which factor is the most important to you?

☐ Brand
☐ Color
Comfort
Cushion
Design
Minimal
Price
Recommendations (running colleague, friend, online, etc.)
Reviews (online)
Specialty (track, racing flats, trail, etc.)
Support
Weight
Other

Where do you buy your running shoes from?

☐ In-store
☐ Online

On average, how much do you spend on a pair of running shoes?

☐ Less than $40
☐ $40-$80
☐ $81-$100
☐ $101-$120
☐ $121-$140
☐ $141-$180
☐ Over $180

Have you ever run in a pair of shoes that did not meet your expectations?

☐ Yes
☐ No
Which expectations were not met?

Running Shoes

When do you decide to replace your running shoes?

☐ After having run a certain distance in them (such as 300 mi)
☐ Feet start to hurt from running
☐ Knees start to hurt from running
☐ Tread starts to look bare/worn
☐ Shoes starting to fall apart/have holes/lose cushioning/etc.
☐ Shoes on sale/coupon
☐ Other

How many miles (on average) do you run in your shoes before replacing them?

What do you use your running shoes for?

☐ Biking
☐ Hiking
☐ Running
☐ Walking
☐ Work
☐ Everyday use (for example: running errands)
☐ Other

Please look over the following reference to answer the next question.
Pronation is a natural motion of your foot during walking and running. Your gait can show a pattern of neutral pronation, overpronation, or supination (underpronation). Examples can be seen in the picture below.

The stresses of overpronating or supinating have been linked to a greater risk of injuries. Motion control shoes and orthotics may be recommended if you are an overpronator, while flexible and cushioned shoes are better for people who supinate.


What type of gait pattern do you have when you run?
- Overpronation
- Neutral
- Supination (underpronation)
- I don't know
Does your gait pattern affect what type of running shoe you choose to purchase?

- Yes
- No

If you’ve had a running-related injury, what was it caused by?

- Overuse of shoes (i.e. running in worn out shoes)
- Overuse of body (i.e. running too far, running too often, starting back to running after a break)
- Ill-fitting shoes (i.e. not wearing shoes with proper support, damage to toes)
- Running surface
- Other
- Not certain
- I have never had a running-related injury.

What injuries have you experienced from running?

- Blisters
- Temperature-related (i.e. sunburn, heat exhaustion)
- Ankle sprain
- Runner's knee
- Hip flexor strain/tendinitis (stretch or tear of a muscle in your hip)
- Shin splints
- Achilles tendinopathy (formerly called tendinitis, this is inflammation of the Achilles tendon)
- IT (iliotibial) band syndrome (this ligament runs along the outside of the thigh, from the top of the hip to the outside of the knee)
- Plantar fasciitis (heel pain)
- Muscle pull/strain
- Stress fracture
- Other

Final Question
What form of recommendation/content for running shoes would you like to see?

- Mileage recommendation for shoes - "These shoes will last 300 miles on a paved surface"
- Focus more on function than style
- Description of fit - "The brand is changing/updating the fit of their shoe"
- Type of stability that the shoes work best for - "These shoes are recommended for those with shin splints"
- Description of type/amount of cushion in the shoe and why
- Types of surfaces recommended for the shoe to perform the best
- Locations of support in shoe - "These shoes offer significant heel support"
- Breathability of the shoe in different temperatures
- Other

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7.2. Appendix B: IRB Letter of Intent

Principal Investigator: Kaitlyn Lund
Faculty Sponsor (if applicable): Trevor Little
Title of Study: Running Shoe Experience
Proposed Source of Funding: N/A

Brief Project Summary: This project will be using a survey to determine how runners experience their running shoes. The information will be used to determine how to segment the market and develop better runner shoe profiles.

This document serves as notice of the Principal Investigator’s acknowledgement that the above referenced proposal involves human subjects, and requires IRB review. Once the proposal receives a fundable score or is funded by the sponsor, an appropriate IRB application will be submitted. The investigator understands that no portion of the research that involves human subjects according to 45 CFR 46 will be conducted until the proposal has received review and approval by the Institutional Review Board.

Principal Investigator’s Certification
“As soon as I learn that the proposal may/will be funded, I will submit the appropriate IRB form for review. I am aware that I must receive IRB approval before I approach, recruit or enroll any human subjects into this study, and that my award will be limited until IRB approval has been received.”

[Signature]
9/21/18
Date

Faculty Sponsor’s Signature (if applicable)

[Signature]
9/21/2018
Date

IRB Acknowledgement of Receipt
The IRB office has received and documented this letter.
7.3. Appendix C: IRB Protocol Approved

Fwd: Little - 14323 - IRB Protocol approved

Tj Little
Fri Nov 23, 2018, 3:36 PM

Sent from my iPhone

Begin forwarded message:

From: IRB Administrative Office <ems_notifications@ncsu.edu>
Date: November 23, 2018 at 12:32:53 PM EST
To: little@ncsu.edu
Subject: Little - 14323 - IRB Protocol approved
Reply-To: ems.coordinators@ncsu.edu

Dear Trevor Little,

IRB Protocol 14323 has been approved

Title: Running Shoe Experience

PI: Little, Trevor J.

The project listed above has been reviewed by the NC State Institutional Review Board for the Use of Human Subjects in Research, and is approved for one year. This protocol will expire on 3/1/2020 and will need continuing review approval before that date.
Hi!

My name is Katy Lund and I am a 2nd year masters student at NC State. I am conducting research for my thesis on runners and their experience with running shoes. As a runner myself, I wanted my thesis to combine my love of running and textiles background.

I am surveying all runners that are at least 15 years of age (parental consent is required for those 15-17). It should only take 5-10 minutes to complete and is completely anonymous. Please complete it within the next 10 days.

Thank you for your time!

Katy Lund  
North Carolina State University  
Master of Science in Textiles  
kelund2@ncsu.edu

Click here to take the Survey
Young & Associates is assisting Katy Lund, a graduate student at North Carolina State University, who is working on her master’s thesis involving runners and running shoes. As a runner herself, she wants to complete a thesis combining her love of running and textiles background.

Participation is entirely optional and anonymous. Katy is surveying all runners that are at least 15 years of age (parental consent is required for those 15-17). It should only take 5-10 minutes to complete. Please complete it within the next 10 days, or as soon as possible.

The link is below:
https://ncsu.qualtrics.com/jfe/form/SV_OH7OMa6WSMUTGjr

If you have any questions about the study and/or how the data will be used, feel free to email Katy Lund at kelund2@ncsu.edu and she will be happy to answer.
There's no question that running changes your heart.

The issue is whether these changes are good or bad. I don't mean the occasional 3 miles once or twice a week, although even this minimal amount of exercise seems to
have positive health benefits.

A famous 2014 study led by Duck-chul Lee that followed 55,000 adults for more than 15 years concluded that even modest amounts of running, around 50 minutes a week total, causes a 30 percent drop in all-cause mortality risk and an average increase of three years in lifespan. The results of this study were fairly flat with respect to running time, distance, frequency, amount and speed, compared to non-runners, although persistent runners "had the most significant benefits, with 29 percent and 50 percent lower risks of all-cause and cardiovascular mortality, respectively, compared with never-runners." However, the authors caution that "further research is needed to determine whether there is an upper limit to the amount of vigorous physical activity, beyond which additional exercise provides no further mortality reduction."

In other words, can too much running be bad for you?

The issue here, as pointed out in an excellent special report by Alex Hutchinson published this month in Runner's World, is what happens long term to your heart if you are a pretty serious runner, averaging 20 or more miles a week consistently for a long time.

The controversy heated up after a 2012 editorial in the British journal Heart co-authored by cardiologist James O'Keefe.

"Exercise may be the most important component of a healthy lifestyle, but like any powerful drug you've got to get the dose right," he said.

Excessive running may thicken the heart tissue, causing fibrosis or scarring, and this may lead to atrial fibrillation or irregular heartbeat. Prolonged exercise may also lead to "oxidative stress," a buildup of free radicals that may bind with cholesterol to create plaque in your arteries.

It makes some sense that too much of a good thing may end up being bad for you. The question is how accurate can these assertions be in longitudinal studies where many conflicting factors are taken into account. Every person is different. Different genetic makeup and predisposition to disease, different diet, different lifestyle. These
variables, as well as others like body mass index, blood pressure and cholesterol levels, are routinely either ignored or adjusted in studies to make the statistical analysis more manageable. Unfortunately, we can’t have copies of the same person doing different things for a more direct comparison.

Being 57 and a very serious runner, I have a vested interest in these studies. There’s no question that when I run up steep trails, I can feel the stress in my heart — sometimes to the point that I need to slow down and hike up in order to get things under control. Your body is usually good at telling when you are going over the limit. We all have a max heart rate, and using watches with heart monitors can be immensely useful to track your heart’s effort. However, we can’t see what’s going on inside, whether our heart tissue is getting thicker and our arteries progressively more blocked. Hence, the interest in these discussions among experts, despite their usually confusing conclusions.

As Hutchinson reports, the overall news is fortunately good. A special symposium at this year’s conference of the American College of Sports Medicine, held in Boston, convened many experts, including Duck-chul Lee, Paul Thompson from the Hartford Health-Care Heart and Vascular Institute, and Paul T. Williams, a biostatistician from Lawrence Berkeley Laboratory. Williams’ studies have been following 156,000 men and women since the early 1990s. The title of the symposium was perfect: "Optimal Dose of Running for Health: Is More Better or Worse?"

Since the 2014 study, Lee has been looking more carefully at the group of more intense runners. His conclusions, still not final, "don’t support that more is worse. But more may not be better." Williams, on the other hand, insists that more is better. In his huge study, he found that men running at least 40 miles a week (a pretty serious mileage) were 26 percent less likely to develop coronary heart disease than those running just 13 miles per week. According to Williams, the apparent discrepancy between the two studies is sample size: "At 156,000 subjects, we're bigger than they are. So I'll stand behind our data."

Endurance runners can have hearts that are 50 percent bigger than normal: more muscle to pump blood to those working muscles. Their arteries are wider and more expandable so that more blood can flow. Their resting heart rates are slower. They
have more abundant capillaries improving blood circulation to tissues. So, even if there would be an increase in calcium buildup in arteries potentially leading to clogging, it could be less damaging than for a non-runner with thinner arteries and less capillaries. Also, in runners such plaques tend to be denser and thus less breakable. The evidence is not final, but it’s also not as bad as many think. The health benefits of running short or long distances are so overwhelmingly positive that they swamp potential dangers.

Plus, there is a whole different aspect to this discussion, the psychological reasons why people run. Serious runners have a commitment that goes beyond just exercising for good health. Generally, the more they run, the more they feel connected to their inner-selves, the more clearly they see themselves and the tasks ahead. There’s something exhilarating about running, the freedom to move on a road or on a trail, that sends us back to our primal selves. If you are a beginner, it may take a while to break through the initial barrier of physical discomfort. But with persistence comes big payoff. And this is an emotional, not just a medical, payoff.

As we evolved as bipeds, we became able to run for long distances after prey, having an endurance that antelope or deer don’t have. This is engraved in our genetic makeup, imprinted in our being. Modern life takes this away from us, as we spend hours a day sitting in front of screens, motionless. (As I am right now, writing this.) The act of running connects us with our ancient past, awakening a part of us that lays dormant, hidden underneath our daily routine.

Every runner should listen to his or her body and slow down and stop if necessary. I even wear an ID band, just in case something bad happens on some remote mountain trail. Consulting a sports physician is essential, if you are to become a serious runner.

But, once potential medical factors are ruled out, those of us who love running can’t live without it. Whatever goes on in the heart and arteries, the mind only gets clearer on the road.

Marcelo Gleiser is a theoretical physicist and cosmologist — and a professor of natural philosophy, physics and astronomy at Dartmouth College. He is the co-
founder of 13.7 and an active promoter of science to the general public. His latest book is The Simple Beauty of the Unexpected: A Natural Philosopher's Quest for Trout and the Meaning of Everything. You can keep up with Marcelo on Facebook and Twitter: @mgleiser

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### Appendix F: Most Popular Outdoor Activities in the U.S. from 2009 to 2017

#### Most popular outdoor activities in the United States from 2009 to 2017, by number of participants (in millions)

<table>
<thead>
<tr>
<th>Year</th>
<th>Hiking</th>
<th>Car, backyard and RV camping</th>
<th>Road biking, mountain biking and BMX</th>
<th>Freshwater, saltwater and fly fishing</th>
<th>Running, jogging and trail running</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>32.6</td>
<td>44</td>
<td>43.3</td>
<td>48</td>
<td>44.7</td>
</tr>
<tr>
<td>2010</td>
<td>32.4</td>
<td>42.3</td>
<td>42.3</td>
<td>45.4</td>
<td>50.2</td>
</tr>
<tr>
<td>2011</td>
<td>34.5</td>
<td>42.5</td>
<td>43</td>
<td>46.2</td>
<td>51.5</td>
</tr>
<tr>
<td>2012</td>
<td>34.5</td>
<td>38</td>
<td>42.3</td>
<td>46</td>
<td>53.2</td>
</tr>
<tr>
<td>2013</td>
<td>34.38</td>
<td>36</td>
<td>46.6</td>
<td>45.9</td>
<td>57.6</td>
</tr>
<tr>
<td>2014</td>
<td>34.3</td>
<td>40.5</td>
<td>44</td>
<td>46</td>
<td>53.7</td>
</tr>
<tr>
<td>2015</td>
<td>37.2</td>
<td>40</td>
<td>43</td>
<td>45.7</td>
<td>51.5</td>
</tr>
<tr>
<td>2016</td>
<td>42.2</td>
<td>40.5</td>
<td>45.9</td>
<td>47.1</td>
<td>52.3</td>
</tr>
<tr>
<td>2017</td>
<td>44.9</td>
<td>41.8</td>
<td>47.5</td>
<td>49.1</td>
<td>55.9</td>
</tr>
</tbody>
</table>

Showing entries 1 to 9 (9 entries in total)

This statistic shows the number of people above the age of six participating in the most popular outdoor activities in the U.S. from 2009 to 2017. Hiking was the fourth-most popular outdoor activity in the U.S. in 2017 with 44.9 million total participants.

Running is one of the most popular and practiced sports worldwide. In the United States alone, almost 60 million people participated in running, jogging and trail running in 2017. Walking for fitness drew more than 110 million participants in the U.S. in 2017. Improving their fitness is one of the main motivations for Americans to start running or jogging. In 2017, about 24 percent of Americans stated that exercise was the primary reason for them to start running. Weight concerns and the decision to enter a race are also common reasons Americans begin practicing the sport. Nearly 80 percent of American runners continue to run to stay healthy or to stay in shape. Relaxing stress and having fun are top reasons as well to why people continue to run as a sport in the United States.

Although not all runners may compete, entering a race or run in a particular event is a major motivation to continue practicing the sport. In the United States, more than 70 percent of core runners – that is, active adult participants who tend to enter running events and train all year round – felt that it is easy to find an event that they want to participate in. About 60 percent stated that they would participate in more events if the entry fees were lower. More than 30 thousand running events and train all year round – felt that it is easy to find an event that they want to participate in. About 60 percent stated that they would participate in more events if the entry fees were lower. More than 30 thousand running events take place in the United States every year, including 5k, 10k and 8k/5 mile races as well as half-marathons and marathons.

The World Marathon Majors is composed of six races hosted in six different cities; three of them are located in the U.S. – Boston, Chicago and New York City. In 2014, the TCS New York City Marathon was the biggest marathon in the U.S. with more than 51 thousand finishers. The Chicago Marathon ranked second in number of finishers, and the Boston Marathon third. Major marathons also attract many spectators and viewers. In 2019, people from almost 3.3 million households are projected to attend a marathon event in the United States.

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https://www.statista.com/topics/17433/running-and-jogging/
The Biggest Pet Hate of Runners Revealed (And It’s Not People Getting in Their Way)

BY ALAN PAUL | JANUARY 09, 2018

The Running Shoes Guru Reader Survey Results

At the end of 2017, here at Running Shoes Guru we put together our first annual reader survey to learn everything from the habits of runners (such as when they run and how often) to how much they’re willing to spend on a marathon...or their next pair of Nike’s.

Our survey was completed by 2,574 runners of whom 77% of which were male, and 23% were female.

60% of participants have been running for more than five years, with 56% of participants running more than 26 miles per week.

In other words, this year’s data comes with feedback from experienced runners who have taken up running for a long time, and those who are just starting out and getting a mile per week under their belt.

Without further ado, let’s get into the results, shall we?

The Biggest Pet Peeve of Runners Is...Pets

We couldn’t let a headline like that go to waste.

The biggest pet hate that our runners shared with us on our survey was undoubtedly pets, or more specifically, dogs that aren’t kept on a leash.

Part of this reasoning could be because dogs get in the way of a run, but another likely reason is the possible tear people have of dogs running towards them or chasing them as they go.

Below you can see the entire results.
The second most popular response to this question was actually quite telling of the passion that people have for running. Over 20% of runners said there is nothing at all they dislike about running, emphatically clicking “I love everything about it”.

The other options, and the number of respondents who chose them, were:

- People walking / running in the middle of the route: 378
- Runners leaving litter: 273
- Not being able to find a great route to run: 270
- Cyclists: 118
- People running too close: 97
- Runners with headphones: 96
- Being left behind: 39
- Having to wait for others: 34

The second least selected option on our list, being left behind, was chosen by 3 times as many women than men.
Favourite Brand of Running Shoes

It just wouldn’t be right for us to not collect data on what your preferred brand of running shoes are.

Asics were our clear winner with Brooks in second place, and Nike and Saucony fighting it out for third.

80 readers selected the ‘Other’ option, which included brands like Vibram, Newton, On and La Sportiva.

Next year, when we run the survey again, it should be interesting to see if these figures change, and how brands and their ratings evolve over time.

37 Respondents Primarily Run So They Can Eat and Drink More

We can relate to that.

When asked why they run, the most overwhelming answer from both men and women was to help them stay fit and healthy.

It was interesting to note that this was chosen as their primary goal by 48% of those under 30, but by 65% of those over 30.
This suggests that people become more health conscious as they get older.

The second most popular choice for men was to push themselves, while the second most popular choice for women was to improve their mental well-being.

Men’s second most popular choice was the third most popular for women, and vice versa.

Here’s the data in its entirety.

![Bar chart showing the primary reason runners run](https://www.runningshoesguru.com/content/sg-survey-results/)

2.3% of women stated they run in order to be able to eat and drink more, with just 0.7% of men saying the same.

**60% of Runners Have Purchased Running Shoes in the Last Three Months**

We’re all about helping you find the most stable, comfortable and reliable shoe for your runs here at Running Shoes Guru, but this one even surprised us.

Almost two out of three of respondents claimed to have purchased a pair of running shoes in the last three months.
Even more surprised was that 26.5% of men, and 26.6% of women, have purchased a pair of running shoes in the past 30 days (!).

If we look at the other end of the spectrum, 0.9% of men are still using shoes they purchased over two years ago, while 1.8% of women say the same.

**Women Are 2X as Likely to Run With Headphones Than Men**

Both men and women picked GPS watches as their favourite bit of tech when out on their runs.

Men were significantly in favour of them (67%) over women (52%).

15.7% of women stated they prefer to run with headphones, while less than half of that for men (7.2%) said the same.
Two people out of our 2,500+ respondents said that their favourite piece of technology when running is having a GoPro or other kind of camera with them.

**The Favourite Race of Our Readers Is the Half Marathon**

There shouldn't be too many surprises here, with half marathons making up some of the most popular and publicised events in the world.

10K events were the second most popular, with 500 readers voting for this option.
There were 26 people who selected ‘Other’ – not included in the chart – who had tended to suggest race types, like fun run, rather than specific distances.

**Runners Tend to Be Friendlier to Each Other in the Daytime**

This is another result that shouldn’t be too surprising, but it does go to the show some of the interesting aspects of this data we were able to pull out.

The number of respondents who run in the mornings or lunch time and stated that they **never acknowledge other runners** (such as a friendly hello or nod of the head) were 1.5% and 2.7% respectively.

When we asked people who prefer running at night whether they acknowledge other runners, they chose ‘Never’ 10% of the time, or were 400x more likely to ignore other runners than their daylight-running peers.

There is more than likely a safety element to this; not wanting to communicate with (or even annoy) someone when it’s dark outside.

Perhaps more interesting is that 63.3% of people who run in the mornings said that they **Always acknowledge other runners**, while just 35% of nighttime runners noted the same.

Continuing with the theme of safety, when we looked at the ‘pet hates’ of runners who tend to run at night, they were up to 3x as likely to pick ‘being left behind by others’ as their biggest hate with running.
The age group that tend to be the friendliest overall are actually those in the 11-25 age range, with 68.3% stating they always acknowledge other runners. That said, the numbers for each age bracket were similar.

**Other Notable Findings from Our Survey**

We’ve already covered some of the main takeaways from our survey, but they’re not all. Now we’ll go through more of the numbers you may be curious about.

**The Time of Day Runners Prefer to Run**

While some of you are content to run at any time of the day, getting in a run in the early morning is the overwhelming favourite choice.

- Morning: 53%
- Evening: 21%
- Afternoon: 11%
- No preference: 8%
- Lunchtime: 4%
- Night: 2%

**How Many Miles Per Week on Average Runners Run**

It’s great to see that even though a large portion of survey respondents had only just took up running, the majority of them are still running more than 10 miles each week.

- 11-25 miles: 43%
- 26-40 miles: 33%
- Less than 10 miles: 11%
- 41-55 miles: 9%
- 56-70 miles: 3%
- 71-85 miles: 1%
- 86-100 miles 0% (9 respondents)
- 100+ miles 0% (4 respondents)

**How Long Ago Our Readers Started Running**

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https://www.runningshoesguru.com/content/rsg-survey-results/
We put a caveat on this question to avoid confusion, essentially saying that if you’ve had a break from running and started up again, how long has it been since you got back into a regular routine.

- 3-4 years: 17%
- 26+ years: 14%
- 1-2 years: 14%
- 5-6 years: 12%
- 10-15 years: 11%
- Less than 1 year: 9%
- 6-7 years: 7%
- 8-9 years: 6%
- 16-20 years: 5%
- 21-25 years: 4%

**How Much Readers Spent on Their Last Pair of Running Shoes**

- $101-120: 25%
- $81-100: 21%
- $121-140: 18%
- $61-80: 12%
- $141-160: 10%
- $41-60: 5%
- $161-180: 3%
- $181-200: 2%
- $200+: 2%
- $21-40: 2%
- Never purchased a pair: 0% (8 respondents)
- Under $20: 0% (8 respondents)

Thank you to everyone who took part in this year’s survey and if you would like to use this data for your own analytical purposes, please do reach out to us.

https://www.runningshoesguru.com/content/rsg-survey-results/
Feel free to use the data or charts above in any articles or posts on your own site. All we ask is that you credit us as the original source.

Over the coming weeks we’ll have some more interesting and specific data to share with you, such as what people look for when they choose Asics shoes over a brand like, say, Nike, so look out for that!

FREE Running Training Plans

by Coach P. Hoyal, NAIA Track & Field All American

DOWNLOAD PDF (FREE-RUNNING-TRAINING-PLANS)

By Alan Peul

A keen trail and cross country runner, Alan started racing at the age of 9. 23 years later and based in the UK, he is a manager of a local running club and embraces running for the love of exploration, nature and fitness.

SUGGESTED READING
7.9. Appendix I: Runners - Average Miles Per Week Worldwide 2017

How many miles do you run on average per week?*

The statistic shows the average number of miles per week that runners covered according to a survey carried out in late 2017. Forty-three percent of the survey respondents said that they run 10 to 25 miles per week on average.

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What is your favorite race distance?*

- 10K: 13%
- 5K: 22%
- Half marathon: 36%
- 11–20K: 7%
- Marathon: 15%
- Ultra: 1%

The statistic shows runners' favorite running race distance according to a survey carried out in late 2017. Twenty-two percent of the survey responder said that their favorite race distance was ten kilometers.
Run for your (long) life

Posted May 24, 2017, 10:30 AM

Monique Tebo, MD, MPH
Contributing Editor

“Researchers find that running can add three years to your life!” shout the headlines. And yes, a new study did find that cardiovascular exercise, including running, can decrease the risk of death and potentially prolong life. But there’s more: the authors not only include analyses of piles of data, but also an exhaustive review of just about every other study of cardiovascular fitness and mortality out there. They cite (and discuss) almost 70 reference articles!

By popular demand...

Their newest study came about due to demand. The authors had previously published data from over 55,000 people followed for over 15 years, and found that running was associated with a 45% reduced risk of death from heart attacks and strokes, as well as a 30% reduced risk of death from anything. This benefit was seen even with as little as five to 10 minutes a day of running, even at paces as slow as six miles per hour, and after accounting for age, sex, weight, and other health risk variables (like high blood pressure, diabetes, smoking, and alcohol consumption).

These findings made sense, as other studies had found that in addition to reducing the risk of cardiovascular disease, running also lowered the chances of developing cancer and neurologic diseases (such as Alzheimer’s and Parkinson’s). But there were questions:

- People demanded to know was there any such thing as too much running?
- The original data set consisted of mostly college-educated, middle-class adult males. What about other populations?
- What about other cardiovascular exercise, such as walking, cycling, or other sports? Any benefits from those?
- The authors themselves point out that in the original study, running was based on self-report. Would their findings hold up if they looked at more objective measures of fitness?

The latest on running and longevity

So the authors went back to their own data pool, and others. They found, again, that running just about any amount increased people’s lives by about three years; put another way, running for an hour provided seven hours of life benefit.

This benefit topped off at about 4.5 hours of running per week, so the people who ran more than that didn’t live any longer. They didn’t live any shorter, either: there was no risk associated with running longer or farther. They looked at other large studies, and saw that similar results had been found for women and other ethnic groups, as well. And, while other physical activities like walking and cycling offer some benefit, it’s less than running.

How can we explain these findings? The authors hypothesize that running is a particularly effective way to increase our cardiorespiratory fitness level, which is typically measured in metabolic equivalents (METs), like in a treadmill stress test. The authors had treadmill stress test data, and they found that a lower MET measurement (a lower fitness level) was associated with 16% of all deaths — more than high blood pressure, smoking, obesity, high cholesterol, and diabetes.

The takeaways from all these data are...

The lower our fitness level, the higher our risk of death. Just being inactive accounts for approximately 9% of deaths worldwide (the fourth leading cause of death), by the way, after smoking, diabetes, and high blood pressure. This has been shown time and again. In this current study, even five minutes of running a day was beneficial.

https://www.health.harvard.edu/blog/run-long-life-2017052411722
The higher our fitness level, the lower our risk of death. So it is through the pursuit of fitness that we measure the physical activity or objectively measured cardiopulmonary fitness during routine physical exams. Fitness levels should be considered just as much as vital signs and the other things we currently measure, like body mass index and blood pressure.

So lace up and get out there! Can't run? Again, benefits are seen with just about ANY physical activity. Find something that you enjoy and get moving!

Sources
Running as a Key Lifestyle Medicine for Longevity. Progress in Cardiovascular Diseases, March 2017.

Related Information: Starting to Exercise

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Comments:

Abhishek Agarwal

Hi,
there are lots of weight loss programs and vids all over the Net but getting an expert advice is what everyone needs.
it's now well known that Diet alone is not the solution for a Healthy life. So how one can be Fit and Healthy what should be the Right MIX of Diet, cardio exercises and Supplements if needed bcoz like me there are many who work 10-12 hrs a day and then hitting at the Gym is not possible. Also there are examples where unpredictable Weight loss without any extra efforts and medical help is going viral on Social medias and Blogs.Like the one as Dr. Atkins Theory, though its found to be very much effective and proven technique of weight loss but many Doctors and Dieticians and Nutritionists has criticised it on the basis of ketosis which occurs inside the body, responsible for quick fat burning. What is your idea and belief as far as Atkins Theory is concerned...?

Peter Bolle

Terry G. I was also concerned about injury risk with returning to running after a meniscus knee injury. After discussing with my physiotherapist, he suggested I begin a return to running program once I was tolerating 30 minutes of fast walking or more like the one on physioadvisor (https://www.physioadvisor.com.au/health/injury-rehabilitation/return-to-running/) He also didn't seem concerned about negative effects of joint wear down over time due to running.

USFY Health

The Article is nice. I want you to elaborate the section about how Running everyday can enhance metabolism. I'll be very grateful.
Once upon a time humankind ran solely to survive—we ran for our lives, chasing down food (or just trying to avoid being eaten ourselves). These days, nearly 30 million Americans willingly choose to do the hard work of running every week. Now that we don’t have to run, why do it at all? Four pros recount why we run.
Laura Thweatt | Professional Runner, Marathoner
I love the simplicity of it. You lace up a pair of shoes and go out the door wherever you are, and anyone can do it. At the start of a marathon, you have the elites and then you have a whole crowd of people with different stories about why they’re there, and you’re all out there together. I love that aspect of it.

Running has also given me a confidence and strength that I don’t know if I’d otherwise have, not just as an athlete but in all areas of life. I had an injury last year that required me to take five months off running. It was hard but also beneficial. Injuries and setbacks have allowed me to take a step back and recalibrate, which has made me a stronger runner and stronger in life.

Noah Droddy | Professional Runner, Free Spirit
Running for me has kind of been an ebb and flow. Once I graduated from college—I ran Division III at DePauw University—I thought that would be it. But running was the thing I knew I was best at, and it kept drawing me in. What I love about it is that you get out what you put in. If you’re committed to doing the work, you will see tangible results. Not everything in life is like that.

Running is also such a great way to see your community, get to know your body, and push yourself every day. I love the experiences it leads to and the people you can meet—I met my girlfriend at a race.
Linsey Corbin | Professional Triathlete, Ironman Champion
I grew up in a mountain town, where running was huge. I train for about 25 to 30 hours a week. There’s an adrenaline rush in seeing how close to the edge I can push. Will I blow up? Will I not? In running, you can test your physical, mental, and spiritual limits at the same time.

We are so used to having some stimulus in front of us all the time, with phones and computers. I don’t run with a phone. Sometimes it’s nice to turn your brain off and not think. It usually takes me three hours to run the marathon in an Ironman, and sometimes when I finish it feels like only 20 minutes. That’s when you know you found your flow state.

Jared Ward | Professional Runner, Self-Professed Running Nerd
I have a bit of a nerdy approach to running. My graduate thesis was on pace strategy in the marathons, and my other research has dealt with biomechanics and foot strike. A coach in high school took me from being a mediocre runner to a runner who had a college chance. I fell in love with the training element and getting better, and just the freedom of it.

I loved that I could go out and run and look at my watch to see how fast I went, and then come back the next week and try to do it faster. I’d been used to sports where there is a winner and a loser, but with running I could always win by pushing harder and faster.

I love the feeling of moving fast, and I also love the idea of seeing how long I can push through when the fatigue sets in. I seek freedom in terms of mind over body, and I’m trying to push my body further than it wants. I think we all love freedom, right? It’s just me out there, and it’s only my shoes between me and the pavement.

Saucony is proud to support all the different reasons we run. Whether you're training for a big race, hitting the trail to clear your mind, or just enjoying the fresh air, click here (http://www.saucony.com) to shop the latest Saucony styles. Run Your World.

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LA Research Project: Running Shoes

Taking a step into the science of shoes

History of Running Shoes

The History of Running Shoes

The running shoe (http://www.ransacker.co.uk/running-shoes/) (or trainer) is a relatively new invention (just over 200 years old). The resurgence in running brought about by the English in the 18th century meant the development of a light weight shoe which could grip the ground. However, initial attempts at a running shoe were made from leather which unfortunately had the tendency to stretch when wet.

In 1832 the first breakthrough was made when Wait Webster patented a process whereby rubber soles could be attached to leather shoes and boots. This led to the creation of Plimsolls, which were widely worn by children. It wasn’t until 1852 when another Britain (Joseph William Foster – the founder of the company Boulton, now known as Reebok (http://compare.ransacker.co.uk/search?keywords=reebok+running+shoes) had the “eureka moment” and decided to add spikes to the bottom of the plimsols and created what we now know as running spikes (http://compare.ransacker.co.uk/search?keywords=running+spikes&so=RATING+DESC).

The next big development was vulcanization, which revolutionized shoe manufacturing. Vulcanization is simply the process of melting rubber and fabric together. This molten mixture was then molded to create a sole for shoes that had a tread design. This design revolution made shoes lightweight, quiet, and flexible. This led to the creation of Keds: canvas and rubber shoes in 1892 by the manufacturer Goodyear. It wasn’t until 1917 when Goodyear made the correlation and started to advertise Keds as an athletic shoe. They eventually became known as sneakers, because of the rubber sole, they could ‘sneak’ around silently.

The father of the modern running shoe was Adolf Dassler who began making shoes in 1920. Each shoe design had a special hand forged set of running spikes and each design was made especially for a certain running distance. This was the first time designs were focused on whether the runner was a sprinter or a long-distance runner. By 1936 his shoes were internationally acknowledged as the best and were worn by athletes of the calibre of Jesse Owens.
After the lean war years he continued to progress and developed the training shoe made from surplus tent canvas and rubber from fuel tanks. In 1948 he founded Addas but the company was soon to split into Adidas (http://compare.ransacker.co.uk/search?keywords=adidas+running+shoe) and Puma (http://compare.ransacker.co.uk/search?keywords=puma+running+shoe&so=RATING+DESC). To give support to the running shoe Dassler added three side strips to the shoe which first appeared in 1949.

Whilst on the other side of the world a new era of sportswear manufacturing began in 1949, when Mr. Onitsuka started Onitsuka Co. Ltd. Looking stunned at post World War II Japan with its huge numbers of homeless children he asked himself: "What can I do to give them a better future?" His love for sports led him to the right answer: That sports would be the best starting point to achieve this goal. ASICS (http://compare.ransacker.co.uk/search?keywords=asics+running+shoe&so=RATING+DESC) was born.

Throughout this post war period the demand for leisure footwear grew. The fitness craze of the 30s meant sneakers became associated with sports and leisure activities. In 1936 the U.S. basketball team adopted the Converse Chucks as the official shoe. In the same year Dassler's running shoes were worn at the Berlin Olympics. By the 1950s famous runners were supplied shoes free. At the discretion of the athlete, they either wore socks or not. This would imply the shoe was a very tight fit.

In 1962, New Balance (http://compare.ransacker.co.uk/search?keywords=new+balance+running+shoe) introduced the first scientifically tested shoe and this weighed 96 grams. In 1968 brush spikes were introduced and replaced the traditional four spike running shoe.

Phil Knight, a business major at the University of Oregon and a miler on the track team was unhappy with the types of running shoes that were currently available. In the early 1960s he decided along with his coach Bill Bowerman to form a company to market a shoe that Bowerman had designed. The shoe was lightweight and comfortable in running conditions. Bowerman and Knight did the only marketing in person. The pair traveled the country to track meets selling their running shoes and becoming more and more successful and well known. The shoes were first known as Tiger Shoes and their defining characteristic was a cushion heel wedge designed by Bowerman. The company, originally called Blue Ribbon Sports, became known as Nike (http://compare.ransacker.co.uk/search?keywords=nike+running+shoe&so=RATING+DESC), named after the Greek goddess of victory.

1970's

Demand for the specialized shoe showed that consumers were ready for further innovation in footwear. The first big innovation for Nike (http://compare.ransacker.co.uk/search?keywords=nike+running+shoe&so=RATING+DESC) came in 1972 when Bowerman poured rubber into a waffle iron in his kitchen. This was the birth of the waffle sole as well as the best selling running shoe in the country. Later on that year Bowerman paid a student $35 to design a trademark for the growing company. He wasn’t thrilled with the “swoosh!” that the student came up with but it was to later become the backbone of Nike (http://compare.ransacker.co.uk/search?keywords=nike+running+shoe&so=RATING+DESC) advertising, a status symbol, and a cultural
icon. Nike (http://compare.ransacker.co.uk/search?keywords=nike+running+shoe&so=RATING+DESC) soon became by far the leader in athletic footwear sales and design.

NASA was not only making strides for the space program during the late 20th century, but was also working with Nike (http://compare.ransacker.co.uk/search?keywords=nike+running+shoe&so=RATING+DESC) to develop the first air cushioned athletic shoe. Frank Rudy from NASA brought the idea of bags filled with pressurized gas that compress under impact to Nike (http://compare.ransacker.co.uk/search?keywords=nike+running+shoe&so=RATING+DESC). The bags absorb shock and cushion the foot. The cushioned were placed in the soles on Nike (http://compare.ransacker.co.uk/search?keywords=nike+running+shoe&so=RATING+DESC) shoes and are still used today, twenty years later.

The 1976 Montreal Olympics was the first time an athlete was photographed endorsing his running shoes after winning 10,000 meter race. Such public endorsement was well rewarded by the companies which produced the goods.

The first Olympics to be televised was Mexico and promoters wasted no time displaying their brand insignias on the champions for the world to see. Before this; shoe advertisements showing Olympians receiving their glittering prizes and wearing branded shoes had to have their faces blotted out. The sight of Tommy Smith photographed in his Puma Suedes (http://compare.ransacker.co.uk/search?keywords=puma+running+shoe&so=RATING+DESC) giving the Black Power fist was a powerful image closely identified by many young people around the globe. At this time it was alleged track athletes were given monetary rewards for wearing certain competition shoes.

In 1973 track athlete Steve Prefontaine became the first major track person to wear Nikes (http://compare.ransacker.co.uk/search?keywords=nike+running+shoe&so=RATING+DESC). When the aerobics explosion took place Reebok (http://compare.ransacker.co.uk/search?keywords=reebok+running+shoes) saw the market potential and began to make trainers in softer materials and in colours appropriate female tastes. The shoes were less rigid in construction.

During the 1970s running shoes were designed based not only on the type of running the person did, but the running style the runner had. The three running styles that shoes were designed for included neutral runners, supernation runners and pronation runners. The final advancement that running shoes received during the 1970s was the use of ethylene vinyl acetate, also referred to as EVA. This material added an air cushion to the design of a running shoe providing runners with extra cushion and shock absorption when they ran.

**1980’s & 1990’s**

Nike (http://compare.ransacker.co.uk/search?keywords=nike+running+shoe&so=RATING+DESC) took advantage of big name sports stars during the 1980’s and 1990’s. Endorsements from people such as Michael Jordan accompanied with the feeling of movement produced by the “swoosh” and the catchy phrase “Just Do It.” The television commercials for Nike (http://compare.ransacker.co.uk/search?keywords=nike+running+shoe&so=RATING+DESC)
keywords=nike+running+shoe&so=RATING+DESC) portray the same feeling of movement that was the desired effect of the “swoosh”. By choosing sport super stars Nike (http://compare.ransacker.co.uk/search?keywords=nike+running+shoe&so=RATING+DESC) appealed to the younger generations who idolized these figures and aspired to “be like Mike”. Nike (http://compare.ransacker.co.uk/search?keywords=nike+running+shoe&so=RATING+DESC) advertising helped to boost sales and create some of the most effective and memorable advertising seen thus far. Athletic shoes were becoming more of a fashion statement than an athletic item.

2000's

Today there are many running shoe companies, most with running shoes to suit all styles, surfaces, distances and speed. Some brands make shoes available in different widths to ensure the perfect fit.

Currently, the biggest players in the running shoe industry are: Nike (http://compare.ransacker.co.uk/search?keywords=nike+running+shoe&so=RATING+DESC), Adidas (http://compare.ransacker.co.uk/search?keywords=adidas+running+shoe), Asics (http://compare.ransacker.co.uk/search?keywords=asics+running+shoe&so=RATING+DESC), Reebok (http://compare.ransacker.co.uk/search?keywords=reebok+running+shoes), New Balance (http://compare.ransacker.co.uk/search?keywords=new+balance+running+shoe), Saucony (http://compare.ransacker.co.uk/search?keywords=saucony+running+shoe&so=RATING+DESC), Mizuno (http://compare.ransacker.co.uk/search?keywords=mizuno+running+shoe&so=RATING+DESC), Brooks (http://compare.ransacker.co.uk/search?keywords=brooks+running+shoe&so=RATING+DESC) and Puma (http://compare.ransacker.co.uk/search?keywords=puma+running+shoe&so=RATING+DESC).

Probably the most iconic image of running shoes and running spikes in recent years is Usain Bolt’s GoldenPuma Spikes (http://compare.ransacker.co.uk/search?keywords=puma+spikes&so=RATING+DESC) the Complete Theseus II.
Resource founded from and used from:

http://www.ransacker.co.uk/home/about-us/manufacturers/the-history-of-running-shoes/

7.15. Appendix O: 10 Common Running Injuries: Prevention and Treatment

10 Common Running Injuries: Prevention and Treatment

Running injuries usually happen when you push yourself too hard. The way your body moves also plays a role.

You can prevent many of them. Here's how.

1. Runner's knee. This is a common overuse injury. Runner's knee has several different causes. It often happens when your kneecap is out of alignment.

Over time, the cartilage on your kneecap can wear down. When that happens, you may feel pain around the kneecap,

https://www.webmd.com/fitness-exercise/guide/running-injuries-causes-prevention-treatment#1
Common Running Injuries: Causes, Prevention, and Treatment

1. Squatting
2. Sitting with the knee bent for a long time

2. Stress fracture. This is a small crack in a bone that causes pain and discomfort. It typically affects runners in the shin and feet. It’s often due to working too hard before your body gets used to a new activity.

Pain gets worse with activity and improves with rest. Rest is important, as continued stress on the bone can lead to more serious injury.

3. Shin splint. This is pain that happens in the front or inside of the lower leg along the shin bone (tibia). Shin splints are common after changing your workout, such as running longer distances or increasing the number of days you run, too quickly. Painwise, they can be hard to distinguish from a stress fracture of the shin, but the pain is usually more spread out along the bone. Also, an x-ray is normal.
Video on How Kids Can De-Stress

The next time you’re stressed out, here are some easy things you can do to feel better.

How to Pick a Workout Shoe

With so many options, how do you know you’re walking in the best shoes? Seven tips to protect your feet during a workout.

Could You Be Living Better With MS? Assess...

Take this WebMD assessment and get personalized tips to help live your life with MS to the fullest.

People with flat feet are more likely to develop shin splints.

Treatment includes:

- Rest
- Stretching exercises
- Slow return to activity after several weeks of healing

4. Achilles tendinopathy. Formerly called tendinitis, this is inflammation of the Achilles tendon. That’s the large tendon that attaches the calf to the back of the heel.

Achilles tendinitis causes pain and stiffness in the area of the tendon, especially in the morning and with activity. It is usually caused by repetitive stress to the tendon. Adding too much distance to your running routine can cause it. Tight calf muscles can also contribute.

Treatment includes:
- Icing the area
- Calf stretches

5. Muscle pull. This is a small tear in your muscle, also called a muscle strain. It's often caused by overstretching a muscle. If you pull a muscle, you may feel a popping sensation when the muscle tears.

Treatment includes RICE: rest, ice, compression, and elevation.

Muscle pull commonly affects these muscles:

- Hamstrings
- Quadriceps
- Calf
- Groin

6. Ankle sprain. This is the accidental stretching or tearing of ligaments surrounding the ankle. It often happens when the foot twists or rolls inward.

Sprains typically get better with rest, ice, compression, and elevating the foot.

7. Plantar fasciitis. An inflammation of the plantar fascia. That's the thick band of tissue in the bottom of the foot that extends from the heel to the toes.

People with tight calf muscles and a high arch are more prone to plantar fasciitis. Although it may be linked to adding activity, plantar fasciitis can also happen without any obvious reason.

Treatment includes:
8. IT (iliotibial) band syndrome. This syndrome causes pain on the outside of the knee. The IT band is a ligament that runs along the outside of the thigh, from the top of the hip to the outside of the knee.

IT band syndrome happens when this ligament thickens and rubs the knee bone, causing inflammation.

Treatment includes:

- Cutting back on exercise
- Heat and stretching before exercise
- Icing the area after activity

9. Blisters. These are fluid-filled sacks on the surface of the skin. They are caused by friction between your shoes/socks and skin.

To help prevent blisters:

- Start using new shoes gradually
- Wear socks with a double layer
- Apply petroleum jelly on areas prone to blisters

10. Temperature-related injuries. These include:

- Sunburn
- Heat exhaustion
- Frostbite
You can prevent these by dressing appropriately, staying hydrated, and using sunscreen.

**Tips to Prevent Running Injuries**

By taking a few precautions and planning, you can prevent many common running injuries. Here are some tips for preventing injuries.

**Listen to your body:** Don’t ignore pain. A little soreness is OK. But if you notice consistent pain in a muscle or joint that doesn’t get better with rest, see your health care provider.

**Create a running plan:** Before beginning a running routine, talk to a trainer. A trainer can help you create a running plan that is in line with your current fitness abilities and long-term goals.

**Warm-up and stretch:** Many injuries occur as a result of inadequate stretching. Before and after you run, stretch your muscles thoroughly -- especially your calf, hamstrings, groin, and quadriceps.

Also, warm up for five minutes -- by walking, for example -- before you start stretching. Stretching cold muscles may cause injuries.

**Strength train:** Add weight training and ab exercises to your routine. This strengthens muscles and develops core strength.

**Cross train:** Mix up your fitness routine. Don’t only run. Try swimming, biking, tennis, or some other activity. This helps prevent overuse injuries that more
Dress appropriately: Wear lightweight, breathable clothing that wicks moisture away from your skin. Dress in layers. Also wear a hat to protect against the sun and cold.

Be shoe smart: Wear proper-fitting socks and shoes with good support. Remember that running shoes are recommended to last for a certain mileage. If the soles of your running shoes have worn thin or are angled, you are overdue for getting a new pair. If you have foot problems, such as flat feet or high arches, consider using orthotic shoe inserts.

Run wisely: Run on a flat, smooth surface and avoid steep hills until your body gets used to the activity.

Be safe: Run during the day, in well-lit areas, or use a light so that you can be seen. Keep a cell phone and identification on you. If running with headphones, set the volume low enough so that you can hear cars and other noises. Run with a partner when you can.

Weather matters: Monitor the weather conditions before you go for a run. Don’t run outside if it is over 90 degrees Fahrenheit, below freezing, or the humidity is high.

Stay hydrated: Make sure you drink an extra 1 1/2 to 2 1/2 cups of water on the days you run. If you are running for more than an hour, drink a sports drink to replenish electrolytes lost in sweat.

Treatment of Common Running Injuries
pain and discomfort continues, see your health care provider. You may need more advanced treatment to resolve your running injury.

**Rest:** Take it easy. If you keep running, your injury may get worse. Choose alternative ways to exercise while you heal, such as swimming or cycling.

**Ice and cold therapy:** Apply ice packs to reduce pain, inflammation, and swelling.

**Compression:** Wrap the affected area with tape and use splints and supports to control swelling and stabilize the affected area.

**Elevate:** If you sprain your ankle or hurt your foot, elevate it to reduce swelling.

**Stretch:** To reduce pain and tension of the affected area, gently stretch and massage the injured area.

**Pain relievers:** Take over-the-counter pain relievers, such as acetaminophen (Tylenol) or anti-inflammatory medications, such as ibuprofen (Advil, Motrin) and naproxen (Aleve), as recommended by your health care provider to relieve pain and inflammation.

Don’t try to push through pain. If you notice discomfort, take a break from running. If the pain continues, seek care from your health care provider.
7.16. Appendix P: Hip Tendonitis

By Amy McGorry

Huey Lewis may have been right singing “It’s hip to be square,” but it’s not hip to be sore -- especially when you’re an athlete singing the blues with hip flexor tendonitis.

https://www.webmd.com/fitness-exercise/features/hip-tendonitis#1
This **painful hip** condition can affect athletes who participate in sports like cycling, running, **swimming**, hockey and baseball. Spin classes, high-intensity interval training (HIIT) workouts and activities involving kicking, squatting and jumping can also leave you at risk for this type of injury.

**When Hip Tendonitis Is A Pain**

The iliopsoas muscle flexes your hip, bends your trunk towards your
Hip Flexor Tendinitis: Exercises to Soothe the Pain in Your Muscle

It's made up of two muscles--the psoas and iliacus. These muscles run from the lower spine and pelvis, join together, then attach by a tendon to the upper thigh. This tendon can get irritated from overuse, muscle weakness and muscle tightness, causing tenderness and pain.

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https://www.webmd.com/fitness-exercise/features/hip-tendonitis#1
Iliopsoas tendonitis often complain of “clicking” in the hip and pain while running, walking or kicking. Even putting on socks can be painful!

**Why You're Sidelined**

The iliopsoas is a workaholic muscle. Throughout the day it's constantly called into play with forward motions like walking, running and lifting your legs. It also picks up the slack when weaker muscles can't perform their movements effectively,
Let’s look at moving your leg out to the side where the glute medius muscle (on the side of your hip) is the primary mover. If the glute is weak, it can be sluggish, leaving the hip flexor to initiate the motion instead. The side-to-side
Hip flexor tendinitis can irritate the hip flexor as it does extra work initiating that “leg out” movement -- work its coworker, the glute, should be doing.

**How To Stay In The Game**

The following tips and exercises may help keep hip flexor tendinitis from sidelining you:

- Adjust your seat height so hips sit higher than knees to avoid “hip pinching”
- Maintain a flexible,
• Discuss proper form with your trainer to prevent muscle compensation

• Strengthen the muscle in its lengthened and shortened state

**Hip Flexor Stretch**

• Kneel on one knee, hip behind knee

• Tuck tailbone underneath you

• Keep back straight as you move
• Stop when a stretch is felt in the upper thigh

• Hold 30 seconds. Do two repetitions.

**Hip Flexion All-Fours**

• Tie resistive tubing to a pole and the other end to ankle

• On all fours, bring knee into chest

• Keep back straight

• Then return foot *slowly* to start position

• Feel resistance
10 repetitions on each leg

**Hip Extension**

- Lie with a fitness ball under your stomach
- Squeeze buttock and lift leg up to trunk
- Hold 3 seconds
- Do 2 sets of 10 repetitions on each leg

**Side-Lying Hip Abduction**

- Lie on side, stacking hips, back to a wall

https://www.webmd.com/fitness-exercise/features/hip-tendonitis#1
Exercise

While lying on your back, gently lift the leg up.

- Hold 3 seconds, then lower.
- Do 2 sets of 10 repetitions on each leg.

Check with your physician prior to starting an exercise program.
Remember: You may be sidelined... but not for long!

WebMD Feature from Turner Broadcasting System

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2,571 readers told us about their running shoes buying habits. Let's see if anything stands out.

At the end of 2017 we surveyed our visitors to find out some of their running habits and preferences. More than 2,500 people completed the survey and that left us with a mountain of extremely interesting data.

**Who likes what?**

In our previous analysis (https://www.runningshoesguru.com/content/rsg-survey-results/) of this data we found out that the favourite brand of running shoes for our readers is Asics (https://www.runningshoesguru.com/reviews/asics/all/), with Brooks (https://www.runningshoesguru.com/reviews/brooks/all/) and Nike (https://www.runningshoesguru.com/reviews/nike/all/) fighting closely for the other spots on the podium.

**Favorite brand of running shoes**

![Favorite brand of running shoes chart]

Competition is fierce as the visitors of our website showed us that they tend to appreciate a multitude of brands.

Though Asics and Brooks reign supreme for the moment, other brands have their portion of fans that keep things interesting as the race is on for the most popular brand.

**But is this true for all runners?** Does their age influence their running shoe preference? What about the number of miles they run per week, or their favorite race? And what does influence runners’ choice of shoes? Is it the brand, recommendations from friends, reviews?
We have all the answers and we are ready to share.

Note: If anybody wants to use this data or charts on their websites, feel free to do so – just credit us as the source. And if you want a summary of this article in an infographic, you will find it at the end of this article.

Clash of the generations

From the hunt for looks to sheer functionality, the purchase of the ideal running shoe is constantly changing with age.

Nike and New Balance lead the choice for the under 20, with Nike at a staggering 38%.

Once reaching the 20-40 age bracket, arguably the so called millennials, Nike starts to leave some room to what are perceived as more technical brands such as Asics, Brooks and Saucony.

Favorite brand of running shoe by age

![Favorite brand of running shoe by age](image)

We observe that Nike reigns supreme up to the age of thirty as top choice registering a significant decrease as the runner gets older and may be more oriented to functional benefits and a more optimal price/ quality ratio gladly sacrificing brand appeal.

Adidas gains popularity after the age of 30 as a more mature functional fashion statement but loses it after the user reaches the age of 40 and turns his eyes to brands like Brooks and Hoka One One.

Asics seems to be preferred more among the people in their third decade of life though there is no significant variation to support this fact.

We also looked at how long people were running for, and if that influenced their choice of footwear.

https://www.runningshoesguru.com/content/running-shoes-buying-habits-results-from-our-survey-plus-infographic/
No significant correlation with the runners’ experience as those who have been running for more than 5 years tend to manifest similar preferences to those who have been running for less than 5 years.

The only significant difference is that inexperienced runners tend to prefer Nike more, but this can be attributed to their age rather than running experience alone.

As for timetable patterns, Adidas fans tend to be more evening runners (27%) rather then afternoon as opposed to the morning-oriented Brooks (58%) and Saucony (54%) fans.

**Favorite brand of running shoes by average weekly mileage**

- **Asics** is the favourite choice both of runners that run less than 10 miles a week (think running 5k three times a week) and people who run 11 to 25 miles (which is the kind of mileage for somebody who wants to run a 5k or a 10k).

- **Nike** is the second-best choice for the recreational runners but slides down to 4th position in both the 11-25 and 26-40 miles per week group. It **does lead the 40+ group** though.

This may be attributed to Nike recently releasing extremely successful racing shoes (Zoom Fly (https://www.runningshoesguru.com/2017/12/zoom-fly-review/), Vaporfly 4% (https://www.runningshoesguru.com/2017/08/vaporfly-4-review/), Speed Rival (https://www.runningshoesguru.com/2017/10/speed-rival-6-review/), Zoom Elite (https://www.runningshoesguru.com/2017/02/zoom-elite-9-review/) especially when runners run more than 40 or 50 miles per week mostly when preparing for a race.

- **Adidas** is the 5th favourite brand in the first 3 mileage groups but it **makes a great comeback in the 40+ group**. I do believe the reason is similar to the reason Nike is first in this category: how renowned and popular their racing shoes are.

**Other findings:**

- 64% of the runners that prefer Altra run more than 26 miles a week, with 24% running 40+ miles.

- All “Puma” fans run less than 25 miles a week.
Running Shoes Buying Habits: Results from our Survey (plus Infographic) | Running Shoes Guru

- Brooks are preferred by women (20%) rather than men (13%).
- Female runners are more committed to a brand than male ones, with only 3% of them having no preference as opposed to 5% in males.

**What do runners look for, when buying a new pair?**

Comfort is the most sought after characteristic people look for when purchasing a new pair of running shoes as one out of three respondents (38%) stated. One in four (26%) tend to place most importance on their personal experience with that brand. One in six respondents (17%) is guided by reviews while the rest tend to be guided by brand (7%), recommendations (5%), price (4%) and style (1%).

This is good news. Comfort should always be your first concern when choosing a pair of running shoes. But also, your own experience. If you know you feel well in a certain brand or in a certain style of shoes you should put that information high up in your buying criteria.

We're certainly happy to see reviews (https://www.runningshoesguru.com/reviews/jst number 3 and it does match with our experience: people usually refer to their own experience and then look for reviews to find information about a new release of their favorite model or for similar shoes in other brands.

All other criteria get a mention, but we are honestly surprised (and pleased) to see “style” to be the last one.

**For runners that run less than 10 miles a week, reviews are more relevant than own experience.** This makes a lot of sense: when we are looking at possibly beginner runners, they won’t have much experience to draw on.

On the opposite side of the spectrum, **runners that run 40+ miles a week, value their own experience more than comfort.**

Gender analysis sees women put significantly more importance on comfort (47%) as opposed to men (35%) and tend to value reviews much less (7%) as compared to males (20%).

Almost half of Hoka ONE ONE fans (46%) are comfort seekers which supports the migration of older segments to this brand known for the maximal cushioning.

https://www.runningshoesguru.com/content/running-shoes-buying-habits-results-from-our-survey-plus-infographic/
Amount willing to spend on a new pair of running shoes

![Bar chart showing the amount willing to spend on running shoes.](chart.png)

In general, almost half of respondents (47%) tend to put aside between $80 and $120 for buying a new pair of running shoes while more than half (55%) of those who guide their purchase mostly based on the price tag will buy them if they fall into $40 – $80 category.

That means either they don't buy the top of the line shoe or they wait until a shoe is on sale before buying it. Or both, possibly.

Whatever the reason, it’s a valid choice. **There are a few good running shoes out there for less than $80 and many great shoes will drop to that price range once they are replaced by a new version.**

Unsurprisingly, nobody in this group purchased a shoe for more than $180.

**We spent quite some time looking at the correlation between the price paid and the brand of choice, but we did not find anything worth of note.** The same findings were common across all brands of running shoes.

The group that – proportionally – purchased more in the less than $40 range is the group that runs less than 10 miles a week. **Wild guess: they are not buying proper running shoes.**

The groups that runs between 11 and 25 miles a week and the 26-40 miles group purchase most often shoes between $80 and 120, while the 40+ mles a week has the highest peaks between $40 and $100.

**Infographic**

We condensed the most important info in the infographic below. Feel free to use it in your own publications, but please remember to cite us as the source of the data and to link back to this article!

https://www.runningshoesguru.com/content/running-shoes-buying-habits-results-from-our-survey-plus-infographic/
This concludes our second deep dive into the results of the runners’ survey. Does this information match your own experience? Does it seem strange to you? Please leave a comment!

The next article in this series will talk about racing preferences!

https://www.runningshoesguru.com/content/running-shoes-buying-habits-results-from-our-survey-plus-infographic/
If you missed the first article, you can find it here (https://www.runningshoesguru.com/content/rsg-survey-results/).

Thank you for reading!

FREE Running Training Plans

by Coach P. Hoyt, NAIA Track & Field All American

DOWNLOAD PDF (FREE-RUNNING-TRAINING-PLANS)

By Ruggero Loda (https://www.runningshoesguru.com/author/ruggero/)
Ruggero launched Running Shoes Guru in 2009. Originally from the Alps of Italy, he now lives in Amsterdam with his much loved little family. He is a passionate runner and athlete who has worked many years in the sports footwear industry. (https://www.runningshoesguru.com/author/ruggero/)

SUGGESTED READING

CBD Oil for Runners: 5 Science-Based Facts

Running and the Stay at Home Mom
7.19. Appendix S: Money People Spend on Running Shoes Worldwide 2017

How much did you spend on your last pair of running shoes?*

The statistic shows the amount of money people spent on their last pair of running shoes according to a survey carried out in late 2017. A quarter of the survey respondents said that they spent between 100 and 120 U.S. dollars on their last pair of running shoes.
Expensive running shoes don't prevent injuries, but comfortable ones might

Despite the lack of proof, we’re bombarded by claims from global footwear companies about the advantages of their pricey products.

John Arnold
Updated: Monday, 28 Sep, 2015 9:33pm
If you have ever suffered an injury from running, you are not alone. About half of all adults who run regularly will get injured each year. And those who have been injured have a higher risk of being injured again.

So it’s no surprise that avoiding injuries is a priority for runners, one third of whom are willing to upgrade their footwear if they feel it is safer and will improve their performance. But do the promises made by global footwear companies about their expensive running shoes stack up?

A recent study, based on 134,867 reviews of 391 pairs of running shoes from 24 brands, found that inexpensive running shoes received a better rating than expensive ones. The 10 most expensive pairs of running shoes (average price US$181) rated 8.1 per cent worse than the 10 cheapest pairs (average price US$61), says Jens Jakob Andersen, the Danish founder and CEO of RunRepeat.com [1] which conducted the study.

"People buy running shoes that are three times more expensive but are less satisfied," says Andersen. "We did this study to spread the word that 'the higher the list price, the more value' does not apply to running shoes."

In August, the Hong Kong Consumer Council echoed a similar alert in its publication Choice, quoting results from a study by the International Consumer Research and Testing and German consumer organisation Stiftung Warentest of 15 running shoes from nine brands. The shoe prices ranged from about HK$700 to HK$1,220.

Twenty-four experienced runners evaluated the shoes on performance, comfort level and preference. Four of the models rated highest (four out of five points) by the runners belonged to the low-to-mid-price range (HK$780 to HK$900). On the other hand, the ratings for the most expensive models were just average.

But does the modern running shoe's extra safety features, such as increased stability or extra cushioning, really protect people from injury?
So far, studies have proved inconclusive. One study that randomly allocated 81 female runners to shoes with different levels of stability based on their foot posture (pronated, neutral, supinated) found no difference in injury rates during a 13-week training programme. Another, which randomly allocated hard- or soft-soled shoes to 247 runners, also found no difference in injury rates over a five-month period.

But despite this lack of proof, we’re bombarded by claims from global footwear companies about the advantages of their expensive products. These claims, are often full of vague terms, that vacillate between the medical and sportswear industries.

Words such as "zoom", "fast", "elite" and "launch pad" are used among others suggesting direct benefits from shoes, such as "better" and "safer". Footwear companies also use terms once synonymous with luxury cars by claiming their products offer the most "fluid", "smooth" or "plush" experience for runners.

The problem is compounded by companies using "surrogate outcomes" to support claims that their newest technology may reduce risk of a running-related injury.

If we want to test whether a new footwear model, or piece of footwear technology, actually protects against injury, we’d measure – in a controlled study – how many people get injured wearing (and not wearing) the product. But tracking who does and doesn’t get injured over an extended period is time-consuming and expensive.

To circumvent this, we could instead measure what effect the shoes have on outcomes that may relate to increasing the risk of injury. We may, for example, measure how much they reduce your foot from rolling (pronating) or soften your impact with the ground (ground reaction forces) as "surrogates" for measuring injury.
People buy running shoes that are three times more expensive but are less satisfied. We did this study to spread the word that 'the higher the list price, the more value' does not apply to running shoes.

Jens Jakob Andersen (above), founder and CEO of RunRepeat.com

But these aren't strong surrogates because neither foot pronation nor high ground reaction forces are strong risk factors for running-related injuries.

In the search to gain an advantage in an increasingly competitive marketplace, footwear companies are forever pushing the boundaries with their claims. And when they slip up, the results can be disastrous.

In 2012, a class-action lawsuit was made against Vibram USA, the company that makes the FiveFingers running shoes, the glove-like footwear at the epicentre of the "natural" or "barefoot" running phenomenon.

The case was based on unsupported and deceptive claims of "strengthened foot and leg muscles", "reduced risk of injury" and improved "balance and agility" and "spinal posture" from wearing the shoes. Vibram USA settled, offering refunds to customers and discontinuing the use of these claims.

Similarly, promises of more toned buttocks from walking in Reebok's EasyTone shoes were found to be deceptive and misleading by the US Federal Trade Commission.
Reebok was required to pay US$25 million in customer refunds and banned from making unsubstantiated health and fitness claims relating to its "toning" footwear.

Selecting running shoes based on the purported benefits of certain foot protective features, such as "cushioning" and "motion control", offers no protection against running-related injuries.

In fact, we may have reached a point at which running shoes are being over-engineered to satisfy market trends, rather than being designed to make running safer.

Interestingly, the solution to selecting a shoe may be as simple as how comfortable they feel. Although footwear comfort is difficult to define and quantify, most people can sense whether the shoes they're trying on are comfortable or not. Support, fit and foot alignment are among factors that influence feeling comfortable in a pair of shoes.

Comfortable running shoes are associated with lower frequency of injuries than uncomfortable shoes. This suggests your body may be the best judge of footwear that's ideal for you.

The next time you feel bamboozled by the cornucopia of gels, foams and rubbers in running shoes, arm yourself with the knowledge that comfort is one of the best determinants of whether a pair of shoes is right for you, and what may work best for preventing injuries are your wallet and your peace of mind.

John Arnold is a lecturer in exercise science at the University of South Australia.

Additional reporting by Jeanette Wang

Source URL: https://scmp.com/lifestyle/health-beauty/article/1862050/expensive-running-shoes-dont-prevent-injuries-comfortable

Links
Pronation, Overpronation, and Supination in Walking and Running

Too little or too much foot rotation may increase risk of injury

By Wendy Bumgardner
Updated October 22, 2018

Pronation is a natural motion of your foot during walking and running. Your gait can show a pattern of neutral pronation, overpronation, or supination (underpronation). The stresses of overpronating or supinating have been linked to a greater risk of injuries. Motion control shoes and orthotics may be recommended if you are an overpronator, while flexible and cushioned shoes are better for people who supinate. Learn about these gait patterns and what you can do to correct them.

Normal Pronation

Pronation refers to the natural side-to-side movement of the foot as you walk or run. It is also known as eversion. Your foot normally rolls a bit inward with each step. Here is what happens during normal pronation:

- From the time your heel strikes the ground, your arch begins to flatten and cushion the shock.
- Your weight shifts to the outside of your foot and then back to the big toe.
- If you have a neutral gait your foot should begin to roll outward with the toe-off.
- The arch rises and stiffens to provide stability as the foot rolls upward and outward.
- All of the toes aid in push-off in normal pronation, but the big toe and second toe do more of the work while the others stabilize.
- During push-off, the sole of the foot is facing the rear of your body in pronation and is not tilted so the sole is facing either inward or outward.

The muscles active during pronation are the anterior tibialis, extensor digitorum longus, and the extensor hallucis longus, all of which are supinators of the foot.
Overpronation

In overpronation, the ankle rolls too far downward and inward with each step. It continues to roll when the toes should be starting to push off. As a result, the big toe and second toe do all of the push off and the foot twists more with each step. Overpronation is seen more often in people with flat feet, although not everyone with flat feet overpronates.

Overpronation leads to strain on the big toe and second toe and instability in the foot. The excessive rotation of the foot leads to more rotation of the tibia in the lower leg, with the result being a greater incidence of shin splints (also called medial tibial stress syndrome) and knee pain. An increased risk of injury and heel pain may also be the result of the stress on the ligaments and tendons of the foot due to overpronation. Motion control shoes, insoles, and orthotics are designed to correct your foot motion in overpronation.

Supination (Underpronation)

Supination is a rolling motion to the outside edge of the foot during a step. The foot naturally supinates during the toe-off stage of your stride as the heel first lifts off the ground, providing leverage to help roll off the toes. However, if supination continues through the toe-off, the weight isn't transferred to the big toe. This results in all of the work being done by the outer edge of the foot and smaller toes, placing extra stress of the foot. Supination is seen more often in people with high, rigid arches that don't flatten enough during a stride.

Supination may increase your risk of ankle injury, iliotibial band syndrome, Achilles tendonitis, and plantar fasciitis. Shoes that are well-cushioned and flexible are best for people who supinate.

Diagnosing Your Gait Pattern

Determining whether you are an overpronator, supinator, or have a neutral gait is the key to selecting the right walking and running shoes. You can do a little self-diagnosis looking at your shoe wear pattern, then get assessed at a good-quality running shoe store or foot and ankle store.

- **Shoe Wear Pattern:** Look at the soles of your current walking or running shoes. Overpronators will see more wear on the inner side of the heel and forefoot. Supinators will see more wear on the outside edge of the shoe.

- **Shoe Tilt:** Take a pair of shoes or boots you have been wearing regularly for several months. Put them on a table with the heels facing you. If the heels tilt inward due to more wear on the inner side of the heel, you may be an overpronator. If the heels tilt outward, you may be a supinator.
• **Have an Athletic Shoe Expert Watch You Walk or Run:** The salespeople at specialty running shoe stores are trained to spot overpronation. Bring a worn pair of shoes with you so the staff person can see the shoe wear pattern. The salesperson may watch your walk or run outside or on a treadmill and may do a video gait analysis.

• **Foot Analysis:** You can get a [foot analysis](#) at a specialty foot and ankle store or at some running shoe stores. They may use a foot pressure scan as well as other methods to get a full picture of your gait pattern and where you place stress on your foot.

• **Podiatrist:** If you have ongoing foot or ankle pain, numbness, tingling, loss of function, or an injury, you should see a podiatrist. This medical professional can fully diagnose your foot health problems and prescribe custom orthotics, medication, and other therapies to correct them.

**Solutions for Problem Gaits**

If you have mild to moderate overpronation or supination you can select the right kind of shoes for your gait for better walking and running comfort. If your gait has a more severe dysfunction, you may need prescription orthotics from a podiatrist.

<table>
<thead>
<tr>
<th>Overpronation</th>
<th>Supination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stability shoes (mild)</td>
<td>Neutral, flexible shoes</td>
</tr>
<tr>
<td>Motion control shoes (pronounced)</td>
<td>Cushioned shoes</td>
</tr>
<tr>
<td>Custom orthotics (severe)</td>
<td>Custom orthotics (severe)</td>
</tr>
</tbody>
</table>

Overpronators may benefit from motion control shoes to help correct their gait. [Motion control shoes](#) have increased medial support and stiffer construction to guide the foot into a proper amount of pronation. They are heavier and stiffer than most neutral athletic shoes.

While it has been common practice for many years to steer overpronators to motion control shoes, the research into whether these shoes prevent injury is mixed and there are [few well-controlled trials](#). For example, military recruits have been given motion control shoes if they overpronate, yet the rate of injury in basic combat training remained the same as when all recruits trained in military boots. You may see a debate about the value of motion control shoes for recreational runners and fitness walkers.

Custom orthotics can provide motion control for those who have severe overpronation. These are prescribed by a podiatrist and individually designed to meet the specific need of each foot. While they can be expensive, they may offer you relief if you have developed foot or leg pain. In the long run, this expense is money well-spent if it means you can walk and run pain-free.
Overpronation can lead to extra stress and tightness of your calf muscles. You may want to do calf stretching exercises to help overcome this.

**Supination**

Supinators do well with neutral shoes and should look for well-cushioned shoes that can absorb more of the impact of each stride. If you supinate, you do not need motion control shoes or stability shoes. Instead, flexible shoes will allow you a better range of motion and you may benefit from shoes or insoles that have more cushioning. If you have a severe supination problem, you can see a podiatrist for custom orthotics.

**A Word From Verywell**

Walking and running are great activities to build fitness and reduce health risks. Getting fit properly for athletic shoes will help you achieve the best speed, endurance, and comfort. If you have any pain that keeps you from enjoying walking or running fully, see your doctor or podiatrist to find the best solution.

Sources:


7.22. Appendix V: Compiled Survey Results

Q1: Do you consent to participate in this study?

<table>
<thead>
<tr>
<th>Response</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, I am 18 or older and I consent to be in this research.</td>
<td>1409</td>
</tr>
<tr>
<td>No, I am not 18 but I assent to be in this research (continue to parental/guardian permission).</td>
<td>64</td>
</tr>
<tr>
<td>No, I would not like to continue.</td>
<td>5</td>
</tr>
</tbody>
</table>

Q8: Do you give this minor permission to participate in this study?

<table>
<thead>
<tr>
<th>Response</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, I give this minor permission to continue.</td>
<td>63</td>
</tr>
<tr>
<td>No, I do not give this minor permission to continue.</td>
<td>1</td>
</tr>
</tbody>
</table>
**Q4:** What type of running shoes do you wear?

**Combined Data from Q5 and Q38**
**Q10:** What do you run on the most?

![Bar chart showing the most common running surfaces: Road and/or paved surface (1181), Sidewalk (564), Woodland trail, grass and/or dirt (478), Treadmill (225), Track (107), Rocky trail/gravel (15), Sand (9), Other (2).]

**Q11:** What is your average weekly running mileage?

![Bar chart showing average weekly running mileage: Less than 10 miles (309), 11 to 25 miles (747), 26-40 miles (292), 40+ miles (124).]
Q13: What is your usual race distance?

Q25: On average, how many organized races do you run each year?
Q14: On average, how many pairs of running shoes do you use each year?

![Bar chart showing average # of pairs of running shoes used per year.](chart1.png)

Q15: Which running shoe brand(s) have you used in the past year?

![Bar chart showing usage of various running shoe brands.](chart2.png)
Q26: From the running shoe brands you’ve used, what is your favorite?

Q32: What resources have you consulted before deciding on a pair of running shoes?
Q16: What are the top 5 factors you consider when buying running shoes?
Q36: Of your top 5 choices, which factor is the most important to you?
Q17: Where do you buy your running shoes from?

Where do you buy your running shoes from?

Q21: On average, how much do you spend on a pair of running shoes?
Q35: Have you ever run in a pair of shoes that did not meet your expectations?

Have you ever run in a pair of shoes that did not meet your expectations?

- 16% Yes
- 84% No

37: What expectations were not met?
Q22: When do you decide to replace your running shoes?

Q23: How many miles (on average) do you run in your shoes before replacing them?
Q24: What do you use your running shoes for?

![Bar graph showing usage of running shoes.](image)

Q27: What type of gait pattern do you have when you run?

![Bar graph showing gait patterns.](image)
Q34: Does your gait pattern affect what type of running shoe you choose to purchase?

![Bar chart showing the choice of running shoe based on gait pattern.]

Q29: If you’ve had a running-related injury, what was it caused by?

![Bar chart showing the causes of running-related injuries.]
Q30: What injuries have you experienced from running?

Q41: What form of recommendation/content for running shoes would you like to see?