The Shoe That Broke Running

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The sport of running is attractive because it is mostly free, and it simple to partake in. Put on your shoes and head out the door, nothing too scientific about it. Additionally, as individuals get more involved in the running scene and starts to gain more experience, they may find out that there is a surprising amount of science involved including things one can manipulate to make themselves better. For example, they can run faster a few days each week. They can start making one run each week longer. They can eat more food to have more energy which make the runs more enjoyable. They can stretch after runs, foam roll, do a few squats. All these things cause changes in the body which would not make things easier per se but allow them to go faster at the same intensity. Foot ware choice for running is largely based on two things: the shoes fit the feet and they provide a cushion of protection from the ground. But one place where runners can gain a surprising edge is not in training but in choice of footwear. Footwear seems like a simple afterthought, akin to picking out the appropriate sports bra to wear. It is a bit more complex than that simply because every runner has a different foot and a different pair of shoes that works best for them. The vast number of shoe companies each make their shoes a bit different so it is likely that after some trial and error each runner can find the shoe that works for them. Recently, however, it has come to light that certain shoes offer a competitive advantage. All the runner had to do was put on the shoe; not train better, eat healthier, do strength work, nothing; and their racing times would drop by minutes. Though scientific evidence was not available at the time, this extreme example is exactly the uncertainty that occurred in 2016 when Nike introduced a new kind of shoe to the running community called the Vaperfly 4%. Though it was unknown at the time, these shoes had been already given to Nike sponsored athletes before their wide release and these athletes were overwhelmingly represented on championship podiums across the world.

Shoe technology is not meant to be used to upset a level playing field and marketplace competition is important to make sure not one company has a monopoly over consumers.

Sport governing agencies were created to establish and enforce the rules and regulations of our sport (USATF, 2022). Such organizations also provide insurance to sanctioned events, certify racecourses, promote sport programs and coaching, develop selection criteria for national and international teams and provide sponsorship to athletes competing on the world's stage. These governing bodies are also responsible for making distinctions upon the use of technology and how much it can help an athlete perform (tennis racquets, gold balls, aluminum bats, swimsuits etc.). These regulations sometimes set spandex length requirements or team logo space. In the case of the Olympics, all team competition wear is prohibited from including any athlete sponsor reference that isn't the USATF's biggest donor. That donor happens to be Nike.

In his most notable work, *The Grasshopper: Games, Life and Utopia*, Bernard Suits defined game play, and by extension the game of sport as "the voluntary attempt to overcome unnecessary obstacles,". Rules limiting technology are imposed because sport is defined by accepting agreed upon obstacles and limitations and then working to overcome those by use of physical skills (Suits, 1978). He then defines the lusory goal of the game: to win, the lusory means and constitutive rules: explain what is prohibited and allowed within the defines of the game, and the lusory attitude of the participants who accept the rules and definitions of the game. It is the lusory means and constitutive rules which are most important when considering technology in sport because without competing under defined parameters, Suits argues that one cannot really be playing the game. Over-reliance on technology in sport that allows players to skirt around the rules or obstacles of the game eventually gets to a point where they are not

participating any longer. In the sporting community, a change in the lusory attitude each participant accepts to play the game may lead to a change in the lusory means and rules under which the sport is played.

It's clear that unfair advantages take away from meaningful competition and equipment can factor into that equation. Because technology in society is increasing at a rapid rate, the definition of the rules and their enforcement could be considered a political act. What is acceptable within one community then extends to mirror society at large. Sport is said to both extend sportsmanship values to society but also to reflect the values present in society. The more unstable or corrupt a country is, the more dishonest it's sport organizations. The East German state sponsored doping scandal of the 1960s or the Russian doping scandal in 2016 are two examples of how the greedy, power-hungry, and coercive nature of a country's leaders overflow into their society's sport culture (IAAF. 1977; Rodchenkov, 2016). In the 1960s the East German government forcefully planned and executed a large performance enhancing drug implementation program throughout its Olympic teams. The athletes themselves were unaware they were taking anything other than vitamins and only became suspicious when they began to get ill, exhibit sex-changing characteristics or watch their teammates die. In 2016 however, the Russian cyclists were aware of and participated in the state-sponsored doping and cover-up. It was not until a Russian medical doctor sounded the alarm implicating himself that the cover was blown. This doctor is now in the United States witness protection program due to threats on his life. To these nations, being dominant in sports is meaningful that they would threaten the health of their constituents and commit large scale acts of deceitful crime. If sports hold this much power over national governments, it makes sense that athletic feats on an individual level also hold a certain amount of personal meaning.

I crossed the line of the 2019 Hartford Marathon in a time of two hours and forty-one minutes, a personal record (PR) and a time that qualified me for the 2020 Olympic Marathon Trials held in Atlanta, GA to following February. Crossing the finish line in that time means I was able to hit a standard set by United States Track and Field (USATF rule-making organization) and therefore it meant something. The time held meaning to me personally and proved that I was among the best marathoners in the country, a marathon being a distance of 26.2 miles. If I want to really get on my high horse, it meant I was among the best female distance runners in the world. Just writing that gives me chills because I certainly do not walk around feeling that way. Remembering crossing that finish line is one of the greatest moments of my life. It represented a successful months long training cycle without injury or burnout. It was the kind of day many runners dream about, and most do not get, or at least they do not have all the pieces fall together on the same day when shooting for their biggest goal. In my mind, achieving high standards requires two things, one of which is much easier to get than the other. People who win or compete at the top are very fit. They put in ten-to-twenty-hour training weeks, go to bed early, fuel appropriately, remain focused and give everything they have on race day. That ironically is the easy part. The hard part is getting lucky on race day.

Running is a sport which seems rather straight-forward; put on some shoes, open the door, and move a bit faster than normal walking speed. High level running includes professionals, elites, and amateurs alike. It is for this reason that it is different than other sports like the NBA or NFL. Regular runners and hobby joggers can line up at the same start line, compete for the same prizes and podiums and even the same sponsorship deals as professionals who are competing at the Olympics. No other sport in the world functions this way. Wealthy individuals could never buy their way into an NBA game against Lebron James. That's what anyone who runs in a prestigious race like the Boston Marathon is doing. People paid a fee and compete against the best runners in the world. To extend the basketball analogy, suppose those same individuals had a ball that went inside the hoop 4% more often when playing pick-up versus Lebron. He (James) would most likely still win. The same scenario happens at road races, the professionals still come out on top. When the 4% ball is brought to the local pick-up game however, there's a new local legend on the court. Though it seems relatively harmless, winning a local road race is very appealing to runners who run every day and train very hard. This mass

appeal is what influences the shoes companies make and therefore what shoes professionals are given to compete in. When Nike was the only company to have performance enhancing shoes, it was their athletes who benefited initially. When the shoe was released to the running community, athletes sponsored by other companies were at a distinct disadvantage until their sponsors could produce a shoe with the same benefits.

Running contains both finite and infinite games, a concept constructed from Dr. James Carse's book, *Finite and Infinite Games* (1986). Racing is an example of a finite game in running, a single event with the purpose being to win. Training or consistency is an example of an infinite game in running, the purpose being to continue to play and become more efficient. In a race, athletes must ignore things outside the race that might improve their performance which they would be able to access when not actively in a competition. The rules are accepted before the competition and even if something new is introduced while competing, the runner cannot access that without breaking the rules and therefore ceasing to play. Infinite running however allows open access to change and innovation with the purpose of furthering both self and sport. For example, use of recovery devices, a proper meal or good nine hours of sleep is used outside of a race to improve performance, but it would be silly to try to use these tactics while running as hard as possible. The use of shoe technology and its regulation is a pertinent issue within the running game because what was agreed upon by governing bodies for professionals in the sport does not necessarily apply to the masses who run as a hobby and do not make their living on it. What makes racing interesting and purposeful is that for the most part it is a test of human-to-human strength, endurance and will. It is assumed that runners on the starting line have an equal playing field in terms of gear and technology. The winner is the one who was able to train the

things they could and perform best on the day. The winner needs to use their own self-powered effort to win. Technology that takes away the humanness of competition is unsettling; almost as if watching the competition in sepia tone, we wonder how good a [professional] athlete would be without it. However, these rules need not apply to the running community at large. Rules for running are in flux, foggy and vary based on distance, terrain, age, gender, and ability. Though what becomes accepted as normal within that community tends to spill over into the professional side due to societal and economic pressures present in the sport. The professionals might get more people interested through the excitement of racing, the rivalries, and the incredible performances but companies that sponsor these athletes are making money through shoe and gear (technology) sales. The running community who buys the products drives the innovation which has the power to change what gear is used.

Shoes are important because by the nature of putting something between the pad of the foot and the ground, running becomes easier. Running Economy [RE] determines the metabolic cost to cover a distance at a certain velocity (Di Prampero, 1993). RE is determined by the sum of cardiopulmonary, biomechanical and neuromuscular efficiency (Barnes & Kilding, 2015; Daniels, 1985; DiPrampero, Atchou, Bruckner, & Moia, 1986; Heise & Martin 2001; Kram & Taylor, 1990; Kyrolainen, Belli, & Komi, 2001). Improved RE decreases the energy cost of running without significantly impairing oxygen uptake (Shaw et al., 2014). Though elite athletes are self-selected to already possess superior RE, there remain other options with which they can improve including altitude training (Gundersen, L.S., 1997), resistance training (Barnes et al., 2013) and step frequency (Quinn et al., 2019) among others. These adaptions require sufficient effort on the part of the athlete and because they do not inherently make the sport easier, they are

allowed in a healthy training program within the rules of the sport. Technological advancements are more controversial because it is not the work of the athlete improving RE, it is a separate piece of equipment.

Getting lucky means the weather was good, the course was fast, their pre-race breakfast was digested correctly, they had good crowd support, they didn't accidentally step in a pothole, they picked up and were able to utilize all their race nutrition. Some things like nutrition can be practiced, but also do not always go according to plan. Variables like weather are much trickier to plan for. A runner not only needs to be fit enough to run their best, but everything else must fall into place as well. On October 11th, 2019 I had the day most runners dream about. I was one of the women who was able to capitalize on the booming female distance running movement to qualify for the Olympic Trials. And I did it without the new supershoes on my feet, which made the achievement so much sweeter.

Technology has advanced the sport in myriad ways. Many of these things have been positive. Improved nutrition knowledge and access aids in energy to train and recover from training. Evolving from cotton sweatsuits to sweat wicking material makes training more enjoyable and therefore people are more likely to be physically active. Proper shoes create a necessary barrier between the pavement and the foot protecting it from abrasion. Shoe technology has evolved rapidly since the 1960s when running became more mainstream (Bermon, 2021). Because more people are running, the differences in foot type, cushion preference, gait mechanics, surface of run and many other factors have caused shoe companies to respond to demand and design countless models of shoes. Each of the brands are similar in ways (provide protection from the ground) and different in others (stack height, mid-sole comfort, bottom tread, width of the forefoot etc.) meaning each type of runner can find a shoe that works for them (Ferber, Davis, & Williams, 2003; Nicola & Jewison, 2012). The variability in foot type and preference had meant that no single brand had an overwhelming monopoly on consumer choice. Fairness and competition between brands are what keep technology improving and prices low, providing economic access for more people to enter the sport.

Before 2020, the regulations regarding shoes set by sport governing body World Athletics stated:

Shoes 5.2

Athletes may compete barefoot or with footwear on one or both feet. The purpose of shoes for competition is to give protection and stability to the feet and a firm grip on the ground. They must not give athletes any unfair assistance or advantage. Any type of shoe must be reasonably available to all in the spirit of the universality of athletics.

Arguably, in 2016 the two runners, Shalane Flanagan and Amy Craig, were already in violation of the rules (Metzler, 2016). However, at the time it was common practice for professional runners to use prototype shoes and gear in competition because, before the VF, no piece of shoe technology significantly improved performance. In other sports and cases, technology has been banned due to case of "mechanical doping". Swim records in 2008 and 2009 dropped significantly after the introduction of the Speedo LZR full-body wetsuit. In 2010, World Athletics banned the swimsuit because it artificially made athletes faster in the water by reducing drag forces providing approximately 5.5% advantage (Foster, James & Haake, 2012). It is important to note that it wasn't until after swimming records were being broken and the swimsuits were widely available that they were pulled. Paralympic 400-meter runner Oscar Pistorius lost his case to use carbon-fiber blades in competition due to such concerns. His lower leg prostheses are effectively a spring (Lewis, 1996), meaning energy returns to him as he pushes off the ground. He did not have to work as hard as able-bodied runners to hit critical speed. Pistorius had already run and won many races using his blades before they were prohibited. This means that World Athletics had established a precedent to ban in-use technology if they

determine it too give too much advantage. It would seem simple for them to extend that precedent to running shoe technology if the need became apparent.

The biomechanical influences of shoe technology can play a significant role in improvement in RE. As distances get longer, RE proves even more significant due to increased oxygen demand. Therefore, reducing RE is one way to improve performance times in endurance events. The height of the sole, type of foam, and stiffness caused by the carbon plate are three likely reasons for the improved RE from the VF shoe. A study by Hunter et al., (2019) concluded that while wearing the VF shoes, runners had a 0.9% longer stride, 5.0% greater vertical oscillation, and 8.5% lower plantarflexion velocity. The VF shoe creates a longer stride with no increase in mass. If the leg is the lever attached in the body in motion, increasing the length of the lever without decreasing the power (dependent on the runner's mass) will propel the body forward with more force (from Newton's Second Law of Motion: force = mass x acceleration). The compression and relaxation of the foam returns more energy to the runner with each step (like Pistorius' carbon fiber blades). The front stiffness of the shoe propels the runner in a forward motion without over-extending the toe (decreases plantar flexion thus reducing the likelihood of injury from ground contact). The specific curved shape of the carbon plate improves and contributes to the runner's momentum (Stefanyshyn, 2004). Stride rate and leg length increase without causing the runner to overstride, a common occurrence at the end of marathon races (Hoogkamer, 2018). This technology is incredible, but also asks the question: do these shoes give too much to the runner, making the incredible feats of endurance more a function of social and financial privilege rather than athletic skill and effort?

Immediately after their release in 2016, leadership was largely absent and late to respond to the technology in a meaningful way. World Athletics did not make a change to shoe

regulations until the month before the 2020 Olympic Marathon Trials (World Athletics, 2020). Unfortunately, not making a decision regarding shoe regulation effortlessly allowed Nike to promote, sell, distribute, and create mass appeal for the product. Waiting on a decision (in the same way a virus travels through an unvaccinated community) allowed the shoes to permeate a huge proportion of the running community. As in the case of contracting a virus, there is no way to "un-contract" it. Releasing a shoe that promised a significant drop in performance times, allowing the running community to use it lawlessly effectively nullified any chance that this technology could be rescinded.

In response to the release of carbon-plated shoe technology, on January 31, 2020, World Athletics released new rules restricting emerging shoe technology.

The rules state:

- *The sole must be no thicker than 40mm.*
- *The shoe must not contain more than one rigid embedded plate or blade (of any material) that runs either the full length or only part of the length of the shoe. The plate may be in more than one part but those parts must be located sequentially in one plane (not stacked or in parallel) and must not overlap.*
- *For a shoe with spikes, an additional plate (to the plate mentioned above) or other mechanism is permitted, but only for the purpose of attaching the spikes to the sole, and the sole must be no thicker than 30mm.*

In a press release from the organization, President Sebastian Coe stated: "It is not our job to regulate the entire sports shoe market but it is our duty to preserve the integrity of elite competition by ensuring that the shoes worn by elite athletes in competition do not offer any unfair assistance or advantage. As we enter the Olympic year, we don't believe we can rule out

shoes that have been generally available for a considerable period of time, but we can draw a line by prohibiting the use of shoes that go further than what is currently on the market while we investigate further."

It is unclear why didn't Coe didn't believe they had the right to recall the shoes when doing so could protect the integrity of competition Governing bodies before this point had thought to do so with swimsuits, tennis rackets and even running prosthesis to protect the integrity of competition. However, it is important to consider and understand the dynamic and complicated relationship between the billion-dollar sportswear company Nike, USATF and World Athletics. Mere days after rules governing shoe stack height and composition were announced, Nike released an updated version of the VF called the Alphafly Next % which were those exact specifications (Nike, 2020).

It is important to point out the difference between technology like swimsuits and innovation like running shoes. Running is a more widely popular competitive sport post high school and college. It is very easy to find a race on almost every weekend and it also has low barrier to entry; one must possess a pair of shoes and walk out the door to partake. Whereas in a sport like swimming for example an athlete must find a pool, pay for a membership, reserve a lane, drive to the pool and finally they may engage in the sport. For time-pressed adults, running seems to be an attractive option both for staying fit and healthy while also scratching that competitive itch they miss from school sports. Therefore, the release of swimsuit technology likely had a smaller effect. Less athletes got hold of the technology (swimsuits like this are very expensive) and therefore banning them caused much less outrage. Also, theoretically it is more unpopular because there isn't a level playing field. In the case of Oscar Pistorius' carbon fiber blades, it is much easier to stop one person from using technology than it is to stop a community.

Most local road races do not require athletes to submit the make and model of their shoes. Oscar Pistorius and those wearing the high-tech swimsuit most certainly did have to have their gear evaluated before competition. Though World Athletics has the right and maybe the responsibility to ban the shoes, it's clearly not a simple decision to make. It would be difficult to go through race results, try to find photo evidence, and rely on athletes to divulge on their footwear choices for particular races. Additionally, the athletes themselves may not remember. And there's also the question to be asked of whether or not people associated with the sport or interested in following it would be particularly moved by such a project. Non-professional runners may not be interested in a system of asterisks next to personal bests based on shoe choice. Adding asterisks would likely result in more headaches reduced enjoyment for those involved. The running community, if nothing else, likes to categorize into chosen distances, marathon PRs ("…she's a 3:20 marathoner"), and/or favorite terrains ("…he's a trail runner"). These labels have meaning. To take away a hard fought for marathon PR is to take away a small part of that runner's identity. As the running community gets further and further away from the major developments in technology between 2016 and 2020, it becomes harder to be able to separate the runner and their accomplishment from the shoe that runner wore while doing it. Even though it seems unsettling to contemplate the reach of the VF parent company Nike and how much the sport has changed, it may be easier to just accept what happened in 2016 and in 2020 as an evolutional step in the growth of distance running.

Nike is the largest donor for the USATF and the United States Olympic Committee. In their sponsorship contract, it clearly defines that any apparel worn by athletes during the Olympics and other world competitions must be emblazoned with the Nike Swoosh (USATF

2020). In late 2021, the U.S. Attorney's Office for the District of Columbia asked for documents regarding the relationship between USATF and Nike (Lorge-Butler, 2021). For decades, Nike has been the biggest sponsor for this organization and it is universally known that any decision made by USATF was influenced somehow by its financial donor. In April 2014, Nike extended its deal supporting USATF to the year 2040 essentially ensuring its place at the table governing the sport. The deal was said to be worth over $400 million dollars and doubled revenue for USATF. Other brands were skeptical claiming it continues to give Nike overwhelming power and authority over the running industry. The deal was negotiated by the firm Bevilacqua Helfant Ventures LLC, owned, and operated by two former Nike employees who are also the highest paid independent contractors working with USATF. This case is still being dissected in legal proceedings but three USATF staff members did disclose to Runners World (the publication who broke the story) that they were forced to sign nondisclosure agreements conditional on their future employment within the nonprofit organization. The head of USATF is a man named Max Siegal who has continually collected bonuses of up to $1 million in 2014, 2015 and 2016 suspiciously after Nike gifted USATF a "one-time commitment bonus" of $25 million in 2014. In 2013 he received no bonus. For more context, the revenue of the USATF in 2019 was $33.7 million; Seigel took home $1.19 million, a large percentage of the USATF budget. For a sport whose top athletes work jobs and struggle to get themselves to competition, the person leading their organization seems to find it doable to get money from the company he represents. Nike has proven to be very proficient at making progress in the sport of running however unchecked power and concentrated wealth proves time and time again to be corruptive. If Nike has done and continues to do questionable things, should their manipulation of shoe technology be considered another blemish on their record, or does it prove they are pushing to continually improve the

sport? Furthermore, if professional athletes train and compete for other brands and those brands pay for them to go to competitions and represent the United States on the world stage, it doesn't seem right that their branding is prohibited from being present on their athletes at those competitions.

Technology has become almost as important to sport as the athlete competing. It has also been argued that as humans approach their limits, it is only through technology that world records will continue to be broken (Balmer et al. 2011). Much of the outcry against updated sports technology is that it takes away the essence of what the creators of the sport intended and makes the sporting effort too easy. Though it would be convenient for things to be clearly right or wrong, this is not often the case. Research collected by Dyer (2015) found over 56 published articles containing 31 cases of technological enhancement in sport and their subsequent consequences. The articles reviewed centered around six themes; the use of assisted technology in able-bodied sport; access to sports equipment; safety in sports equipment; re-skilling as sport through new technology; de-skilling a sport through new technology and governing body oversight issues. These themes are hardly straightforward, and it is to sport governing bodies with which both professional and non-professional athletes look for rules regarding use of technology in sport. Everyday athletes and run shoe enthusiasts can speculate on these regulations because this sport is a hobby. When it comes to individuals' livelihood and income, these issues and questions become much more salient and important.

Research biologist Claude Bouchard famously claimed “If we can do it, it has already been done,” (1990). When society or science identifies a new way to cheat or do things more efficiently, it is almost certain some athletes have already been doing it. Athletes who use performance enhancing substances prohibited by World Athletics and the World Anti-Doping Agency are hard to catch for this reason. They are ahead of the people attempting to catch them. The controversy surrounding the VF asks whether it is still cheating if the performance enhancement is in plain sight, taken as normal and distributed widely before regulations have been made.

To cheat is to deceive, trick, swindle or flout the rules designed to maintain conditions of impartiality (Cashmore, 2010). Runners who use footwear that is widely available are not hiding their choice so it is not the same kind of cheating as defined by Cashmore. To decide whether using a performance enhancing technology such as the VF is cheating requires the understanding of the context of road marathon running. Running is arguably the most popular sport upon the conclusion of school-based involvement with over 17.6 million participating in races in the U.S. in 2019 (US Running Trends, 2020). It could reasonably be surmised that those who partake in a racing environment are more serious about the sport than a regular exerciser who includes running in their fitness routine.

Competition, or the competitive drive runners feel inside is likely the reason for the VF debate. If runners did not see it necessary to get better at running, which is marked by better PRs and faster race times, a new shoe promising that would hold little attention. It is the nature of society to do things that show improvement. Running is an expression of the human need to continually test personal limits and achieve long after the traditional testing done in schools and adolescence is done. Running is also one of the few sports in which the professional and elite

athletes are in the same competition as the age-group or amateur runners. They are also running for the same prizes, the same podium spots and the same potential sponsorship deals. Professional road running has a highly tiered and loosely defined system to designate its stars. These may be directly from a sponsor (such as Nike) who pays a salary, prize money from winning major road races, bonuses from breaking course records or world records and free gear, travel, and entry to races (Monti, 2021). Professional and elite marathon runners often hold a full-time job in addition to competing at a high level. Because having that perfect race and winning is so rare, because athletes can only peak three to four times per year for a race and because the money won is usually not enough to live on, athletes must have a back-up plan for when things do not work out. Coincidingly, because races are infrequent and peaking at the right time is so important to even have a chance to make it professionally, serious athletes would take all the necessary steps to put themselves in the best position to win. After 2016, that meant wearing the VF shoes. It was not until 2020 that other brands began to catch up and release their own models of the shoe. For four years, Nike had a monopoly on the running shoe market due to a lack of rules and regulations regarding what is fair or unfair and what constitutes a performance enhancing technology.

It is important to consider the positive outcomes which subsequently followed the VF shoe release. Between 2016 and 2019 many studies have looked at the change in race times correlated with the release of the Nike VP shoe. Bermon et al., (2021) found female race times decreased by 1.9, 1.7, and 2.0% in the 10 km, half-marathon, and marathon, whereas these decreases in males were at 1.1, 0.7, and 1.2%. Guiness et al., (2020) found similar results, showing men's times to improve between 2 and 3.8 minutes and women's to improve by 0.8 and 3.5 minutes. These studies, done in elite runners, show around 2-3% increase in performance. To

the outside observer or 4-hour marathoner, one to three minutes of time is an incredible achievement in distance running. To the professional, that is a huge margin of time. A pair of shoes could mean the difference between a sponsorship, a big payday or in the case of marathon world record holder Eluid Kipchoge, being the first human to go under the 2-hour marathon barrier (BBC, 2019).

To provide more perspective regarding the 4% effect of the VF, Malm et al., showed the performance enhancing effects of blood doping to be at 3% (2016). Blood doping is illegal and athlete caught can get years or a lifetime bans. Though the claim of 4% advantage wasn't achieved in all runners, it has been shown that sub-elite and recreational runners show to benefit as much as 3-4% (Hoogkamer et al., 2018). It is at this level, between recreational and elite, that deserves greater attention.

The most recent U.S. Olympic marathon trials appreciated the highest number of entries with almost 500 women competing (USATF, 2020). Though changes in society, training, diet and psychology played a role, widespread use of carbon-plated footwear was certainly influential. According to first-person data collected by Runner's World editor in chief Jeff Dengate at mile 21.5 of the Olympic Trials race, 94% of all athletes wore some version of a carbon-plated shoe (2020). This phenomenon was partly due to Nike "gifting" each athlete at the race a pair of the newest edition of the VP shoe, the Nike Air Zoom Alphafly Next%. Though athlete superstition and training usually prevent the use of new technology on race day, the data supporting the performance enhancing benefit from carbon-plated technology was too good to pass up. Fifty-three men and ninety-five women chose to run in a mode of shoes they had never tried on before that day (Dengate, 2020). See Figure 1.

In 2016 I never dreamed I would be an athlete who would be fast enough to qualify for the Olympic Trials. A few years later I made some faster friends who convinced me to train with

them. I got faster and they qualified for the trials. They encouraged me to try to do the same, so I tagged along in the summer of 2019, trained as hard as I could and hoped for a good day. Though I achieved the Olympic standard without direct benefit from the shoes, I did benefit indirectly; my training partners had the shoes and they had already qualified.
It was during this time that shoe technology came onto my radar and has been consistently on my mind since. I decided before the race that no matter what, I was going to wear my normal trainers. I did not want an asterisk by my results. I was one of the athletes competing in the trials who did not use this new technology. I was the only runner to use the Saucony Kinvara 9 model. Training in a group has been shown to cause greater performance increases versus training alone (Hollingshead, 1998a; Liang, Moreland & Argote, 1995; Moreland & Levine 2002; Araujo & Davids 2016). A study done by Carnes & Mahoney (2016) showed that running in a group increased enjoyment and decreased rate of perceived exertion (RPE). Termed the "Shalane Effect" (so named after world-class runner Shalane Flanagan) by NTY opinion editor Lindsay Crouse to reflect the female running population, through group dynamics, camaraderie and social support, athletes can achieve better results in competition when they work hard with others (2017). My teammates used the shoes to help them qualify and run faster. I was able to use their speed and train with them to better my own performance even without wearing the shoes myself. This phenomenon may be extended to the sub-elite female running population. As more women got faster, set personal bests or even qualified for the Olympic Trials (carbon-plated shoes or not), other women believed they could too, so they did.

Whether or not one is able to separate the distance running boom created by the VF shoes, Dyer (2020) concluded that though concerns regarding cost, access and coercion remain, they are short term issues. The shoes push to the absolute limit what technology should be allowed to enhance performance and the mass release cannot be taken back. Therefore, it is imperative that industry regulators set parameters to prohibit this from happening in the future. Shoe buying trends of runners since 2016 indicate it is not wise to make the consumer decide what should be allowed in competition. The average consumer is not thinking about how this will affect athletes up the chain, nor how this will set the standard for allowable running technology. The average consumer is more invested in how a change of shoes can take the last few minutes off their marathon time. Those minutes are meaningful to them and is why the mass appeal of the VF shoes created a cultural revolution in the running community. Dyer concludes by saying that running shoe technology has not been optimized yet so regulators must exercise vigilance when assessing future allowable running shoe technology.

The past few years have seen an increase in dissatisfaction towards the Nike enterprise from the female athletic community regarding equal representation, protection, and opportunity in sport (Lucas, 2000; Grow, 2008). This phenomenon is likely due to the combination of social media representation (Loos & Kelleher 2014), higher numbers of women in sport (Andersen, 2019) and the unfortunate public whistleblowing surrounding abuses from Nike running coach Alberto Salazar (USADA, 2019). Though the history of Nike stems from questionable business practices to outright human rights abuses, three of the most decorated female runners in recent history, of Mary Cain, Kara Goucher and Allyson Felix highlight how Nike's corporate strategy makes their day-to-day operations even more ethically challenged.

Mary Cain was the fastest high school runner in the country. In 2013 she joined Nike to run professionally for esteemed Nike running coach Alberto Salazar. In 2019 Cain publicly came forward with the abuses she had succumb to at the hands of Salazar and Nike (Crouse & Cain, 2019). Professional athlete Kara Goucher extrapolated the abuses she; Cain and others had faced while training under the coach. In addition to these abuses, Salazar received a 4-year ban from the United States Anti-Doping Agency (USADA) for trafficking testosterone, L-carnitine and tapering with doing controls (USADA 2019). After the ground-breaking report from Cain to the New York Times, Nike promised to look into these concerns (Kilgore, 2019). This was most likely a response to the protesting from company employees outraged at the abuses either ignored or outright covered up. Though the defamed coach was recently permanently banned from coaching at the elite and professional level, Nike has chosen to remain steadfastly in support of him at this writing of this essay, even naming a building after Salazar at the new Hayward Field, which opened in 2021.

According to Goucher, the reason she and other athletes do not reveal the details of their experiences is due to the nature and language used in their professional contracts. They are explicitly or implicitly discouraged from describing them. This is especially hard on female athletes because many contracts come with deductions from missing races due to injury or pregnancy. Whereas having a baby can mean career suicide for a female athlete, this is not the case of a similarly talented male athlete. It is not unique to Nike that gender assumptions and gender roles often cripple female involvement and advancement in sport. Because running contracts are much more varied and fluid than other sports and because the running industry is a relatively new phenomenon, it has only been recently that companies and sponsors began to include language protecting the female body. In the past, pregnancy would be included under something that prevented an athlete from competing in the require number of competitions and therefore subject to deductions or release from the team (Monti, 2021). Pregnancy is a significant disturbance to the female body. If the athlete was kept on the team, the pressure to get back to running form can include rushing back to training when not ready, ignoring signs of trauma present post birth. Even if she is able to get back to form and run well, it takes time. Missing races and events mean lost income in a sport that isn't steadily lucrative in the first place. This fear either stops women from having a family or pushes them out of sport because they believe the two are simply not compatible.

Ex-Nike athlete Allyson Felix had made the Olympic team representing the United States in the 400 meter four times when she decided to start a family. She has 9 Olympic medals and 11 championship titles (Felix, 2019). In 2019 she penned an Op-Ed breaking her nondisclosure agreement with Nike to explain the punishments she and other female athletes receive for having children during a competitive year. Nike cuts athletes pay, takes away bonuses and in the case of

Felix, wanted to pay her 70% less in 2018 when she was pregnant with her first child. Felix tried to negotiate but Nike refused. They were at a standstill until pressure from the running community and pregnancy policies enacted by brand competitors forced Nike to update its athlete maternity policy. A statement from Nike explains the new contract which guarantees no reduction in pay and bonuses for 18 months surrounded pregnancy (Nike, 2019). In 2021 Felix left Nike and signed with &Mother and clothing brand Athleta, then made her 5th Olympic team. It would seem contradictory that the female running community would band together to support athletes Mary Cain, Alison Felix and Kara Goucher when they denounced their previous sponsor Nike, yet choose to purchase the brand footwear, whereby doing so supports their bottom line.

Economist Rene Roy presented the fundamental idea that "all individuals first allocate their income to goods or services that are essential for survival in conditions imposed by their physical nature, the climate, the specific characteristics of their residence and social constraints" (Roy, 1943). Before incomes began to rise, Roy noticed that people with the same levels of income spent it on similar things; those related to survival and modest comforts. As people get richer, from the hierarchy of needs develops a hierarchy of taste preferences and similarly well-off groups begin to divide. As society gets further evolved and globalization continues to connect distant nations, issues outside of survival and taste preference influence consumer choice. The substantial increase in the standard of living for citizens in developed countries has meant they have more expendable income to purchase goods. The affluence in the running community takes place in the ability to buy whatever shoe or piece of technology one could want to make running more enjoyable or, in the case of the VF, run faster. Consumer choice is often driven by the salient needs (or wants) if those individuals. Shoe buying trends since 2016 and the subsequent decrease in personal best and world record times demonstrate this phenomenon. It is not that the

running community, or specifically the female running community, consciously decided they would rather have faster running times and ignored the problematic history of the parent company, it simply did not cross their mind. Once it did, it was most likely too late. The shoes were bought, the times were better and rather than a passing thought about Cain, Goucher and Felix, that is where the thinking about shoes and responsible consumer choice ceased to matter. It shouldn't fall on single athletes to take on large corporations in order to make their contracts and working conditions hospitable for themselves. As in the case of Felix, it didn't work. It was only when push came from the running community at large that bigger brands improved the way they treat their athletes. This means that it is the collective who holds the power because they hold the money.

The VF shoes fall on a continuum between pure and impure sport, between legal and illegal and between the equal and unequal opportunities we've come to expect. In a worldly context, shoes matter very little, sport matters very little and life would go on without both. The shoes point out the holes that exist in the very systems to govern and rule the sport. These systems were put in place by our community and therefore we should be able to trust them to preserve integrity unhinged by monetary alliances. However, sport does not exist in Suits' utopia unmarred by the selfish wants of human nature. It reflects the inner workings of the populations it serves, and this is troubling. There is reason to believe in all the positive values sport gives society. It is not easy, even after spending countless hours in the literature and being exposed to evermore examples of such selfish behavior, to see sport and its governing bodies to be, well, human and subject to human weakness. These institutions can rise above greed, power, and money to do what is best for their constituents. Sport can remain an area of human excellence

where playing the game and trying hard are the focus. These values still exist, but it might not be possible anymore to separate them from less altruistic methods.

It is important to use these talking point as a springboard for exploring the ethics of distance running. These words, thoughts, debates, agreements, and arguments by extension makes the sport better even if there isn't an exact "right" answer. Discourse and disagreement are critical to improving the experience. It is disappointing how Nike has changed the running community, so too is the way in which these changes came about. Alas, there is now better precedent for future machinations of performance enhancing technology. Women are running faster than ever. The sport is expanding and effort is being put into making their dreams a reality. In the future professional running could mirror the systems of the NBA, NFL or professional cycling and that is to be applauded. Wrong doings by doctors, trainers, coaches and institutions are being put under the microscope more often. This can only make our sport and our society better.

The VF shoe was very successful in encouraging runners to at least see if they had indeed reached their potential. The many women running next to me found that they had more to give and more importantly, wanted to give it. At the beginning of writing this, I believe I held my performance above others who used technology I did not understand or agree with to achieve the same result. Within the controversy and mire surrounding the shoes I had forgotten what running actually is. Running is putting one foot in front of the other, which can be done barefoot or in work boots, in supershoes or sandals. Running is not the gear we wear or the personal records we set, but the enjoyment and purpose we find in the activity itself. That is what matters most of all. With or without supershoes, I still ran 2:41 in the marathon and that provides something of value to me. I find value in competition and purpose in pushing my limits. I still am a part of a wonderful community of people who come together outside doing what we love. No company or pair of shoes can take that away from us.

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Appendix

COUNT	MODEL	MEN	WOMEN
213	NIKE ZOOMX VAPORFLY NEXT%	65	148
148	NIKE AIR ZOOM ALPHAFLY NEXT%	53	95
49	BROOKS HYPERION ELITE	15	34
43	NIKE ZOOM VAPORFLY 4% FLYKNIT	7	36
17	HOKA ONE ONE ROCKET X	9	8
17	NEW BALANCE FUELCELL TC ELITE	3	14
12	SAUCONY ENDORPHIN PRO	6	6
9	HOKA ONE ONE CARBON X	2	7
6	BROOKS HYPERION ELITE 2	-	6
5	NEW BALANCE FUELCELL RC	3	2
4	ADIDAS ADIZERO ADIOS 5	3	1
4	ASICS META RACER	1	3
2	ADIDAS ADIZERO ADIOS 3	-	2
2	ADIDAS ADIZERO BOSTON 7	-	2
2	ADIDAS ADIZERO BOSTON 8	-	2
2	ADIDAS ADIZERO PRO	2	-
2	ALTRA VANISH R	1	1
2	NIKE ZOOM FLY 3	-	2
1	ADIDAS ADIZERO ADIOS 4	-	1
1	ADIDAS ULTRABOOST 19	-	1
1	ALTRA TORIN 4	-	1
1	ATREYU	1	-
1	BROOKS HYPERION	-	1
1	BROOKS LAUNCH 5	1	-
1	BROOKS RAVENNA 10	-	1
1	BROOKS HYPERION TEMPO	1	-
1	MIZUNO WAVE SHADOW 3	-	1
1	NEW BALANCE 1400 V6	-	1
1	NEW BALANCE 1500 T2 BOA	-	1
1	NEW BALANCE 1500 V5	-	1
1	NEW BALANCE 1500 V6	-	1
1	NEW BALANCE FRESH FOAM BEACON	-	1
1	NEW BALANCE FRESH FOAM ZANTE 4	-	1
1	NEWTON DISTANCE S 9	-	1
1	NIKE ZOOM FLY SP	-	1
1	NIKE ZOOM VAPORFLY 4%	-	1
1	ON CLOUDBOOM ECHO	1	-
1	SAUCONY GUIDE ISO 2	-	1
1	SAUCONY KINVARA 9	-	1
1	SAUCONY KINVARA 10	1	-
1	SAUCONY KINVARA 11	-	1
1	SAUCONY TYPE A8	-	1
1	UNDER ARMOUR VELOCITI 2	-	1
1	UNDER ARMOUR VELOCITI RACER	-	1

Figure 1: Olympic Trials Shoe Breakdown. Adapted from "What Shoes Do the U.S.'s Fastest Runners Wear?" by J. Dengate, Mar 2, 2020. Copyright 2020 by Runner's World