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Paper Title: Performance Enhancing Design for Running Shoes: When Technology Wins

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Performance Enhancing Design for Running Shoes: When Technology Wins

Abstract:
This paper discusses the politics of cheating via sportswear and amateur running footwear, where boundaries and synergies exist between the body and apparel that enhance sport performance. In 2017, Nike introduced a revolution in running shoe design, launching its *Vaporfly 4%* running shoes. The claims used in advertising for the shoe stated a possible increase in performance of up to 4%. The design of the shoe was aesthetically distinguished by its thick foam sole, which contains carbon plating. There has been a significant drop in times for elite running races since professional athletes adopted such advanced footwear and as a result, tighter regulations have been developed by World Athletics (2020), who have banned certain editions. Other footwear designers have followed Nike and are looking to new technology to advance performance, such as the *Adidas Futurecraft* run shoe, a 3D printed shoe designed to work with the athlete's foot shape using foot-scanning technology, perhaps paving the way for a move to 'bespoke' footwear design based on personal data. The ethics of performance enhancing design for running shoes are contextualised through a wider consideration of specialist garments for specific sport and leisure activities worn to enhance ease of movement and increased activity. There is a gap in research related to performance enhancing design for running shoes for amateur runners therefor the study makes an important and original contribution to literature.

Key Words: Running Shoes; Performance Enhancing; Sportswear; Cheating; Design; Amateur Runners

Introduction

The paper is structured to explore the aim and objectives of the research detailed at the end of this section. The literature review sets a context for the study through an overview of changes in sports clothing that has enhanced performance in general sportswear. Literature is also considered related to the ethics involved in wearing enhanced performance sportswear and the notion of cheating in this activity. This is followed by a brief historical overview of the running shoe and the technical developments in design that have enhanced the wearer's performance in running. The methodology section describes the mixed method approach and the data collection techniques utilising auto-ethnography, and a questionnaire given to amateur runners. These results are analysed using inductive thematic analysis and a triangulation of the data discussed with four runners not involved in the research. The findings section is split into two. It begins with an auto ethnographic account of one of the author's lived experience as an amateur runner. This provides an informative account of her experiences related to the adoption of running shoes in amateur races and the reactions of other runners to this. The results of the questionnaire completed by the amateur runners are discussed in relation to the reflections from the lived experience. It consists of the qualitative comments from the runners as well as numeric data related to the participant's running experience. The ethical considerations involved in the use of performance running shoes are considered and a code of practice is suggested to inform the future of amateur running. The conclusion considers the contribution to knowledge and lasting global influence of the research in the sport of running.

Research Aim

- To investigate the politics of cheating via running shoes and explore where boundaries and synergies exist between the body and apparel that enhance sport performance.

Objectives

- To site the research in the realm of the amateur runner as an under researched area of study.
- To contextualise the research with an overview of the history of performance enhancing clothing and footwear in sport.
- To record first hand auto-ethnographic experience as a runner and user of performance enhancing running shoes.
- To gather the lived experiences of amateur runners and their perception of performance enhancing running shoes.
- To review ethical considerations involved in the use of performance running shoes to inform the future of amateur running.

Figure 1: Nike *Zoom Vaporfly Next%* running shoe, first series. Photograph courtesy of Lisa Stansbie, 2022.

Literature Review

A variety of books, journal and newspaper articles, Internet articles, reports and magazines were consulted in the review of literature. Within the clothing and fashion industry the overall design of both clothing and footwear (including sports clothes) has evolved considerably over time. Clothing the body has always been essential for human beings because it is both protective and insulating. The evolution of fashionable clothing has accommodated many aesthetic changes, which have not always been designed to advance comfort or performance in the everyday activities of the wearer, however the fashion industry has been keen to adopt many technological developments to enhance the aesthetic appeal of clothes (Almond, 2017; Tarrant,

1994). For instance, the inclusion of a small percentage of lycra in fabrics in the 1980s, gave fashion garments a greater comfort in movement and aesthetic appeal and the introduction of smart fabrics in the 1990s enabled garments to synchronise with digital developments in other industries. Evolution in fabrics and the technology involved in making clothes has also evolved to ensure both comfort and protection for the wearer.

The development of sportswear has included many garments as well as footwear designed to enhance the comfort and performance of the wearer for different sports activities. In the 1920s, the pioneering French tennis star Suzanne Lenglen (1899 – 1939), ended the norm of women competing in clothes unsuitable for the playing of the sport. She had sleeveless tops and short skirts designed not to restrict her movement in order to improve her performance. Lenglen's sartorial revolution set the tone for women tennis players and her outstanding success in the sport was attributable to the way she chose to dress (Engelmann, 1998).

The technology involved in the creation of ski jackets has also evolved over time. Today they are created with insulation and made to be warm but light, constructed with materials that are not restricting. This allows skiers to maximise their function so the body is thermally regulated and does not impinge on performance (Winterinternational, 2024). In general athletics, cooling vests regulate the wearers' body temperature, and are used wherever temperatures can reach unbearable highs. Athletes use them prior to competition. When the vest is worn one hour before competition, it has been shown to improve performance (Chaen, Onitsuka and Hasegawa, 2022; Hunter, Hopkins, and Casa, 2006). Within weight training, wearing a specialist top with strong technical design is encouraged and the nature of the garment influences how the muscles move during a workout. This leads to training with correct movements, to the best of abilities (Rodriguez, 2024).

The boundaries between the support and enhancement of the sports activity through wearing clothing or footwear, and what can be constituted as cheating needs to be clearly defined in contemporary sports. The overriding rationale for sports clothing is to enhance fitness by protecting the body from the elements, improving breathability and preventing injuries (Nook Sports, 2024). These boundaries have and continue to evolve and the notion of cheating within the sports industry is continuously debated. Similar debates also take place regarding the use of sports performance enhancing drugs (Aurora University, 2024; Cox, 2024; Gordon and Stacey, 2024; Ritchie, 2022; Zabala, 2022). A definition of cheating through the use of specialist clothing is defined by sports technologist Ross Weir, 'Technology doping is the practice of gaining a competitive advantage using equipment (including apparel). The World Anti-Doping Agency (WADA) considers prohibiting technologies if they are 'performance-enhancing' or 'against the spirit of the sport' (2022: n.pag). Some recent examples of performance-enhanced clothing thought to constitute cheating include compression leggings, socks and stockings. These are considered to be, 'Ubiquitously associated with phrases such as "increase muscle power", "go further and faster" and "optimise performance' (Cox, 2024: n.pag). An article in the National Post argued that, 'Clothing alone won't make up for years of training, good coaching and the right body mechanics, but the wrong kind can hurt' (Associated Press, 2022: n.pag) The article also described how the use of body scanners in the design of swimsuits by Adidas had helped to maintain an ideal

form for swimmers. The cycling specialists Assos have created fitted suits for the US cycling team utilising wind tunnels. Nike has used 3-D printing technology within running clothes to create silicone protrusions in order to redirect the airflow around the runner. In these examples, boundaries between cheating are often blurred because the wearing of appropriate clothing in a sports activity has been widely proven to enhance that activity. The journalist, Thane Ritchie argued that, 'The concept of the human body as a machine that can be tweaked and optimized is gaining traction thanks to advancements in science and technology' (2022: n.pag).

The literature review identified much discussion related to the ethics involved in cheating in sports (Aurora University; Gordon and Stacey, 2024; Loland, 2005; McNamee, 2022; Ritchie, 2022; Zabala, 2022). There is a long history of athletes who have been construed to have cheated and these examples are often complex, therefore many boundaries become obscured. In his article on cheating in sportswear the lawyer Diego Zabala considered how human beings often find a way to justify unethical behaviour in relation to the psychological and material rewards involved in winning. This was supported in an anonymous article from Aurora University Online, 'Many ethical decisions are made privately and are difficult to monitor. Individuals who recognize, perhaps from experience, that they can derive both material and psychological rewards from engaging in unethical behavior may be powerfully motivated to behave unethically' (2024: n.pag). This article went on to describe how athletes want to win and the financial remuneration from this success can often distort the realities of being labelled a cheat and the subsequent disgrace this can bring. Gordon and Stacey commented on the celebrity culture associated with contemporary sports people and how the industry had become, 'Commodified, commercialised and spectacularised', encouraging participants to utilise any means in order to win (Gordon and Stacey, 2022: n.pag). In light of this, they considered that it was crucial to assess these behaviors in relation to a sustainable ethical code of practice.

The sports shoe has evolved considerably over the past 200 years (Demeester, 2016; Grawe, 2020; Magdalinski, 2009; Turner, 2019). In 1839 the chemist and manufacturing engineer, Charles Goodyear developed the process to use rubber (Bradford, 1866). As a result of this it was viewed as an ideal material for athletic shoes because it added traction underfoot. By the 1850s, the first spiked shoes were made for cricket and croquet and in 1865 the first spiked running shoe. In the 1890s the manufacturers, J.W Fosters and Son (Bolton, UK) introduced spiked running shoes, made in light leather on sewing machines. Many athletes adopted these including Olympic runners in 1924 Olympics. The company eventually became Reebok. Significant innovations in the development of running shoes include the marathon shoe created by Onitsuka in 1959. Holes were placed in various parts of the shoe to allow heat to be extracted, which prevented blistering when running long distances (PodiaPaedia, 2022). By 1960 Puma had developed vulcanization technology which allowed the shaft and sole of the shoes to be bound together. Various innovations evolved that were designed to improve running performance. In 1972, Adidas used a combination of polyamide and sharkskin half soles in sprint shoes that improved traction. By 1980, Nike had opened their Exeter Research & Development Center that housed an advanced testing facility for bio mechanic shoes. This coincided with their introduction of Tailwind, a running shoe that included an air sole cushioning system. Brooks invented their DNA cushioning system, which was the first smart cushioning, used for the midsole of the shoe. This was debuted in 2009,

which coincided with the release by Reebok of their EasyTone toning footwear technology. Today running shoes are available in a variety of shapes and sizes tailored to different types of running and abilities. The majority of running shoes are made from complexities of rubber including plastic or metal stiffeners that control the movement of the foot. More flexible and flatter running shoes are created for advanced runners for comfort and to enhance performance.

In 2024, performance enhancing shoes or super shoes as they are sometimes called, are extremely common in elite and amateur running circles. In most UK based amateur road running races, competitors rarely look at what type of shoes the winners of races are wearing. If fellow runners do look at the shoes of those who have made the podium, there is an element of surprise if a runner is wearing a regular running shoe. There is also a perception that their performance was superior because of not wearing super shoes. In a 2024 article in *The New York Times*, journalist Alexander Aciman described how carbon plated super shoes are now worn by a great deal of amateur as well as professional runners. In the article, six branded super shoes from 2024 were tested with amateur runners. The feedback from the runners highlighted the psychological effect on their performance when they perceive they are wearing fast shoes. The article also touches on the notion of cheating, drawing an analogy with the record-breaking runner Roger Bannister's feat in 1954, of breaking the four minute mile during his lunchbreak run. It suggests this is an example of a pure run, not reliant on technology enhanced apparel. The article also details the genuine agreement amongst runners - that as your body adapts to super shoes it becomes used to them. Therefore, the idea of reserving them just for races works both to sustain their longevity and to ensure the body experiences a different sensation when first wearing them.

This paper largely focusses on sole technology, namely carbon plates and the use of foam in the stack of the shoe. However, the future evolution of super shoes is likely to include broader advancements across use of materials and specifically performance feedback via digital technology. Since 2022, there has been a body of research looking at the impact of 3D printing on the development of running shoes. Adidas has publicised its research into printed lattice innovation for shoes and insoles (Carbon, 2024). This use of 3D printing aims for a bespoke fit for a runner's foot and the control of the runner's gait, in order to best perform and prevent injury. Alongside other research in the field, not all amateur runners feel the same benefit from super shoes and perhaps a more personalised approach via 3D printed shoes might be appropriate - particularly for injury prone amateur runners. There is also a growing body of research focusing on smart footwear. (Anwar, 2024, Continental - The Future in Motion, 2024). In this area, the use of data monitoring, sensors and movement tracking help to prevent injury and enhance performance. Users of running shoes with smart sensors have the ability to receive live feedback while training and be encouraged to adopt better running positions, pacing and analysis of fitness. Therefore training, races and workouts can be adapted. Currently, aside from the research laboratories of leading sports brands, smart running shoes are not commercially available, however it could be argued it is only a matter of time before the running shoe and digital technology are integrated in this form. This could potentially initiate the beginning of the next super shoe.

Methodology

The research adopted a mixed method approach, both qualitative and quantitative (Cresswell and Cresswell, 2018; Hesse-Biber, 2018). This combines the benefits of both elements in order to address a research question. Qualitative research sought to gather the thoughts, opinions and personal experience related to footwear worn in amateur running. This was gathered through one of the authors autoethnographic reflection and from the questionnaire responses (Chang, 2018). This scrutiny of personal experience revealed how opinions related to wearing supper shoes in the sport of running were formed. Quantitative research in contrast collects numerical information and was particularly beneficial in the use of a questionnaire sent to amateur runners, as some of the answers were assessed through their numerical importance. This was through the percentages of answers to some questions considered in relation to the number of questionnaire respondents, which totaled 254. For instance, when asked about their most important considerations when purchasing running shoes, 198 participants noted that comfort was the primary factor, which was 78% of the cohort and therefore a significant percentage in relation to the research.

Auto-ethnography was selected as a form of qualitative research (Chang, 2018). It can be both analytic and emotive and employs self-reflection on personal, lived experience as a means to connect it to a wider level of understanding of a cultural or social context. One of the authors has considerable familiarity with the sport of running as a triathlete and as a participant in amateur races where she has many running contacts. It was therefore appropriate to reflect on this involvement in relation to the research aim and objectives. Analytic ethnography, therefore, permitted the author's engagement in amateur running to be part of the analysis adding to an understanding of these activities through an explanatory use of this data. The emotive connection, 'seeks to bring the readers to an empathetic understanding of the writer's experience' (Springer Nature Link, 2019, n.pag). In this case the recollections of the author describe vicarious instances of her understanding and consideration of participants activities when wearing super shoes in races. This lived experience contrasts with the questionnaire's findings as it creates a narrative that is both factual and anecdotal, drawing on the activities involved in amateur running as well as the perceptions of those involved.

Questionnaires are defined by research expert, Adi Bhat as an, '….instrument that consists of a set of questions or other types of prompts that aim to collect information from a respondent' (2024, n.pag). He continued by stating that a questionnaire often comprises of a merger of close-ended questions (in this research quantitative) and open-ended questions that are qualitative. The questionnaire for this study correlated to the research aim and objectives and was conducted through a commonly used online tool, Survey Monkey. It was devised as an open call to amateur runners who are members of UK based running clubs and these were selected through the network of the author's sporting contacts in the amateur running community. The link to the questionnaire was placed on the social media pages of 10 amateur running clubs and shared via email to other running clubs. This was further passed on to participants contacts to encourage a snowball effect resulting in greater responses. As discussed, a total 254 replies were received. The basic demographics of participants were not specifically asked for in the questionnaire, as this was considered irrelevant for this particular piece of research. For example, newer runners tend to be of all ages in amateur running, so it does not necessarily align with age. It could be said that those

that have been running longer and are more experienced are generally likely to be more accepting of super shoes if they take part in competitions regularly as they might be seeking a competitive edge, but not all amateur runners compete. It is widely known that there is a great disparity between the number of female and male runners in amateur running competitions, which would likely effect the purchase of super shoes and running shoes (Bozon, 2024). A gender analysis of views around super shoes could be an area for future research.

Both the literature review, as well as the auto-ethnography and practice research helped to develop the questionnaire. The responses identified elements of cheating in the use of running shoes as well as exploring where boundaries and synergies exist between the body and apparel that enhance sport performance. Inductive thematic analysis, which interprets patterns, and signs in qualitative data, was adopted to analyse the results of both the lived experience of the runner and the questionnaire (Braun and Clarke, 2006). The main themes to emerge from the questionnaire are detailed in findings section and discussed in relation to analysis of the lived experience. This evaluation was used to suggest an ethical code of practice for adoption in amateur running globally. Following this, triangulation of the findings, took place through four running professionals who were not involved in the research. As experienced runners, their opinions added gravitas to the results gained independently from the amateur runners who participated in the questionnaire. These runners agreed with the themes identified in the questionnaire and were able to make useful suggestions for how these, plus the reflections of lived experience could support the conclusions from this and the development of a code of ethical practice. Triangulation therefore ensured methodological integrity through a reliable set of data. This was identified as a solid process of validity by the sociologist Uwe Flick who remarked, '….the term 'triangulation' is used to refer to the observation of the research issue from (at least) two different points (Flick, 2004:178).

Findings

Lived Experiences of an Amateur Runner – The Super Shoe

This section is the record of the auto-ethnographic experiences of one of the authors, Lisa Stansbie, who has considerable experience as an amateur runner and user of performance enhancing running shoes. It records a conversation between both authors and details Lisa's personal involvement in the sport and her knowledge of running shoes in general. It also details her interaction with a network of amateur runners. This experience is discussed in relation to the research aim and objectives of the study.

Lisa first heard of Nike's Vaporfly running shoe was when the runner, Eliud Kipchoge ran the INEOS1:59 Challenge in October 2019 (Eliud Kipchoge (born 1984), is a long distance runner from Kenya who competes in marathon races and has specialised in the 5000 metre distance) (figure 2). He was aiming to show that it was possible to break the two-hour barrier for the marathon. He achieved it in 1:59:40:2. However, this event (it wasn't a race) was about optimised performance, and how conditions for running, including footwear could be manipulated, to achieve what had previously seemed impossible (Notably the hashtag for the event is #NoHumanIsLimited). The event proved to be influential because it enhanced every element involved in a run including using a pacing vehicle, the world's fastest pacers surrounding a runner in a wind shielding formation. There were optimal weather

conditions, using the flattest course and Kipchoge wore performance enhancing Nike footwear, therefore his running performance was significantly improved (He took 2 minutes off his own world record in the event). Lisa did not pay too much attention to his shoes, mainly because everything about the event was enhanced (The INEOS 1.59 Challenge, 2023). The event itself was a highly publicized spectacle of an enhanced sporting performance. This artificial set up of the event was completely different to what you could experience in amateur race conditions, due to the nature of it being a spectacle.

Figure 2: Nike *ZoomX Vaporfly Next % Series 2*. Photograph courtesy of Lisa Stansbie, 2023.

The version of Nike Vaporfly trainers that Kipchoge wore, were also a prototype and unavailable to all but a few elite runners (Rosenberg and Sailors, 2022). It was not until the following year in 2020, when the shoes took centre stage as the World Athletics banned the particular version that Kipchoge ran in in races. Rules were established around the shoes that designated sole thickness and number of carbon plates within the sole. Interestingly, a new stance was also taken on the availability of performance-enhancing shoes. Any new shoes had to be publicly available for four months before they could be used in competition. This aimed at creating a level playing field amongst athletes. Late in 2020, Lisa began noticing more and more of the Nike Vaporfly on start lines at both professional and amateur events. This also initiated a new mode of behavior both in training and at races. Runners started to take notice of each other's footwear and actively looked at other runner's feet to assess what footwear they wore. There was a notable change to amateur runner's perceptions and assumptions about footwear and links between footwear and running ability. As these trainers seemed relatively new in 2020, they were perceived as unusual in both availability, due to expense (around £230 in the UK) and their design. The largeness

of the sole and pronounced fin shape at the back of the sole, made them look much larger than other running shoes. Lisa suggested that the peak for Nike's super shoes was probably 2021. At this time, there was still little competition from other brands, whereas fast forward to 2024 most brands have developed a super shoe. In 2024, you can also observe that availability and commonality has changed amateur runner attitudes and the perception that the bulky design of super shoes is no longer viewed as unusual. A variety of super shoes are worn by all different abilities of runners in amateur racing.

In London in 2021, Lisa recalled getting on an underground train to go to the start line of the London Marathon in Greenwich. The carriage had many runners in it and opposite her a runner was staring at her feet and those of the runner next to her. They were both wearing Nike Vaporflys. The runner looked at Lisa and said, 'London marathon in cheat shoes for you too' (Anonymous quote). She recalled being surprised at the time by this, but also considered that there are runners who have taken the stance (and still do), that the Vaporfly is a step too far. Also, the argument of a level playing field due to availability is not true for all runners and many amateur runners can't afford the variety of super shoes, whose price points have followed those laid down by Nike's Vaporfly. When standing in her GFA starting pen for the London Marathon, Lisa was amongst a sea of super shoes, including her own. She purchased her first pair after first thinking she wasn't a fast enough runner to wear them and felt sure she needed to wear them to run a marathon to improve her time and reduce fatigue. These thoughts were influenced by word of mouth from other runners she knew, and further inspiration was gleaned from a multitude of online reviews and articles suggesting they were almost magical in their powers. All the research at that time pointed to them improving marathon times, mainly as the carbon plate is said to preserve energy as it rebounds from the ground. This is exactly what Vaporfly felt like when Lisa first wore them (figure 3). With this super bouncy feel also comes a sense of being less stable, due to their stack height. When she first wore them to run in, they felt high and platform like. However, with her basic knowledge of muscle memory it was no surprise to find that the more she wore them, the less noticeable the bounce was. When she currently wears them, she is aware that her body and mind has adapted to the shoes and her ankles and feet feel as if they compensate for the instability more naturally. She judged that the body therefore habituates to them.

Figure 3: Author in the 2022 *Trimpell 20 Mile Race* wearing *Nike Alphafly*. Both runners either side have the same trainers on. Photography courtesy of Sprint Finish Photography.

The first time Lisa wore bright yellow Vaporflys, she was convinced people would stare and wonder what she had on her feet. She has since found out that the general public really do stare when wearing the futuristic, bizarre design of the sister shoe, the Alphafly. She was also convinced that any runner she encountered would see her wearing them, recognise the shoes, and wonder why she had a pair. Lisa considered them to be a status symbol of a certain level of runner that she was not. It was however much easier to run when wearing them, and even in her training runs she could put in the same energy, but seemingly be around 20 seconds a mile quicker. In one long distance, 20-mile race in which she participated, she heard a runner behind her who sounded very odd. She assumed she must have a rock of some kind trapped in the sole of her shoes as the noise went clickety-click. As she sped past, Lisa saw the Alphaflys for the first time. She thought they looked ridiculous and sounded very loud! This reaction has not changed. Even after having two pairs herself, she considered them very loud and the split high stacked sole looked particularly odd.

Lisa continued to research the sort of trainers she could wear for the marathons she participated in. All the reviews she read, showed that the Alphafly was a better long-distance shoe. However, they demonstrated that Alphafly is even-more futuristic with its incredibly high foam sole that is split in the middle. It has air chambers within the sole that are visible and looks like an evolution from the Vaporfly, and is indeed even more unstable. Lisa finally caved in and bought a pair. The first time she ran in the Alphafly was down a steep hill. As she was not used to wearing them, they felt incredibly unstable. Due to their ability to propel, Lisa was worried she wouldn't be able to stop, and due to this, considered them to be a poor choice for running in technical races with uneven ground or lots of corners. She also found them to be

energy conserving as her legs did not feel as tired in races, and in particular marathons. They can however aggravate particular kinds of injuries, as Lisa personally found out. Due to their instability, her right ankle weakness flared up if she wore them frequently. Lisa also reflected how most runners do not wear Vaporfly or Alphafly for training. It generally is not sustainable to do so, as they don't last. The upper, while light is thin and wears out more quickly than other trainers. This is demonstrated in the images in figure 4 and 5. It is also particularly hard after wearing enhanced running shoes to go back to not running as fast and trying harder in other types of trainers. Lisa has found that even as her old Vaporflys and Alphaflys fall apart, they are still far quicker for training runs than ordinary trainers.

Figure 4: Nike *ZoomX Vaporfly Next % Series 2* view from above of toe wear. *Nike ZoomX Alphafly Next % Series 1*side view. Photograph courtesy of Lisa Stansbie, 2023.

Figure 5: *Nike ZoomX Alphafly Next % Series* close up of sole deterioration. Photograph courtesy of Lisa Stansbie, 2023.

Questionnaire Findings

The questionnaire was designed to survey a range of social and amateur runners. There is minimal research around the use of the performance shoe (super shoe) in the field of amateur running and UK club running (amateur running clubs). The majority of current research does not look at the lived experience of the amateur runner, or ways in which the influence of the elite performance of professional runners can shift perceptions for amateur and club runners. There is a recent study that has shown that super shoes assist runners who are quicker than the average runner, and this perception has been mirrored in some of the responses to the questionnaire (Soong, 2023). In order to target this demographic, the questionnaire was circulated to a range of running clubs, which cater for beginner to advanced amateur (non-professional) runners, 254 replies were received. The responses are grouped into themes and discussed in relation to these.

Experience as a Runner

Over 50% of the respondents classed themselves as being at an intermediate level of runner with 40% designating themselves as advanced; 8% beginner and 2% professional/elite. It is of course important to consider the runners self-perception of their own ability. Club runners are more likely to judge their ability by comparison with other club runners, particularly training groups that organised club training sessions, which are based on training speed. 70% of respondents had been running for over 5 years; 12.5% had been running 3 - 5 years; 12.5% 1 - 3 years and 5% less than a year.

Brands of running shoes owned for training and running

This theme sought to identify if a running shoe brand was a factor in choice and if this could be linked to Nike's dominance in the super shoe market. Interestingly, the most popular brand in the questionnaire was Hoka, followed by Saucony. This could suggest that the everyday amateur running shoe market is less popular for Nike, and it is not until professional racing shoes are considered, that the brand has the lead. For actual racing Nike was a favorite with 21% of respondents selecting the brand. There were a myriad of other brands selected with Sucony being the closest runner up at 18%. It can be deduced from the responses that many runners are likely to have a separate shoe for racing, not necessarily their everyday training shoe. This idea is relatively new.

Most important considerations when purchasing running shoes

Participants were asked to rate different perspectives they considered important when purchasing running shoes. Overwhelmingly, comfort was the leading answer at 78%; with performance at 27%; price at 22.5%; motion control 22.5% and sustainability at 5%. The design of the shoe received a 0% response. This clearly identifies that the aesthetic appeal of the shoe was not an important factor in the purchase because the functional capabilities transcended design sensibility. 15% of the runners wrote 'other' and the overwhelming feedback in the free comments for this question, centered around biomechanics and the movement of the body during running as well as cushioning capabilities and width.

Running shoes enhancing performance and controversy surrounding this
80% of respondents considered that super shoes enhanced performance. Further comments suggested that the shoe could enhance performance, but it needed to be coupled with the correct training as a runner. 5% of the comments suggested that such shoes can only impact on what were termed professional, experienced runners. Therefore, the shoes would have to be worn and used at quicker speeds to maximise their ability to enhance performance. This aligns with the recent research detailed in the literature review.

Aspects of performance impacted by running shoe choice
The main performance enhancing aspects noted in improved running performance included, being able to run faster; recovering quicker; being more responsive (one respondent commented, 'My pace picks up without trying'); the shoes were bouncier; pulse rates were lower, and it was easier to go up hills. Numerous respondents suggested their legs felt less tired. The energy return and energy saving properties were clearly a main benefit with runners and make these shoes ideal for longer-distance road racing and marathons. This is also encouraged by the advertising from the world's elite marathon runners, who wear them as their shoe of choice. There were however around 30% of respondents who had never worn a performance enhancing shoe. This is not perhaps surprising in the amateur running scene. It could also be to do with affordability, alongside the perception that these shoes are not appropriate for all runners (as reflected in the experiences of the amateur runner section).

Perceptions of cheating in the use of super shoes
In this theme the concepts of personal ethics and choice are important. The responses mainly related to individual and personal views on cheating and what this constitutes. A significant number of respondents suggested that it is not viewed as cheating when most of the participants in a race, and or their peers are wearing them. Several runners do however raise the importance of cost and for amateur runners this is an important factor as they do not compete for financial gain. While they may be theoretically available to all, the cost can be prohibitive. There was also an acknowledgement in some of the responses that technical progression is part of the evolution of any sport. In one response, this evolution was likened to Formula 1 racing, with another saying it is clear that it is mechanical doping. At the other end of the spectrum, 30% of respondents stated that it needed monitoring and rules needed to be clearer. Overwhelmingly, comments suggest that while the shoes assisted performance it is the training and ability of the runner that is most important.

Regulations impacting on the evolution of the super shoe
The comments in response to this theme generally suggested that current regulations in place are sufficient, particularly around the accessibility of shoes (which at the time of writing are widely available). It was also felt by around 40% of the respondents that without the initial rules currently in place, the evolution of the shoe could continue and advance further. It is difficult to see how and where future developments could be. One response does suggest wheels on the bottom of running shoes although this seems farfetched! Many respondents agreed that the stack height and tallness of the sole is the main area where regulation is needed, and this is where the carbon plate is contained.

Discussion and Analysis of Lived Experience and Questionnaire Responses
In amateur running, there are a myriad of types of runners, and this is why the questionnaire responses overall were so varied. Members of amateur running clubs in the UK are not always competitive runners and run for a variety of reasons. The responses suggest that the notion of performance enhancement has not really been an issue in amateur running until the Nike Vaporfly became available. This contrasts with elite professional running, where the notion of performance and performance gains, as well as how the running shoes might assist these gains, has a long history (Rodriguez, 2022; Taylor, 2023). This is very similar to the Speedo Fastskin debate in swimming, when Fastskins became available to the amateur swimming market. A Fastskin, is high technology swimwear, designed to allow the swimmer to glide through the water at high speed (Caralogs Editorial Staff , 2023). In both of these examples the media proliferation around the shoes and garments gives rise to wider public interest in both, and an adoption in some areas of the amateur sport worlds of swimming and running (Chaen, Onitsuka,, Hasegawa, 2022; Soong, 2023). There are already rules around footwear for running since the invention of the Vaporfly. This is detailed in new regulations that consider, in particular, the stack height of carbon plate footwear. An article that considered injuries in runners using such footwear observed how, 'Concerns about fairness in sport were evaluated by World Athletics and resulted in new rules stating that the combination of a single CFP and responsive foam midsoles was permissible for use, if not exceeding 25 mm of sole thickness for track (≥ 800 m), and 40 mm for road running ("Athletics Shoe Regulations", effective from 1 January 2022)' (Tenforde, Hoenig, Saxena, Hollander, 2023, n.pag). The market since 2022 is now flooded with super shoes, Nike however remains the most popular on start lines and in feedback from the questionnaire.

The author's auto-ethnographic reflections as a runner, and the questionnaire responses have been gauged to review the ethics involved in the use of performance running shoes, to inform the future of amateur running. These could be considered as a working code of practice. As super shoes began to be adopted in running, athletes started to look at each other's feet to consider the type of shoes worn for the race. It naturally created unease, particularly with the number of runners who could not afford this type of shoe. This is reflected in the comment to the author from another runner on the way to a race in London, 'London marathon in cheat shoes for you too' (Anonymous quote).

One solution to this would be to ensure that in races all runners wear performance enhancing footwear however as demonstrated in the findings this is not so simple. A large proportion of questionnaire respondents considered that if the majority of runners in a race wore super shoes it could not be viewed as cheating. However, this would disadvantage those runners who did not or could not wear them. The cost of the shoes was also noted as being prohibitive for those who could not afford them, particularly for those who compete in amateur races, as there is no financial gain (or sponsorship). It also removes choice for runners to wear shoes they prefer and there are amateur runners who favour standard running shoes, as evidenced through the choices highlighted in the questionnaire. The design of performance enhanced running shoes is particular across all brands, and a common feature is high heel stack height. This does not however, suit runners with a particular gait or injuries. In amateur running the reasons runners, run are varied. For example, there are many

runners who do not enter races and run for a sense of wellbeing or as part of club, which can offer social interaction. Runners also enter races, to take part in a large social event or to finish the distance irrelevant of time, so the notion of competitive advantage is perhaps not relevant here.

It was clear that one of the main benefits for amateur runners in wearing performance enhancing footwear were the energy return and energy saving properties. This makes the shoes ideal for road racing and marathons. Although the shoe enhanced running performance, it was also recognized that wearing the shoe should be coupled with adequate run training and ability. A small percentage of questionnaire responses also suggested that the real impact of the shoes should be measured on professional trained runners, to maximize their ability to enhance performance. In this group of runners, we might assume that there is a more standardized level of running ability, making it easier to compare the performance advantages of the shoes. Interestingly, several questionnaire respondents stated that the development of the technology to produce performance enhancing running shoes was recognized to be part of the natural evolution of the sport. A number of runners did suggest that such technology needs monitoring, and include rules or a code of practice for amateur running.

A key theme generated is the price point of super shoes. Rather than attempting to develop a series of rules that could affect amateur running, if the shoes were generally as accessible as standard running shoes, this might encourage a fairer option to wear them. This is problematic as it means lowering the cost of the shoes. However, while there is still significant demand the price is unlikely to be lowered. At the time of writing, the world's top 5 carbon plated, running shoes ranged in price from £220 to £280. This included the Nike Vaporfly and Alphafly; New Balance Fuel Cell; Adidas Adizero Pro; and Saucony Endophin Elite (Hobson, 2023). Notably, the other brands build on the notion of a professional/elite runner in the naming of their super shoe. The notion of where the boundaries of technological improved performance and ability lie will continue to be pushed. Perhaps a signal of this, is the new rules that will come into force in 2024 aimed at running track shoe (spikes) technology (Dickinson, 2023). These rules will only apply to elite running events termed as applicable competitions. Similar to road shoes, masters and amateur clubs will be exempt from the rule. While a very small percentage of amateur runners engage in track events it is useful to see where the development of super shoes is heading.

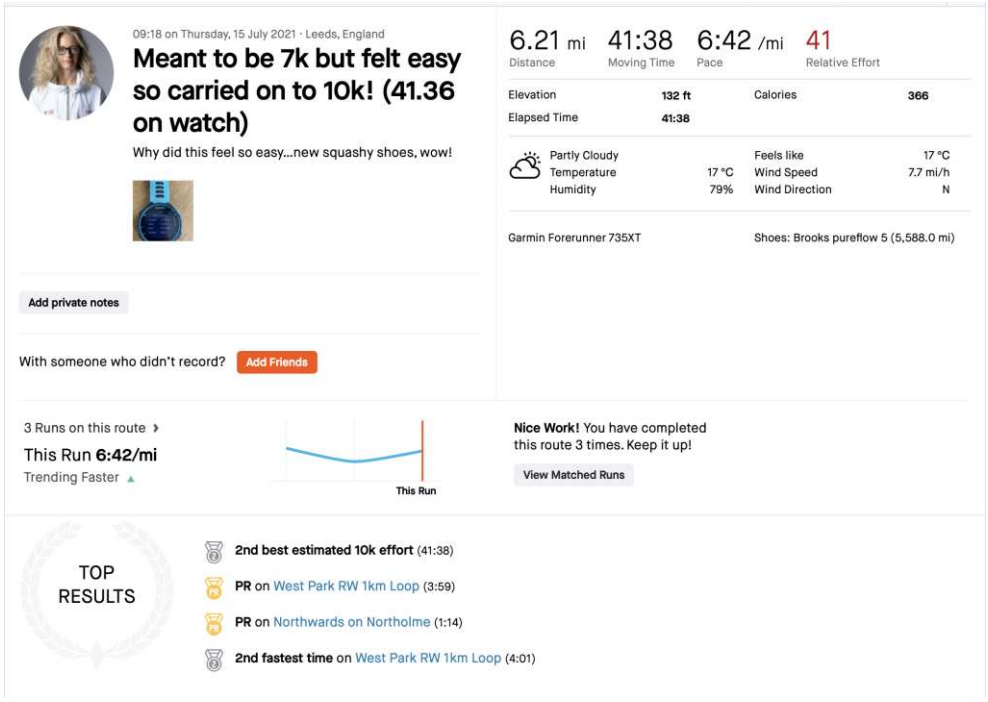

Figure 6: Screenshot of *Strava* Fitness Application. The first time the author wore performance enhancing shoes. Photograph courtesy of Lisa Stansbie, 2023.

Conclusion

The research has focused on the politics of cheating via running shoes and explored where boundaries and synergies exist between the body and apparel that enhance sport performance. Situating the study within the realm of the amateur runner significantly contributes to a gap in literature and the range and depth of research and its application, as the majority of study related to performance enhancing sports shoes has focused on professional runners. The literature review contextualized the research with an overview of the history of performance enhancing clothing and footwear in sport. It also explored the technological advancement of super shoes, notions of cheating, performance enhancement and theories of races/records but focusses on elite performance rather than amateurs lived experience. Therefore, this paper is original and a catalyst for new thinking and practices because it focusses on an amateur runner's auto-ethnographic account of lived experiences alongside the results of a questionnaire to amateur runners. The lived experience also converges on perceptions by others of running shoes, which is directed very much toward their design and look, something often missed in research. It is possible through the collection of data from such amateur runners via the questionnaire, to understand that the application of rules as is the case in elite, professional running, is not appropriate to amateur running. Therefore, an attempt at the introduction of a level playing field, is the only way to offer fairness in amateur races. This qualifies the research as an important point of reference of lasting influence on runners who compete in amateur races.

References

Aciman, Alexander (2024), 'Super Shoes Aren't Just for Olympians. But Do Casual Runners Really Needs Them?', https://www.nytimes.com/wirecutter/reviews/carbon-plate-running-shoes/. Accessed 28 August 2024.

Almond, Kevin (2017), 'A Potential Dichotomy: Clothing, Fashion and the UK Apparel Industry', *The International Journal of Designed Objects,* 11:1, pp. 1-14.
Anwar, Naveed (2024), 'The Rise of Smart Footwear: Navigating the Future of Technology Integration', Accessed 28 August 2024.
Associated Press (2022), 'Olympians Suit Up in High-tech Apparel to Shave Seconds', https://www.voanews.com/a/olympians-suit-up-high-tech-apparel-shave-seconds/3446214.htm. Accessed 06 December 2022.
Aurora University (2024), 'The Psychology of Cheating in Sports', https://online.aurora.edu/psychology-of-cheating-in-sports/. Accessed 04 June 2024.
Bhat, Adi (2024), 'Questionnaire: The Ultimate Guide, Advantages & Examples', https://www.questionpro.com/blog/what-is-a-questionnaire/. Accessed 28 October 2024.
Bozon, Jenny (2024), 'Its 2024 and women still aren't treated equitably in our sport, heres what needs to change and why', https://www.runnersworld.com/uk/training/motivation/a60124039/gender-equality-running-racing. Accessed 8 November 2024.
Bradford, Peirce (1866), *Trials of an Inventor: Life and Discoveries of Charles Goodyear*, New York: Carlton & Porter.
Braun, Virginia & Clarke, Victoria (2006), Using Thematic Analysis in Psychology. *Qualitative Research in Psychology*, 3:2, pp. 77–101.
Caralogs Editorial Staff (2023), 'What is High-Tech Swimwear', https://www.catalogs.com/library/what-is-high-tech-swimwear. Accessed 28 October 2023.
Carbon (2024), 'Carbon 3D Print Lattice Innovation – The Adidas Story,' https://www.carbon3d.com/resources/whitepaper/the-adidas-story. Accessed 28 August 2024.
Chaen, Yudai, Onitsuka, Sumire and Hiroshi.Hasegawa (2022) 'Wearing a Cooling Vest during Half-Time Improves Intermittent Exercise in the Heat', https://www.frontiersin.org/articles/10.3389/fphys.2019.00711/full. Accessed 06 December 2022.
Chang, Heewon (2008), *Auto-ethnography as Method*, California: Left Coast Press.
Continental - The Future in Motion (2024), 'Can Smart Shoe Technology Change the Way You Run? Connected Footwear', https://www.continental-tyres.co.uk/b2c/stories/smart-shoes/. Accessed 28 August 2024.
Cox, David (2024), 'Do Compression Sports Clothes Really Improve Performance?', https://www.theguardian.com/lifeandstyle/2017/jun/19/under-pressure-do-compression-sports-clothes-really-improve-performance. Accessed 04 June 2024.
Creswell, John W and Creswell, J. David (2018), *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, California: Sage Publications.
Demeester, Leen (2016), *The Giants of Sportwear*, Lanoo: Belgium.
Dickinson, Marley (2023), 'World Athletics Introduces New Rules and Regulations for Shoes in Competition', https://runningmagazine.ca/the-scene/world-athletics-approves-new-rules-and-regulations-for-shoes-in-competition/. Accessed 28 October 2023.
Engelmann, Larry *(1988), The Goddess and the American Girl: The Story of Suzanne Lenglen and Helen Wills, Oxford University Press.*
Flick, Uwe (2004), 'Triangulation in Qualitative Research,' in U. Flick, E. Von
Gordon, Sandy and Stacey, David (2024), 'Cheating in Sports: How Can We Embed Ethics and Values',

https://www.news.uwa.edu.au/archive/2018070610759/sport/cheating-sport-how-can-we-embed-ethics-and-values. Accessed 04 June 2024.
Grawe, Sam (2020), *Nike: Better is Temporary*, New York: Phaidon.
Hobson, Ben (2023), 'The Best Carbon Plate Running Shoes for your Next PB Attempt', https://www.runnersworld.com/uk/gear/shoes/g39512517/carbon-plate-running-shoes/. Accessed 28 October 2023.
Hunter, Iain, Hopkins J. Ty and Casa Douglas J, 'Warming Up With an Ice Vest: Core Body Temperature Before and After Cross-Country Racing', *Journal of Athletic Training*, 41:4, pp. 371–374.
The INEOS 1.59 Challenge (2023)', 'The Performance Strategy', https://www.ineos159challenge.com/performance. Accessed 28 October 2023.
Kardorff and I. Steinke (eds), *A Companion to Qualitative Research*, London: Sage Publications. pp. 178-183.
Loland, Sigmund (2005), 'The Varieties of Cheating—Comments on Ethical Analyses in Sport', *Sport and Society*, 8:1, pp. 11 – 26.
Magdalinski, Tara (2009), *Sport, Technology and The Body*, Routledge: London.
McNamee Mike (2022), 'Ethics and Sport', *British Philosophy of Sport Association*, http://philosophyofsport.org.uk/resources/ethics-sport/#:~:text=To%20cheat%2C%20deceive%2C%20harm%20or%20lie%20to%20people,conduct%20for%20participants%20and%20coaches%20engaged%20in%20sports. Accessed 06 December 2022.
Hesse-Biber, Sharlene Nagy. (2018). *Mixed Methods Research: Merging Theory with Practice*, New York: Guilford Press.
Nook Sports (2024), 'Clothing and How It Affects Workout Performance', https://www.spookynooksports.com/blog/manheim/clothing-and-workout-performance. Accessed 06 December 2024.
PodiaPaedia (2022), 'The Podiatric Encyclopaedia History of Running Shoes,' https://podiapaedia.org/wiki/sports-medicine/individual-sports/running/history-of-running-shoes. Accessed 06 December 2022.
Ritchie, Thane (2022), 'Is Tech Doping Cheating? How Science and Tech Enhance Athletic Performance Ritchie Capital Management', https://medium.com/@thaneritchie/is-tech-doping-cheating-how-science-and-tech-enhance-athletic-performance-6650e2ba6907. Accessed 06 December 2022.
Rodriguez, Diana (2022), 'Everyday Health Choosing the Right Workout Clothes', *Everyday Health*, https://www.everydayhealth.com/fitness/choosing-workout-clothes.aspx. Accessed 06 December 2022.
Rosenberg, Danny, Pam R. Sailors (2022), What Money Can Buy: Technology and Breaking the Two-Hour 'Marathon' Record. *Journal of the Philosophy of Sport*, 49:2: 1-18.
Soong, Kelyn (2023), 'Are your 'Super Shoes' Worth the Money? It Depends on your Running Skill', https://www.washingtonpost.com/wellness/2023/02/08/nike-vaporfly-super-shoe-running/. Accessed 24 October 2023.
Springer Nature Link (2019), Autoethnography', https://link.springer.com/referenceworkentry/10.1007/978-981-10-5251-4_86. Accessed 28 October 2024.
Tarrant, Naomi (1994), *The Development of Costume*, London: Routledge.
Taylor, Jonathon (2023), 'Super Shoes: Explaining Athletics' New Technological Arms Race', https://theconversation.com/super-shoes-explaining-athletics-new-technological-arms-race-156265. Accessed 28 October 2023.

Tenforde, Adam, Hoenig, Tim, T, Saxena Amol, Hollander, Karsten (2023), 'Bone Stress Injuries in Runners Using Carbon Fiber Plate Footwear', https://doi.org/10.1007/s40279-023-01818-z. Accessed 28 October 2023.
Turner, Thomas (2019), *The Sports Shoe: A History from Field to Fashion*, London: Bloomsbury.
Weir, Ross (2022), 'Cheater! Technological Doping', https://www.progressivesports.co.uk/cheater-technological-doping
Sports and Tech: How Athletes Make Use of the Latest Inventions http://www.technologist.eu/the-sports-revolution/. Accessed 06 December.
Winterinternational, (2022), 'Technical Data', https://www.winternational.co.uk/pages/technical-data. Accessed 06 December 2022.
Zabala, Diego (2022), 'Cheating in Sportswear: The Risks behind a Winning Culture', https://lawahead.ie.edu/cheating-in-sports-the-risks-behind-a-winning-culture. Accessed 06 December 2022.