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Original Research

Adherence, motivational factors, and injury rates in runners using minimalist vs. conventional shoes: A cross-sectional study of 4719 Brazilian runners

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ABSTRACT

Background: In the early 2010s, a movement advocating a more natural running style, such as running in minimalist shoes, emerged. However, little is known about runners' adherence to these shoes, interest in them, and injury rates associated with them.
Objective: To investigate adherence, motivational factors, and injury rates associated with running in conventional and minimalist shoes.
Methods: 4719 Brazilian runners answered an online survey assessing demographic data, training habits, adherence levels, motivational factors for selecting running shoes, and running-related injuries. Associations with shoe type were assessed using chi-square (χ^2) tests, and multivariable stepwise logistic regression was used to examine the association between minimalist shoe use and injury prevalence.
Results: Most runners were classified as conventional shoe users (78%), while 22% reported having tried minimalist shoes, primarily motivated by performance improvement (43%). Among those with experience (n = 1042), 31% were former users, while 41% and 28% were classified as occasional and habitual users, respectively. Most reported no formal guidance during the transition. Men and more experienced runners were more likely to report experience with minimalist shoes ($p < 0.001$). No significant association was observed between shoe type and overall injury prevalence. However, stratified multivariable analyses showed lower odds of injury among habitual users (OR = 0.72, 95% CI: 0.56, 0.93; p = 0.013) compared with conventional shoe users.
Conclusions: Adherence to minimalist shoes is low, and shoe selection is associated with sex and running experience. Although overall injury prevalence did not differ between groups, adjusted analyses indicated lower odds of injury among habitual users.

Introduction

Running is a popular physical activity worldwide,[1] which can improve morphological, physiological, and psychological conditions.[2,3] However, the prevalence of injuries among runners is high.[4–6] It is well known that running injuries are multifactorial and arise from the interaction of multiple modifiable and non-modifiable factors.[7–9] Among these factors, one of the most discussed and modifiable is the selection of running shoes.[10,11]

It has been shown that runners perceive that selecting the wrong

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1413-3555/© 2026 Associação Brasileira de Pesquisa e Pós-Graduação em Fisioterapia. Published by Elsevier España, S.L.U. All rights are reserved, including those for text and data mining, AI training, and similar technologies.

shoes for their specific foot type, such as those with less cushioning or old shoes, may increase the risk of running injuries.[12] Notably, comfort, cushioning, and injury prevention have been identified as key factors in running shoe selection among runners.[10,13] In this regard, running shoe manufacturers have varied the cushioning materials and midsole structures throughout history to enhance comfort and prevent running injuries.[14,15] However, no significant or consistent effects of these strategies on injury reduction among runners have been observed,[16] and preliminary evidence suggests that only lighter runners may benefit from them.[17] Therefore, as far as we know, there is no well-established, evidence-based guidance on prescribing running shoes to prevent or reduce injuries.[18–20]

Conversely, given that cushioned running shoes do not necessarily attenuate impact forces or reduce injury risk,[15] a movement emerged in the early 2010s advocating for a more natural running style, such as barefoot running or running in minimalist shoes.[21–23] This trend was likely influenced by non-evidence-based beliefs among runners about the supposed injury-prevention benefits of barefoot running.[24] However, there is limited knowledge regarding runners' adherence to and interest in these shoes. Only two studies have specifically examined the adoption of minimalist shoes among runners,[25,26] and found that approximately 30% of runners have already tried this type of shoe, primarily motivated by the potential for injury prevention.[25,26] For instance, evidence on gender-based adherence to these shoes is conflicting, with one study reporting higher adoption rates among men[26] and another among women.[25] The relationship between age, training level, race ambitions, and running shoe selection remains unclear.

Another important aspect to consider is the relationship with injury-related factors. To date, evidence regarding the incidence and prevalence of injuries among runners using minimalist shoes remains conflicting.[27] It has been suggested that injury rates tend to increase when a less specific definition of running-related injuries is adopted.[28,29] However, among studies assessing injury prevalence or incidence among runners using minimalist shoes, no consistent definition of injury has been applied. For instance, Rothschild (2012) reported a 37.8% injury prevalence when considering any injury occurring within the last six months, while Cohler and Casey (2015) found a 29% injury prevalence when specifically asking about injuries sustained while running in these types of shoes. Comparisons across these studies are limited due to relatively small local samples of runners and inconsistent definitions of running-related injuries. Also, no studies have compared injury rates between runners who have and have not used minimalist shoes using a single injury definition. The purpose of this observational study was to assess adherence to minimalist shoes, injury prevalence among runners with experience with minimalist shoes, and the motivational factors influencing these choices.

Methods

Participants

A sample of runners was recruited for this observational study through flyers posted on social media platforms (Facebook, Twitter, and Instagram) and by contacting Brazilian running coaches and athletes via email.[30] This combination of recruitment strategies improved response rates and allowed for a more diverse population.[31] The inclusion criteria required participants to be over 18 years old, have at least 6 months of running experience, have internet access to complete the survey, and speak Portuguese. Incomplete surveys and duplicate responses were excluded, with only the first submission from each participant being retained. All participants were required to read and sign a consent form to take part in the study. This study was approved by the local ethics committee (Protocol number 68824117.0.0000.5391).

Study design

The STROBE recommendations[32] were followed in conducting this study. Participants completed a Google Forms survey with 19 closed-ended questions on demographic data, running habits, whether they had ever tried running in minimalist shoes, their reasons for choosing or not choosing these shoes, and their history of running injuries. The online survey was written in Portuguese and distributed to Brazilian runners from December 2017 to May 2018.

Data collection

Participants were asked to provide their demographic information, including sex, age, average weekly training distance, self-reported level, predominant running surface, longest race distance completed in the previous 12 months, and longest race distance planned to complete in the next 12 months. Regarding self-reported levels, participants could identify themselves as recreational runners (runners who train regularly for health benefits and may participate in running events without a primary focus on competition), competitive amateur runners (runners who engage in regular training and compete in running events), or elite runners (i.e., individuals who are competitive distance runners).

A recent literature review indicated that there is still a wide range of definitions used to describe minimalist shoes.[33] Therefore, in this study, participants were asked whether they had ever tried running with minimalist shoes, defined as ultra-lightweight running shoes with minimal heel protection or shoes that simulate barefoot running. Participants who reported never having used minimalist shoes were classified as conventional shoe users and asked about their reasons for not using them, their interest in trying them, and their motivations for this interest. Those who had tried minimalist shoes were asked about the primary reasons for choosing them, whom they consulted before running in them, and what they did to prepare for the transition. They were also asked about the frequency with which they used minimalist shoes during training sessions and competitions and were subsequently categorized according to their usage patterns as habitual users (runners who used minimalist shoes in all training sessions or competitions), occasional users (runners who used minimalist shoes only in some training sessions or competitions), or former users (runners who no longer used minimalist shoes). Former users were asked to report their reasons for discontinuation, whereas occasional users were asked to report the reasons for not using minimalist shoes in all training sessions or competitions.

All participants were asked to describe their history of running-related injuries (i.e., injury prevalence and the body parts involved in each injury). Regarding the body parts involved in running injuries, participants could select more than one option for this question. To ensure uniform injury surveillance, a running-related injury was defined as "running-related (training or competition) musculoskeletal pain in the lower limbs that causes a restriction on or prevents running (distance, speed, duration, or training) for at least 7 days or 3 consecutive scheduled training sessions".[28] To minimize memory recall bias, questions regarding running-related injuries were restricted to the 6 months before the survey.[29]

Statistical analysis

Descriptive statistics, including absolute (n) and relative frequencies (%), were used to present the data. Chi-square tests were performed to assess the association between participant characteristics (demographic variables, training habits, and race-related variables) and running shoe type. A separate chi-square (χ^2) test was conducted to evaluate the association between injury prevalence and running shoe type. When necessary, post hoc analyses were performed on adjusted residuals, following previously described recommendations for contingency tables.[34,35] In contingency tables, effect size was assessed using Cramér's

V, with magnitude interpreted according to Cohen's conventional benchmarks.[36] V < 0.10 = very small effect; 0.10 ≤ V < 0.30 = small; 0.30 ≤ V < 0.50 = moderate; V ≥ 0.50 = large. To further explore potential heterogeneity among runners who had tried minimalist shoes, this group was subdivided into habitual, occasional, and former users. A multivariable binary logistic regression analysis was then performed to examine the association between running-related injury (dependent variable: yes/no) and patterns of minimalist shoe use, while accounting for potential confounding factors. The main independent variable was the frequency of minimalist shoe use (never, former, occasional, and habitual users), with runners who had never used minimalist shoes as the reference category. Sex, age, weekly training distance, and self-reported running level were included as exploratory variables in a stepwise selection procedure. Variables were retained in the final model based on statistical criteria. Categorical variables were entered using dummy coding. Results are presented as odds ratios (OR) with 95% confidence intervals (CI). Statistical significance was set as $p < 0.05$. All analyses were conducted on IBM SPSS Statistics version 23 (IBM Corp., Armonk, NY, USA).

Results

Out of 5176 completed surveys, 457 duplicate responses were removed, resulting in 4719 valid responses (2123 from women) for final analysis. Most runners (78% of the total sample; n = 3677, 1959 males) were classified as conventional shoe users (i.e., reported never having run in minimalist shoes), whereas 22% of the total sample (n = 1042, 637 males) reported having previously tried running in minimalist shoes. Demographic characteristics, training habits, and injury prevalence are presented in Table 1. Additional descriptive variables (including race history and race plans, as well as training surface) are presented in Table 2.

The primary motivation reported for trying minimalist shoes was the potential for performance improvement (n = 448, 43%; Fig. 1). When asked who they consulted before trying minimalist shoes, many runners (n = 399, 32.1%) reported that they did not receive guidance from anyone before trying minimalist shoes (Fig. 2a). Similarly, most of them (n = 633, 52.5%) reported no specific preparation before adopting minimalist shoes (Fig. 2b). Among the 1042 runners who reported having run in minimalist shoes, 31% (n = 319) were classified as former users. The main reasons for discontinuation included "discomfort" (39.9%), "injury" (24.7%), "lack of performance improvement" (23.7%), "cost" (7.6%), and "dissatisfaction with the shoe's style" (4.1%). The remaining 723 participants who reported still using minimalist shoes for training or competition were classified as habitual users (28%; n = 291) or occasional users (41%; n = 432). For occasional users, the reasons for not using minimalist shoes in all training sessions or competitions included a "preference for varying shoe models" (33.3%), "fear of injury" (17.4%), "discomfort" (16%), "use restricted to specific surfaces" (15.1%), "ongoing adaptation to minimalist shoes" (10.4%), or "having experienced an injury" (7.8%).

Among runners classified as conventional shoe users (i.e., those who reported never having run in minimalist shoes), 31% reported that the main reason for not trying minimalist shoes was "satisfaction with their current shoes". Other reported reasons included the "price of minimalist shoes" (16.9%), "fear of injury" (12.6%), "discomfort" (10.8%), and "negative feedback about minimalist shoes" (1%). Also, 27.6% did not provide a specific reason for not trying minimalist shoes. Despite these concerns, 60% (n = 2205) of these runners expressed some interest in trying minimalist shoes. The primary motivations for this interest were "curiosity about the experience of running in minimalist shoes" (52%), "potential performance improvement" (28.2%), "possible injury prevention" (15.1%), "shoe style" (2.8%), and "price" (1.9%).

A significant association was observed between sex and running shoe type ($\chi^2(1) = 20.2$, $p < 0.001$, Cramér's V = 0.065; Table 1), as well as self-reported running level and running shoe type (χ^2 (2) = 40.8, $p < 0.001$, Cramér's V = 0.093; Table 1). Post hoc analyses of adjusted residuals indicated that men were more likely to report experience with minimalist shoes, whereas women were more likely to be classified as conventional shoe users. Additionally, competitive amateur and elite runners were more likely to report experience with minimalist shoes, whereas recreational runners were more likely to be classified as conventional shoe users. A significant association was also observed between weekly training distance and running shoe type (χ^2 (9) = 153.9, $p < 0.001$, Cramér's V = 0.181; Table 1). Post hoc analyses indicated that runners covering 33 km or more per week were more likely to report having experience with minimalist shoes. In contrast, runners reporting weekly distances of up to 24 km were more likely to be classified as conventional shoe users.

Running shoe type was associated with both the longest race completed in the past 12 months ($\chi^2(6) = 140.3$; $p < 0.001$, Cramér's V = 0.172; Table 2) and the longest race planned to be completed in the next 12 months ($\chi^2(6) = 108.5$; $p < 0.001$, Cramér's V = 0.152; Table 2). Post hoc analysis indicated that completing long-distance races (21.1 km, 42.2 km, and ultramarathons) and planning to complete marathons and ultramarathons were significantly associated with a higher likelihood of reporting experience with minimalist shoes. In contrast, shorter distances (i.e., 5–15 km) were associated with conventional shoe users. No significant associations were found between running shoe type and either age or training surface (Table 2).

Injury prevalence was 35.7% (n = 372) among runners who reported

Table 1
Demographic and training characteristics and injury prevalence according to minimalist shoe experience (n = 4719).

	Conventional shoe users (n = 3677)	Minimalist shoe Experience (n = 1042)	p-value	Cramér's V
Sex				
Male	1959 (53.3)	637 (61.1)	<0.001	0.065
Female	1718 (46.7)	405 (38.9)		
Age (Years)				
18 - 20	60 (1.6)	19 (1.8)	0.149	
21 - 29	633 (17.2)	200 (19.2)		
30 - 39	1509 (41.0)	448 (43.0)		
40 - 49	982 (26.7)	264 (25.3)		0.041
50 - 59	407 (11.1)	92 (8.8)		
60+	86 (2.3)	19 (1.8)		
Self-reported level				
Recreational	1778 (48.4)	392 (37.6)	<0.001	
Competitive Amateur	1884 (51.2)	640 (61.4)		0.093
Elite	15 (0.4)	10 (1.0)		
Weekly training distance (km)				
≤ 8	353 (9.6)	58 (5,6)	<0.001	
9 to 16	925 (25.2)	205 (19.7)		
17 to 24	794 (21.6)	162 (15.5)		
25 to 32	682 (18.5)	176 (16.9)		
33 to 40	408 (11.1)	153 (14.7)		
41 to 48	210 (5.7)	88 (8.4)		0.181
49 to 56	143 (3.9)	96 (9.2)		
57 to 64	73 (2.0)	38 (3.6)		
65 to 80	51 (1.4)	43 (4.1)		
more than 80	38 (1.0)	23 (2.2)		
Running injury in the last 6 months				
Yes	1385 (37.7)	372 (35.7)	0.247	0.017
No	2292 (62.3)	670 (64.3)		

Note: Values are shown as n (%). Percentages refer to column totals. p-values were obtained using the chi-square test, and effect size was assessed using Cramér's V. Conventional shoe users: participants who reported never having run in minimalist shoes. Minimalist shoe experience: participants who reported having tried minimalist shoes.

Table 2
Race-related characteristics and training surface according to minimalist shoe experience (n = 4719).

	Conventional shoe users (n = 3677)	Minimalist Shoe experience (n = 1042)	p-value	Cramér's V
Training surface				
Concrete/Asphalt	3223 (87.7)	914 (87.7)	0.221	
Track	49 (1.3)	20 (1.9)		
Treadmill	261 (7.1)	59 (5.7)		0.035
Grass	18 (0.5)	7 (0.7)		
Trail	126 (3.4)	42 (4.0)		
Longest race distance completed in the previous 12 months				
No races completed	110 (3.0)	23 (2.2)	<0.001	
5km	517 (14.1)	85 (8.2)		
10km	957 (26.0)	194 (18.6)		
15km	585 (15.9)	115 (11.0)		0.172
Half-Marathon (21.1 km)	1084 (29.5)	393 (37.7)		
Marathon (42.2 km)	351 (9.5)	189 (18.1)		
Ultramarathon	73 (2.0)	43 (4.1)		
Longest race distance planned to be completed in the next 12 months				
No races planned	49 (1.3)	8 (0.8)	<0.001	0.152
5k	156 (4.2)	28 (2.7)		
10k	558 (15.2)	112 (10.7)		
15k	482 (13.1)	90 (8.6)		
Half-Marathon (21.1 km)	1473 (40.1)	369 (35.4)		
Marathon (42.2 km)	818 (22.2)	353 (33.9)		
Ultramarathon	141 (3.8)	82 (7.9)		

Note: Values are presented as n (%). Percentages refer to column totals. p-values were obtained using the chi-square test, and effect size was assessed using Cramér's V. Conventional shoe users: participants who reported never having run in minimalist shoes. Minimalist shoe experience: participants who reported having tried minimalist shoes.

having tried minimalist shoes and 37.7% (n = 1385) among those classified as conventional shoe users. No significant association was found between running shoe type and the prevalence of running-related injuries (χ^2 (1) = 1.34; p = 0.247, Cramér's V = 0.017; Table 1). The body parts involved in injuries among runners who reported having tried minimalist shoes and among those classified as conventional-shoe users are shown in Fig. 3. The knee was the most affected body region in both groups, followed by the lower leg or calf.

To further explore potential differences among runners who reported having tried minimalist shoes, this group was stratified by usage pattern (former, occasional, and habitual users). A multivariable stepwise logistic regression model was performed to account for potential confounding factors (Table 3). In the final model, minimalist shoe classification and running level were retained as independent predictors of running-related injury. Compared with runners who had never used minimalist shoes, habitual users showed lower odds of reporting a running-related injury (OR = 0.72, 95% CI 0.56–0.93; p = 0.013), whereas former and occasional users were not significantly associated with injury prevalence. Regarding running level, competitive amateur runners had higher odds of injury than recreational runners (OR = 1.19, 95% CI 1.05–1.34; p = 0.005), while no significant difference was observed for elite runners. Model performance indicators showed a Nagelkerke R^2 of 0.005 and an area under the ROC curve of 0.543.

Discussion

This study aimed to assess adherence to minimalist running shoes, injury prevalence among runners with these shoes, and the motivational factors influencing their use. The main findings revealed that most runners were classified as conventional shoe users. Additionally, women and less-experienced runners (recreational runners, individuals with lower training volume, and those who had completed or planned to complete shorter race distances) were more likely to be classified as conventional shoe users. On the other hand, men and more experienced runners (competitive amateurs and elites, individuals with higher weekly training volumes, and those who had completed or planned to complete long-distance races) were more likely to report experience with minimalist shoes. Although several variables were statistically

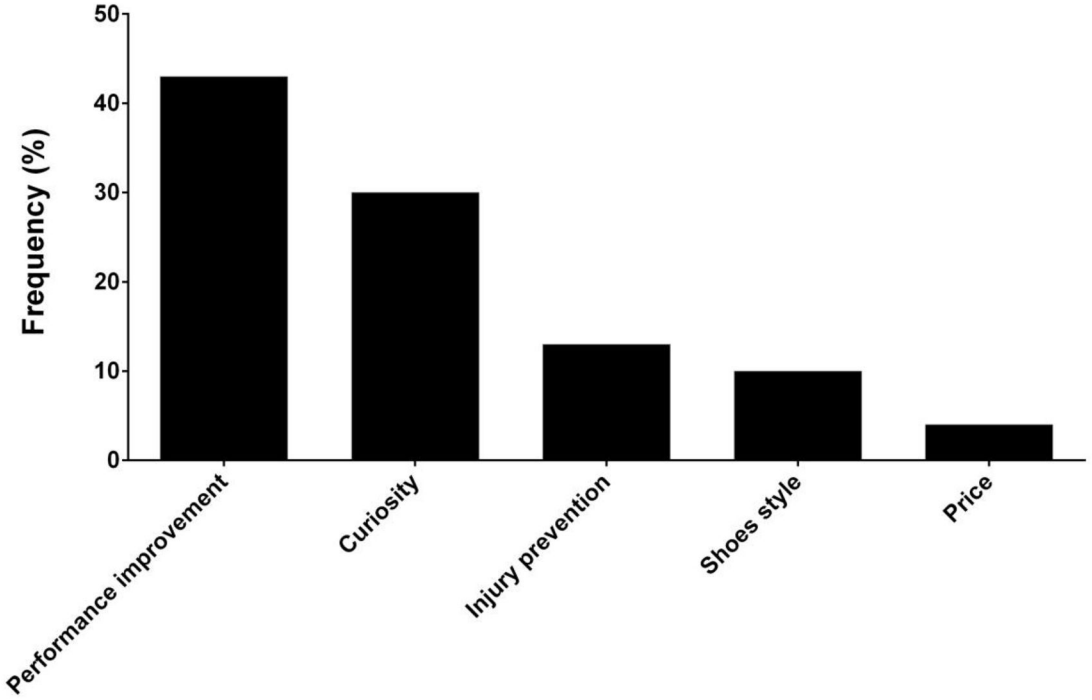

Fig. 1. The main reason reported for trying to run in minimalist shoes (n = 1042).

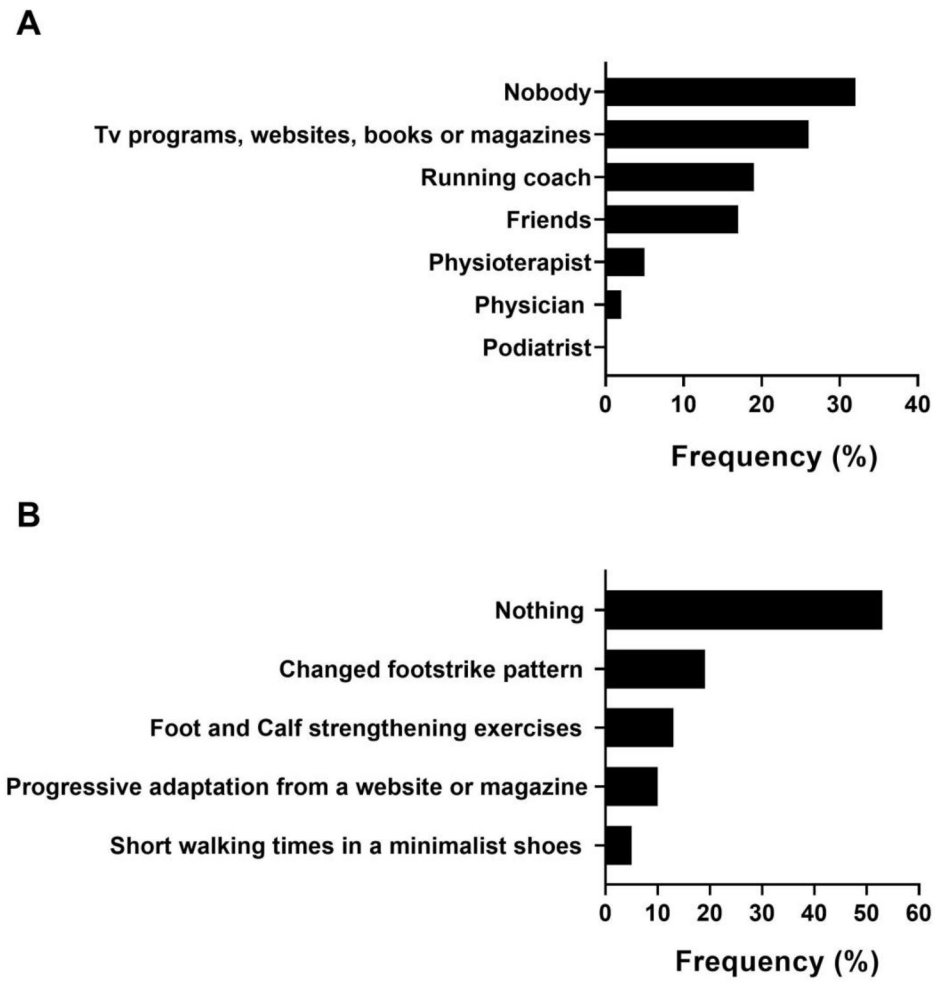

Fig. 2. (A) Relative frequency of sources of guidance reported by runners before trying minimalist shoes. (B) Relative-frequency preparation strategies were reported prior to adopting minimalist shoes.

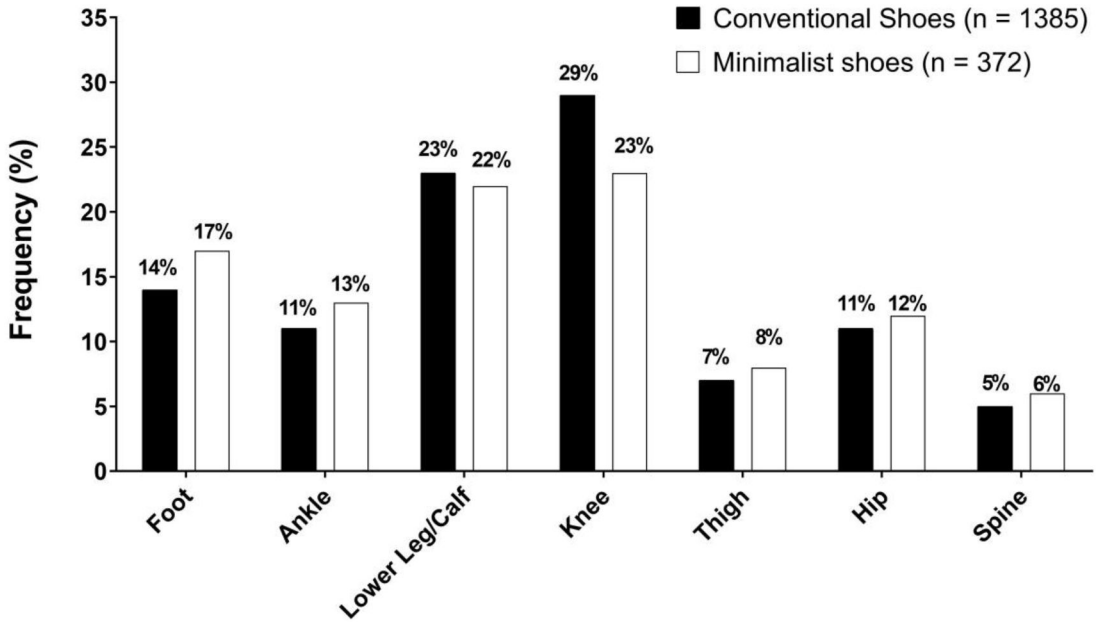

Fig. 3. Main body parts involved in running-related injuries for running in conventional and minimalist shoes.

associated with running shoe type, the magnitude of these associations was small, indicating that these factors explain only a limited portion of

Table 3
Multivariable stepwise logistic regression analysis of factors associated with running-related injury (n = 4719).

Predictors	OR[1]	95% CI[1]		p-value
(Intercept)	0.55	0.50	0.60	<0.001
Classification according to minimalist shoe use				
Never used minimalist shoes (reference)	-	-		-
Former users	1.14	0.90	1.44	0.260
Occasional users	0.87	0.70	1.07	0.177
Habitual users	0.72	0.56	0.93	0.013
Self-reported level				
Recreational (reference)	-	-		
Competitive amateur	1.19	1.05	1.34	0.005
Elite	1.82	0.81	4.04	0.139

Note: OR = odds ratio; CI = confidence interval. Variables entered in the stepwise procedure included classification of minimalist shoe use, sex, age, weekly training distance, and running level. The final model retained the minimalist shoe-use classification and the running level. Reference categories were never used with minimalist shoes and recreational runners.

the variability in footwear choice. Injury prevalence and injury locations were similar between these two groups. However, when runners experienced with minimalist shoes were stratified by usage patterns, multivariable analysis showed lower odds of reporting running-related injuries among habitual users compared with those who had never used minimalist shoes.

Despite the resurgence of minimalist shoes in the early 2010s,[22] the vast majority of runners in this study were classified as conventional shoe users, with most expressing satisfaction with their current footwear. An association was observed between less experienced runners and classification as conventional shoe users. There is no standardized method for defining categories of conventional shoes, and classifications are often based on manufacturers' recommendations.[37,38] In general, conventional shoes provide greater cushioning, a feature linked to increased comfort, and a recent systematic review indicated that comfort and cushioning are the most frequently cited factors influencing running shoe selection, especially among novice runners.[13,39] These factors may help explain why less experienced runners were more likely to be classified as conventional shoe users in the present study.

In this study, 22% of runners reported trying minimalist shoes. However, other studies have reported that approximately 30% of runners have used minimalist shoes.[25,26] This discrepancy may reflect differences in the study population. Additionally, about 60% of runners classified as conventional shoe users have expressed interest in trying minimalist shoes, with curiosity as the primary motivating factor. This considerable interest in minimalist shoes is consistent with prior evidence.[22,25,26,30,40] Despite this, the proportion of runners reporting experience with minimalist shoes remains relatively low. Regarding sex differences, the present study found that men were more likely to report experience with minimalist shoes, consistent with Rothschild (2012). By contrast, Cohler & Casey (2015) reported a higher prevalence among women. Although the reasons for these differences remain unclear, a recent systematic review suggested that men tend to prefer more cushioned shoes, whereas women may favor lighter footwear.[13]

Previous studies have suggested that injury prevention was the main motivation for trying minimalist shoes.[25,26] In contrast, the main reason reported in this study was the potential for improved performance. This shift in motivations across studies could be related to evidence indicating performance benefits associated with lightweight shoes.[41,42] Furthermore, in this study, more experienced runners were more likely to report experience with minimalist shoes. This finding aligns with previous evidence suggesting that high-caliber runners may prioritize performance aspects when selecting footwear.[13,39]

To the best of our knowledge, this is the first study to assess injury prevalence in a large community of runners using a standard definition of running-related injuries.[28] Approximately 35% of runners who had tried minimalist shoes reported a running-related injury, whereas 37.7% of those classified as conventional shoe users reported an injury. No significant difference was observed between groups. This finding aligns with existing literature, which generally reports no clear association between minimalist shoes and injury risk.[27] Regarding the body parts involved in running-related injuries, both groups showed a similar distribution of injury sites, with the knee being the most frequently affected region, followed by the leg or calf. This finding is consistent with previous studies that identified the knee as the most commonly injured site in runners.[43–45] It is important to note that this study did not distinguish between leg and calf injuries, as this distinction may be too technical for laypeople to understand or respond to appropriately. Therefore, more subtle differences in injury patterns may not have been detected.

Although the cross-sectional and self-reported design of this study does not allow a detailed understanding of the etiology and mechanisms underlying the anatomical distribution of running-related injuries, biomechanical adaptations associated with minimalist shoes, such as a shift from rearfoot to non-rearfoot strike patterns and changes in stride characteristics (e.g., reduction in stride length), have been shown to redistribute mechanical load from the knee toward the ankle–foot complex.[46–50] From this perspective, the ankle and lower leg would be expected to be the main body parts involved in injuries among runners who have tried minimalist shoes. However, this pattern was not observed in the present data. It should also be considered that factors potentially influencing the anatomical distribution of injuries, such as duration of exposure to minimalist shoes, degree of adaptation (e.g., short- versus long-term), training load and progression, and prior injury history, were not assessed. In this context, these findings should be interpreted with caution, and studies employing different designs may build upon these observations to further investigate these relationships.

In a multivariable analysis stratified by reported usage patterns, runners with experience using minimalist shoes who were classified as habitual users had lower odds of running-related injuries than conventional shoe users. One possible explanation for this pattern is survival bias among habitual users. Runners who continued to use minimalist shoes may represent a subgroup that successfully adapted to this type of footwear and potentially developed musculoskeletal adaptations, such as increases in intrinsic and extrinsic foot muscle strength,[51–53] which have been proposed as potential mechanisms associated with reduced injury risk.[54] In contrast, runners who experienced discomfort, difficulties during the transition period, or injuries may have discontinued their use, which is consistent with our findings showing that approximately 30% of runners who had tried minimalist shoes reported abandoning their use, with most cases (64.6%) attributed to pain or discomfort while running in these shoes. It is important to note, however, that the stepwise logistic regression model's predictive performance was modest, indicating that the available predictors capture only a limited portion of the variability in injury occurrence. Altogether, these results reinforce the notion that running-related injuries are widely recognized as multifactorial[9] and occur when accumulated forces exceed the biological tissue tolerance limits.[7,9,55] Therefore, attributing a primary role in injury prevention or causation solely to footwear type may oversimplify the complex etiology of running-related injuries.

Most runners in this study did not alter their training routines or adopt some complementary strategies to prepare themselves for the transition to minimalist shoes. Furthermore, many runners in this study did not seek any consultation before adopting minimalist shoes (32%), and only a quarter received professional supervision (e.g., from running coaches, physiotherapists, physicians, or podiatrists). While the mechanisms by which professional supervision may influence injury risk or performance improvement remain unclear, emerging evidence supports the potential benefits of progressive transition methods for minimalist shoes,[27,56] and professional guidance should also be considered when adopting minimalist shoes. On the other hand, it has been shown that runners often fail to consider qualified advice about running or running

shoes, instead seeking information from blogs, forums, websites,[10,57] and sports stores.[58] Although the transition period or the process of adapting to minimalist shoes was not within the scope of the present study, it may represent a critical factor influencing both injury risk and adherence. In this regard, future intervention studies should prioritize evaluating structured progressive transition protocols to determine their effectiveness in reducing injury risk and improving long-term adherence.

This study has some limitations that should be considered when interpreting the findings. First, given its cross-sectional design, it was not possible to establish temporal relationships between footwear use and injury occurrence, limiting causal inference. Although multivariable analyses were performed to adjust for potential confounders, residual confounding cannot be ruled out. In addition, all data were self-reported through an online survey. Although definitions were provided, participants in large-scale online surveys may interpret key terms differently, which is a common limitation of studies relying on self-reported data. This may have led to misclassification of both footwear use and injury outcomes, potentially attenuating true associations or introducing bias in comparisons between groups.

Furthermore, the study assessed injury prevalence and body regions involved; however, more detailed analyses of injury characteristics (e.g., severity, type, or time lost from work), injury mechanisms (e.g., acute vs. overuse), and their temporal relationship with minimalist shoe use were not conducted. While such analyses could provide additional insights, they fall beyond the scope of the cross-sectional design employed in the present study. Therefore, the findings should be interpreted as descriptive epidemiological data rather than causal evidence. Another limitation of this study is that low back injuries were not included among the body parts involved. Although participants were first asked about the occurrence of a running-related injury, the absence of this option may have limited the characterization of the anatomical distribution of injuries reported by the runners.

Finally, the use of a voluntary online survey also introduces the possibility of responder bias,[25] as participants' experiences might differ from those of nonparticipants in this study. In addition, online surveys are prone to self-selection bias, potentially attracting runners with a greater interest in running footwear, particularly those who have experimented with or favor minimalist shoes, which may have influenced the observed adherence rates and motivational factors.

Conclusions

Despite the great interest in minimalist shoes, adherence to these shoes remained low. Most runners were classified as conventional-shoe users, especially women and those with less experience. On the other hand, men and more experienced runners were more likely to run in minimalist shoes, primarily motivated by potential performance improvement. Although overall injury rates and the distribution of injury sites did not differ between conventional-shoe users and runners with experience using minimalist shoes, adjusted analyses indicated lower odds of injury among habitual minimalist-shoe users compared with runners who have never tried minimalist shoes.

Declaration of competing interest

The author(s) declared no potential conflicts of interest.

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