

# Knowledge, interest, and preference for gait retraining programs in street runners: a cross-sectional study

*Conhecimento, interesse e preferência por programas de retreinamento de corrida em corredores de rua: estudo transversal*

*Conocimiento, interés y preferencia por programas de reentrenamiento de corrida en los corredores de calle: un estudio transversal*

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**ABSTRACT** | Some treatment modalities have been used to prevent or treat running-related musculoskeletal injuries, among them, gait retraining. This study aimed to evaluate street runners' knowledge, interest, and preference for gait retraining programs and assess if these aspects differ between runners with and without history of injury. This is a cross-sectional study with 100 runners. Initially, a text showing what gait retraining was about was presented to participants. Then, they answered questions about their knowledge (yes x no) and interest (yes x no) on the programs. Subsequently, a text showing how fully and partially supervised programs would be conducted was offered to participants. Then, they reported their preference for one of them (fully x partially supervised). We found that most athletes were unaware of gait retraining programs (69.8%), though they showed great interest in performing them after explanation (87.1%). We observed no preference for a fully (48.2%) or partially supervised (51.8%) protocol. We also found a statistical difference in knowledge ( $p=0.029$ ) in favor of participants with history of injury. Despite the growing evidence available, we observed that most runners lack any prior knowledge of this modality. Due to the great interest and lack of preference for different protocols shown, we suggest that healthcare providers who treat this population offer the programs described to patients.

**Keywords** | Physical Therapy Specialty; Sports Medicine; Running; Athletic Injuries.

**RESUMO** | Com o intuito de prevenir ou reabilitar lesões musculoesqueléticas relacionadas à corrida, algumas modalidades de tratamento têm sido utilizadas, entre elas o retreinamento de corrida. O objetivo deste estudo foi avaliar o conhecimento, o interesse e a preferência acerca de programas de retreinamento de corrida por parte de corredores de rua e verificar se esses aspectos diferem entre corredores sem e com histórico de lesão. Trata-se de estudo transversal feito com 100 corredores. Inicialmente, um texto mostrando do que se tratava o retreinamento de corrida foi apresentado aos participantes, que então responderam com relação ao conhecimento (sim ou não) e ao interesse na realização (sim ou não). Posteriormente, um texto mostrando como seria a realização de um programa supervisionado e outro parcialmente supervisionado foi apresentado aos participantes, que responderam acerca de sua preferência por um deles (supervisionado ou parcialmente supervisionado). Constatou-se que a maioria desconhece os programas de retreinamento de corrida (69,8%), porém houve um alto interesse (87,1%) na realização do programa após a leitura do texto. Os participantes não apresentaram preferência por um protocolo totalmente supervisionado (48,2%) ou parcialmente supervisionado (51,8%). Foi encontrada uma diferença estatística quanto ao conhecimento ( $p=0,029$ ) a favor dos participantes com histórico de lesão. Apesar das crescentes evidências disponíveis, observou-se que a

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maioria dos corredores não tem conhecimento prévio sobre esta modalidade. Devido ao alto interesse e à ausência de preferência por diferentes protocolos, sugere-se que os programas descritos sejam apresentados aos pacientes por profissionais da saúde que trabalhem com essa população.

**Descritores** | Fisioterapia; Medicina Esportiva; Corrida; Traumatismo em Atletas.

**RESUMEN** | Con el propósito de prevenir o rehabilitar las lesiones musculoesqueléticas relacionadas con la carrera, el reentrenamiento de carrera es una de las modalidades de tratamiento. El objetivo de este estudio fue evaluar el conocimiento, el interés y la preferencia por los programas de reentrenamiento de carrera por parte de corredores de calle, así como verificar si estos aspectos difieren entre los corredores sin antecedentes de lesiones o con. Se trata de un estudio transversal, realizado con 100 corredores. Inicialmente, los participantes recibieron un texto sobre el reentrenamiento de corrida y, luego, respondieron acerca del conocimiento (sí o no) y el

interés por hacerlo (sí o no). Enseguida, los participantes recibieron un texto sobre cómo aplicar un programa supervisado y otro sobre el programa parcialmente supervisado, y respondieron su preferencia por uno de ellos (supervisado o parcialmente supervisado). Se constató que la mayoría de los respondientes desconoce los programas de reentrenamiento de corrida (69,8%), pero hubo un gran interés (87,1%) por aplicar el programa después de la lectura del texto. Los participantes no mostraron preferir un protocolo totalmente supervisado (48,2%) o parcialmente supervisado (51,8%). Se encontró una diferencia estadística en cuanto al conocimiento ( $p=0,029$ ) sobre los participantes con antecedentes de lesión. A pesar de la creciente y disponible evidencia, se observó que la mayoría de los corredores no tienen conocimiento previo de esta modalidad. Debido al gran interés y la falta de preferencia por uno de los protocolos, los programas descritos deberían de ser presentados a los pacientes por los profesionales de la salud que trabajan con esta población.

**Palabras clave** | Fisioterapia; Medicina Deportiva; Corrida; Traumatismo en Deportistas.

## INTRODUCTION

Running is often practiced for conditioning, leisure, and competition. The increasing number of practitioners is due to its practice effects. Running three to four times a week for approximately two to three hours with 60 to 90% maximum heart rate for one year is associated with reduced resting heart rate, body mass, body fat and triglycerides, as well as with increased maximum consumption of oxygen and high-density lipoproteins<sup>1</sup>.

The exponential growth in the incidence of musculoskeletal injuries reflects the increasing adherence to the sport. Injury occurrence varies from 19.4% to 79.3%, according to the definition chosen to conceptualize injuries. Knees (7.2-50%), legs (9-32.2%), and feet (5.7-39.3%)<sup>2</sup> are the the main affected sites, and the most common lesions are medial tibial stress syndrome (13.6-20%), Achilles tendinopathy (9.1-10.9%), and plantar fasciitis (4.5-10%)<sup>3</sup>. This high injury incidence requires different strategies to both prevent and rehabilitate running injuries, one of which is gait retraining<sup>4</sup>.

Gait retraining includes the use of tracks or strategies to adapt individuals' running technique. The most used strategies involve the real-time correction of running technique via video or mirror analysis (trunk and lower limb alignment)<sup>5-7</sup>, cadence increase<sup>5,8-11</sup>, changes in the initial contact from rearfoot to midfoot/forefoot<sup>12</sup>, and impact

reduction<sup>13</sup>. Protocols last from two to eight weeks, during which visual<sup>6,7,12,13</sup>, auditory<sup>5,8-11</sup>, and/or verbal<sup>5,6,7,12</sup> feedback is provided and gradually removed so individuals can use intrinsic strategies to perpetuate new standards<sup>12</sup>.

Despite numerous studies investigating gait retraining effects<sup>5-13</sup> and clinicians' growing interest for this type of intervention, there are still no studies that incorporate participants' opinions on this modality. It is important to evaluate aspects such as knowledge of gait retraining to assess the need to disseminate relevant information to practitioners. We believe that changes to inadequate running patterns occur due to lack of knowledge about correct interventions. This hypothesis is reinforced when we consider the number of athletes who change their initial contact pattern to reduce injury risks during running, despite no current evidence supporting this, showing an increase in the prevalence of calf soreness<sup>14,12</sup>.

Moreover, showing healthcare providers the advantages of gait retraining protocols for street running athletes is important since a patient-centered approach that considers their preferences in clinical decision-making increases treatment adherence and improves clinical outcomes<sup>15</sup>.

This study aimed to evaluate street runners knowledge, interest, and preference for a fully or partially supervised gait retraining program and to verify whether results differ between athletes with and without history of running injury.

## METHODOLOGY

### Study design

This is a cross-sectional study following STROBE recommendations<sup>12</sup>. Informed consent forms were obtained from participants, following Resolution No. 466/2012 of the National Health Council.

### Location

Data collection was performed during the main running race in the municipality of Goiânia, Goiás, Brazil. Recruitment occurred after the event in a research booth located in the exhibition area of the venue. Inclusion criteria: (1) people of all sexes; (2) age equal to or above 18 years; and (3) event registry. Failing to answer at least one of the questions related to the main outcomes of this study was our exclusion criterion.

### Participants

A convenience sample of 100 street runners – 61 men and 39 women – was selected, with a mean age of  $34.57 \pm 9.74$  years; body mass,  $71.57 \pm 12.59$ kg; height,  $1.71 \pm 0.09$ m; and body mass index,  $24.32 \pm 2.86$ kg/m<sup>2</sup>. Most participants had been running for less than five years (64%), two to three times a week (61%), and a total of up to 10 kilometers per week (39%). Of these, 48 (48%) participants reported no history

of running-related injury, whereas 52 (52%) reported at least one injury.

### Measurements

A form elaborated by the researchers was used. It contained an explanatory text on what gait retraining was, another showing how fully or partially supervised programs would be, and specific questions to evaluate the main outcomes of this study.

Gait retraining was introduced to the participants as an intervention used to correct aspects of running that may be related to injuries<sup>12</sup>, that is performed after a detailed biomechanical assessment which shows the main points that can be changed.<sup>12</sup> The main retraining types involve the real-time correction of running technique via video analysis<sup>5-7</sup>, change in the number of steps per minute<sup>5,8-11</sup>, change in patterns of initial contact with the ground<sup>12</sup>, and impact reduction<sup>13</sup>. Retraining can be done at clinics or at home with the aid of a treadmill.

Gait retraining programs were offered as follows: the main gait retraining programs consisted of eight sessions, lasting from 15 to 30 minutes, held over two weeks. In the fully supervised program, all sessions were supervised at the clinic<sup>5-7,12,13</sup>, whereas in the partially supervised program, two supervised sessions were performed at the clinic and six non-supervised sessions, at home<sup>16</sup> (Chart 1).

After reading the explanatory texts, participants answered questions on gait retraining program knowledge (yes or no), interest (yes or no), and preference (fully or partially supervised).

Chart 1. Gait retraining protocol with eight sessions held in two weeks

Fully supervised protocol				
Week	Day	Feedback time (minutes)	Total training time (minutes)	Type of training
1	1	15	15	Supervised
	2	18	18	
	3	21	21	
	4	24	24	
2	5	21	27	Supervised
	6	15	30	
	7	9	30	
	8	3	30	
Partially supervised protocol				
Week	Day	Feedback time (minutes)	Total training time (minutes)	Type of training
1	1	15	15	Supervised
	2	18	18	Unsupervised
	3	21	21	
	4	24	24	

(continues)

Chart 1. Continuation

Partially supervised protocol				
Week	Day	Feedback time (minutes)	Total training time (minutes)	Type of training
2	5	21	27	Supervised
	6	15	30	Unsupervised
	7	9	30	
	8	3	30	

Source: The authors.

## Bias

To avoid measurement biases, the self-explanatory texts were elaborated in accessible language. Nevertheless, we believe sampling bias may be present since the recruiting booth was in an area in which sports massages and recovery equipment were offered and were thus more likely to select individuals with history of injury.

## Margin of error

The margin of error of this study was estimated using official registrant numbers, which were disclosed only after the event. Via the Raosoft® sample size calculator with a 95% confidence level, 50% response distribution, 3,679 enrolled individuals, and a 100-participant sample, a 9.7% margin of error was obtained.

## Statistical analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS), version 23.0. Primary outcomes were described as frequencies and percentages. The comparison between runners with and without history of injury was made by the chi-square test with a significance level set at  $p < 0.05$ . Retraining effect was

estimated by the phi coefficient, considered large when values were close to 0.8; moderate, when close to 0.5; and small, when close to 0.2<sup>17</sup>. In the absence of data, these were omitted.

## RESULTS

We found that most participants were unaware of gait retraining programs but showed great interest in performing the procedure after reading our explanatory texts. Participants showed no preference for a fully or partially supervised gait retraining protocol, with a 3.6% difference between them and a 9.7% margin of error.

By comparing participants with and without history of injury, we found a statistical difference on their knowledge of gait retraining programs ( $\chi^2=4.74$ ,  $p=0.029$ ,  $\phi=0.22$ ), in which participants with history of injury showed a higher prevalence of knowing this modality. However, the small effect observed shows that this difference is irrelevant for clinical practice. We found no statistical differences when comparing participants with and without history of injury in terms of interest ( $\chi^2=0.04$ ,  $p=0.842$ ,  $\phi=0.02$ ) and preference ( $\chi^2=1.04$ ,  $p=0.308$ ,  $\phi=0.11$ ) for fully or partially supervised gait retraining programs (Table 1).

Table 1. Absolute (n) and relative frequency data (%) on knowledge, interest, and preference about gait retraining programs in the comparison between participants with and without history of injury

	General	No injury	Injured	p	phi
Knowledge					
Yes	29 (30.2%)	9 (19.6%)	20 (40%)	0.029*	0.22
No	67 (69.8%)	37 (80.4%)	30 (60%)		
Interest					
Yes	81 (87.1%)	38 (86.4%)	43 (87.8%)	0.842	0.02
No	12 (12.9%)	6 (13.6%)	6 (12.2%)		
Preference					
Fully supervised	40 (48.2%)	16 (42.1%)	24 (53.3%)	0.308	0.11
Partially supervised	43 (51.8%)	22 (57.9%)	21 (46.7%)		

Chi-square test. \*Significance level:  $p < 0.05$ . Value of phi coefficient: 0.2=small; 0.5=moderate; 0.8=large.  
Source: The authors.

## DISCUSSION

As expected, most runners had no prior knowledge of gait retraining. Additionally, athletes with history of injury have more knowledge of the modality but this difference is clinically irrelevant. These results show the need for greater dissemination of quality information for this population. A recent study showed that the number of tweets and Facebook posts were more strongly related to the number of sports article citations than to measures considered important as an impact factor. Thus, the literature suggests the use of such platforms as a strategy to increase the number of citations and disseminate quality content to the general public<sup>18</sup>.

Despite their lack of knowledge of gait retraining, participants showed great interest in its performance and no preference regarding the offered protocols, regardless of history of injury. Studies conducted with different populations suggest that treatment results are directly influenced by adherence<sup>19,20</sup>, which is associated with aspects related to patients, health condition, and treatment<sup>21</sup>. Considering that interest and preference are part of the aspects influencing treatment adherence, we recommend that therapists who identified the need for gait retraining offer the protocols used in this study.

On preference, we believed that athletes would choose the partially supervised program due to the time and costs involved in going to the clinic for visits. However, we observed that many athletes considered supervision a fundamental part of treatment. Another study found that five weeks of unsupervised training were insufficient to maintain the gains in physical fitness among sedentary people who participated in a five-month supervised training. Improper training was inadequately associated with lack of motivation and inability to train independently<sup>22</sup>. From this perspective, we believe that behavioral aspects can justify most athletes' choice for the supervised program.

Based on these results, and previous studies showing high retention rates<sup>5,6,8,10-12,23</sup>, positive effects on pain<sup>5-8,10,11,23</sup> and function<sup>5-7,10,23</sup>, and few adverse effects<sup>8,10,11</sup>, we suggest the use of gait retraining to minimize risks and treat possible running-related musculoskeletal injuries. Along with the results and clinical contributions of this study, it is also important to show its limitations. Knowledge, interest, and preference for retraining programs were evaluated by dichotomous responses to facilitate information collection. Thus,

a specific questionnaire assessing different modalities may provide a richer overview of this intervention. As for future perspectives, we suggest that studies be conducted to investigate the mechanisms involved in gait retraining and compare this modality with other types of intervention.

## CONCLUSION

Despite increasing available evidence on gait retraining, we found that most runners lacked previous knowledge of the subject. However, since participants showed great interest on the matter and had no preference for a supervised or partially supervised program, we suggest that the healthcare providers treating running-related musculoskeletal injuries show the protocols described to patients. Runners with history of injury had greater knowledge about this modality, but this difference was irrelevant for clinical practice.

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