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DIET, SUPPLEMENTATION, PERFORMANCE, AND SUBJECTIVE EXPERIENCE IN MARATHON RUNNERS

DIETA, SUPLEMENTAÇÃO, DESEMPENHO E EXPERIÊNCIA SUBJETIVA EM CORREDORES DE MARATONA

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ABSTRACT

Background: Nutrition strategies may influence marathon performance and runners' subjective experience. **Aims**: To evaluate the association between dietary habits, supplement use, performance, and subjective experience in runners of the 2025 Mendoza International Marathon. **Methods**: A survey of 240 runners from the 2025 Mendoza International Marathon examined dietary habits, supplement use, performance, and subjective experience. **Results**: Nutritional counseling was linked to more favorable perceptions. Conversely, pre-race alcohol and excessive carbohydrates with poor hydration increased gastrointestinal complaints. Supplements showed no measurable performance or well-being benefits. **Discussions**: These findings suggest that pre-race nutritional behaviors may have a greater influence on runners' subjective experience than supplement use.**Conclusions**: Nutritional guidance may improve race experience, whereas poor pre-race practices increase gastrointestinal complaints.

Keywords: *hydration; carbohydrates; alcohol; gastrointestinal symptoms; nutritional counseling*

ABSTRACT second language

Introdução: As estratégias nutricionais podem influenciar o desempenho em maratonas e a experiência subjetiva dos corredores. **Objetivo**: Avaliar a associação entre hábitos alimentares, uso de suplementos, desempenho e experiência subjetiva em corredores da Maratona Internacional de Mendoza 2025. **Métodos**: Um levantamento com 240 corredores da Maratona Internacional de Mendoza 2025 investigou hábitos alimentares, uso de suplementos, desempenho e experiência subjetiva. **Resultados**: O acompanhamento nutricional esteve associado a percepções mais favoráveis. Em contrapartida, o consumo de álcool antes da prova e a ingestão excessiva de carboidratos associada à hidratação inadequada aumentaram as queixas gastrointestinais. Os suplementos não apresentaram benefícios mensuráveis sobre o desempenho ou o bem-estar. **Discussão**: Esses achados sugerem que os comportamentos nutricionais adotados antes da prova podem exercer maior influência sobre a experiência subjetiva dos corredores do que o uso de suplementos. **Conclusões**: A orientação nutricional pode melhorar a experiência durante a prova, enquanto práticas nutricionais inadequadas no período pré-competitivo aumentam as queixas gastrointestinais.

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1. INTRODUCTION

Participation in marathons and long-distance races has increased in recent years, encompassing both professional and amateur athletes. An appropriate nutritional strategy is essential to optimize performance, prevent gastrointestinal discomfort, and promote recovery (Sutehall & Pitsiladis, 2025). However, many runners design their own plans without professional guidance, raising questions about the effectiveness and safety of their dietary and supplementation practices. Previous studies have indicated that carbohydrate and fluid intake during prolonged exercise directly influence performance and the subjective perception of effort, whereas inadequate consumption may lead to adverse gastrointestinal and muscular symptoms (Alvero-Cruz et al., 2020; Braschler et al., 2025).

Beyond objective performance outcomes, subjective responses during endurance events have gained increasing attention in sports science. Constructs such as perceived exertion and affective responses reflect how athletes experience exercise and have been associated with pacing strategies, exercise tolerance, and overall performance during endurance competitions (Billat et al., 2022; Torres et al., 2025). Furthermore, affective responses, defined as the feelings of pleasure or displeasure experienced during exercise, are increasingly recognized as relevant components of the athlete's overall exercise experience and may influence perceptions of performance and future engagement in endurance sports (Ekkekakis, 2021).

In this context, the present study aimed to evaluate the association between dietary habits, supplement use, performance, and subjective experience in runners of the 2025 Mendoza International Marathon.

2. MATERIALS AND METHODS

An observational, cross-sectional, and analytical study was conducted among 240 participants of the 2025 Mendoza International Marathon (34.6 ± 9.3 years; range: 18–65 years). Data collection took place at the beginning and end of the event through an anonymous, voluntary, and self-administered online survey (Google Forms). The pre-race survey was available from one hour before the race start, while participants were instructed to complete the post-race survey within one hour of crossing the finish line; compliance was verified using the timestamp of each survey submission. The survey included questions regarding:

- Performance: total running time and distance completed.
- Dietary habits: type and timing of food intake before, during, and after the race; breakfast timing; total water consumption.
- Supplementation: individual or combined use of creatine, magnesium, and collagen.
- Other factors: alcohol intake within 24 hours prior to the competition and professional nutritional counseling.
- Subjective experience: self-reported perception before, during, and after the marathon, rated on a 1-to-10 Likert scale.

Information on food and beverage intake was converted into grams of macronutrients or mL of water using United States Department of Agriculture (USDA) food composition tables. Continuous variables were described as mean and standard deviation, while categorical variables were expressed as frequencies and percentages. Group comparisons were performed using Student's t-test and one-way ANOVA, or the Mann–Whitney U and Kruskal–Wallis tests, depending on variable normality. A p-value < 0.05 was considered statistically significant. Data processing was performed using GraphPad Prism, version 8.0.1.

As the study involved an anonymous survey without collection of sensitive data, formal informed consent was not required. Nonetheless, confidentiality was ensured, and the principles of the Declaration of Helsinki were upheld.

3. RESULTS AND DISCUSSION

3.1. Results

Guidance and alcohol intake influence the subjective experience

Previous nutritional guidance and alcohol intake were assessed because both factors may influence participants' subjective perception of the event and their performance. Runners who received professional guidance reported a better subjective experience (8.9 ± 1.4 points) at the beginning of the competition compared with those who did not (7.2 ± 1.7), as seen in Table 1 and

Figure 1 (upper). Alcohol consumption within the previous 24 hours was associated with a poorer subjective perception of performance across all stages (7.8 ± 1.5 vs. 8.5 ± 1.2 on average).

Carbohydrate intake

Adequate carbohydrate consumption is a key component of post-exercise recovery and glycogen replenishment. High carbohydrate intake during the race (>58 g/h or 2.5 g/km) was associated with a higher incidence of gastrointestinal discomfort in the 42 km participants (Table 1 central; red tones in Figure 1, below left). In these cases, according to further inquiries, the carbohydrate intake came from foods brought by the runners themselves, such as quince paste, potato chips and candies, instead of the sports drinks and gels provided in the race.

Water intake

Water intake was examined because fluid replacement during and after endurance exercise is necessary to compensate for sweat losses and promote recovery. In this regard, lower water intake was also associated with digestive events in both 21 km and 42 km events, and with fatigue in 10 km runners (Table 1 below; red tones in Figure 1, bottom right).

Breakfast timing, water intake, and the individual or combined use of creatine, collagen, and/or magnesium were not associated with improvements in performance or subjective experience. Except for water consumption, these variables were also not associated with the onset of discomfort during the race.

3.2. Discussions

This study provides evidence on the influence of nutritional strategies among amateur middle- and long-distance runners. Our findings show that professional guidance is associated with a better subjective experience during the marathon, consistent with previous reports emphasizing the relevance of an individualized nutritional plan to optimize both performance and perceived exertion (Alvero-Cruz et al., 2020).

In contrast, alcohol consumption within 24 hours before the event was linked to a poorer overall perception of the competition. These results are supported by literature describing the negative effects of alcohol on hydration, neuromuscular function, thermoregulation and recovery, which may directly impact athletic performance (Vella & Cameron-Smith, 2010; Lakićević, 2019).

Another relevant finding was that low water intake increased the incidence of gastrointestinal symptoms among runners in the 21 km and 42 km races. Among marathon runners, high carbohydrate intake coincided with low water consumption, aligning with reviews indicating that excessive carbohydrate intake, without an adequate hydration strategy, increases the risk of gastrointestinal distress during prolonged endurance events (de Oliveira & Burini, 2009). Exercise-associated gastrointestinal symptoms are currently recognized as multifactorial phenomena involving dehydration, reduced splanchnic blood flow, altered gastrointestinal motility, carbohydrate malabsorption, and exercise-induced physiological stress. These mechanisms have been described within the framework of exercise-induced gastrointestinal syndrome, which may compromise gastrointestinal integrity and contribute to symptom development during endurance events (Costa et al., 2025). Furthermore, repeated exposure to race-day nutritional strategies, commonly referred to as “gut training”, has been proposed as an effective approach to improve carbohydrate tolerance and reduce gastrointestinal discomfort during prolonged exercise (Martinez et al., 2023). Therefore, the gastrointestinal complaints observed in our participants were likely influenced not only by carbohydrate intake and hydration status, but also by individual adaptation to nutritional practices during competition. These findings are consistent with recent evidence highlighting the importance of appropriate carbohydrate-feeding strategies and gastrointestinal adaptation in reducing exercise-associated gastrointestinal symptoms among endurance athletes (Montero-Carrasco et al., 2024). Likewise, lower water intake was associated with early fatigue at 10 km runners, consistent with classical studies showing that even modest levels of dehydration (~2 % of body weight) significantly impair performance in distance running (Armstrong et al., 1985).

Conversely, neither breakfast timing nor supplementation with creatine, magnesium, or collagen was associated with significant differences in performance or subjective experience. This lack of association agrees with studies showing that, in individuals with adequate intake, magnesium supplementation does not enhance performance (Zhang et al., 2017). However, recent research suggests that supplemental magnesium may play a role in preventing cramps and supporting muscle recovery, particularly in physically active individuals (Tarsitano et al., 2024) or those with

inadequate dietary intake (Dominguez et al., 2025). Other studies have found several associations between running performance and pre, during and/or post-race intake of several nutrients, including caffeine, carbohydrates and protein (Jiménez-Alfageme et al., 2025).

Among the strengths of the present study are the sample size and the evaluation of multiple factors within the context of an actual competition, which enhances the applied relevance of the findings. Nevertheless, a limitation to note is that the data were obtained through self-administered surveys, which may introduce recall and reporting bias and do not allow for objective verification of the analyzed variables.

Overall, the results of this study highlight the importance of professional nutritional guidance and appropriate hydration and carbohydrate strategies to increase knowledge (Chen et al., 2025), optimize performance and reduce discomfort among amateur marathon runners, providing local evidence to a field still scarcely explored in South American populations.

4. CONCLUSIONS

Appropriate nutritional guidance is essential for improving the subjective experience during competition. In addition, it may help prevent gastrointestinal discomfort and cramps associated with high carbohydrate intake. Finally, the role of the nutritionist is crucial in planning the conscious and effective use of supplements for those who truly need them.

5. DECLARATIONS

5.1. Study Limitations

Self-reported answers can be understood as limitations, as memory bias and subjective interpretations are present.

5.2. Acknowledgements

The authors would like to thank the running groups that participated in this research.

5.3. Funding source

This research was funded by the authors.

5.4. Competing Interests

The authors declare that they have no conflicts of interest.

5.5. Open Access

6. HUMAN AND ANIMAL-RELATED STUDIES

6.1. Ethical Approval

This study required no ethical approval since it included anonymous data.

6.2. Informed Consent

Participants provided consent prior to answering the survey.

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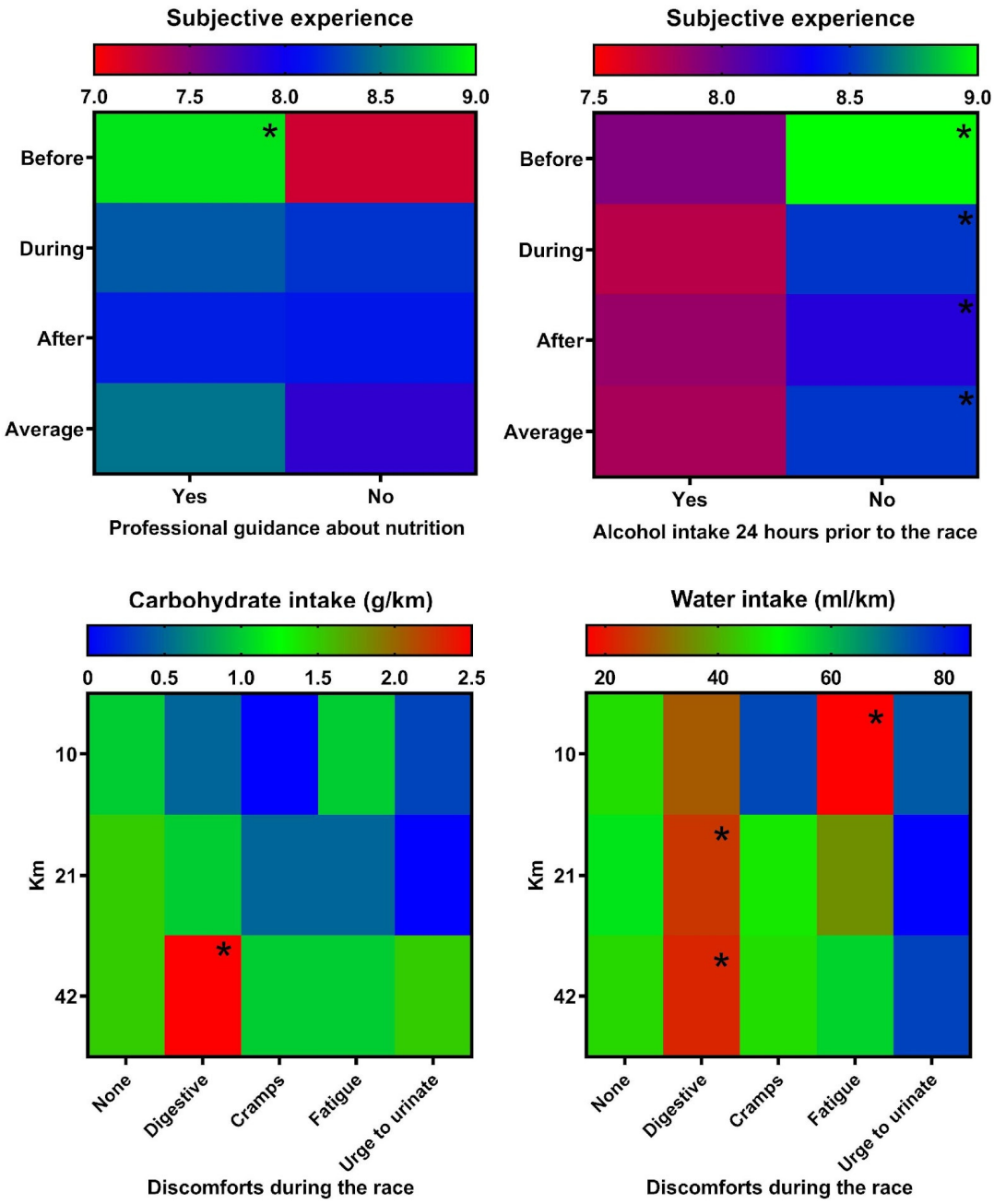

Figure 1. *Subjective experience and intake of water and carbohydrates related to professional guidance, alcohol intake and discomforts during the race. Significant differences indicated with asterisks. Source: the authors*

Table 1. *Subjective experience and intake of water and carbohydrates related to professional guidance, alcohol intake and discomforts during the race. Source: the authors*

Subjective experience				
Moment	**Before**	**During**	**After**	**Average**
Guidance				
● **Yes**	8.9 ± 1.4*	8.4 ± 1.2	8.2 ± 1.3	8.5 ± 1.3
● **No**	7.2 ± 1.7*	8.4 ± 1.4	8.1 ± 1.5	7.9 ± 1.5
Alcohol				
● **Yes**	7.9 ± 1.5*	7.7 ± 1.4*	7.9 ± 1.6*	7.8 ± 1.5*
● **No**	9.0 ± 1.1*	8.5 ± 1.5*	8.2 ± 1.4*	8.5 ± 1.2*
Carbohydrate intake (g/km)				
Distance	**10 km**	**21 km**	**42 km**	
Discomfort				
● **None**	1.0 ± 0.5	1.5 ± 0.7	1.5 ± 0.5	
● **Digestive**	0.5 ± 0.2	1.0 ± 0.2	2.5 ± 0.6*	
● **Cramps**	0.1 ± 0.2	0.5 ± 0.2	1.0 ± 0.2	
● **Fatigue**	1.0 ± 0.3	0.5 ± 0.1	1.0 ± 0.3	
● **Urge to urinate**	0.3 ± 0.1	0.0 ± 0.0	0.5 ± 0.1	
Water intake (ml/km)				
Distance	**10 km**	**21 km**	**42 km**	
Discomfort				
● **None**	46.0 ± 15.2	54.1 ± 11.1	45.4 ± 16.7	
● **Digestive**	28.6 ± 8.9	23.8 ± 10.5*	21.7 ± 7.5*	
● **Cramps**	75.0 ± 13.5	47.6 ± 12.3	46.3 ± 11.7	
● **Fatigue**	16.7* ± 3.5	35.7 ± 4.9	56.5 ± 5.5	
● **Urge to urinate**	72.5 ± 12.5	84.6 ± 20.1	75.7 ± 15.4	
Significant differences indicated with asterisks.				