ANNALES ACADEMIAE MEDICAE SILESIENSIS

ACCEPTED MANUSCRIPT

Ann. Acad. Med. Siles. (Online) 2026; DOI: 10.18794/aams/220583

Original paper

Health behaviors and their determinants among marathon and ultramarathon runners: A cross-sectional study

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Received: 25.02.2026, Revised: 18.03.2026, Accepted: 12.04.2026, Published: June 2026

Publisher: Medical University of Silesia, Katowice, Poland

ABSTRACT

Introduction: Health behaviors are essential for disease prevention in endurance sports. This study was to evaluate the level of health behaviors among marathon and ultramarathon runners and examined associations with sociodemographic, training, health, psychological, and motivational factors to determine independent predictors of health-promoting behaviors

Material and methods: A study was conducted among 1,432 long-distance runners participating in marathon and ultramarathon events in Poland. The final sample included 786 marathon runners and 646 ultramarathon runners, aged 18–73 years (40.1 ± 11.3 years). The study group comprised 367 women and 1,065 men. Data were collected using an original questionnaire and the standardized Health Behavior Inventory (HBI).

Results: Most participants had completed 2–10 marathons (60.21%), with men showing better performance ($p < 0.00001$) and more frequent ultramarathon participation ($p = 0.018$). Pain during training was common (81.42%), and over half continued training despite symptoms. A moderate level of health behaviors predominated, with no differences between marathon and ultramarathon runners ($p = 0.61$), but higher levels in men ($p = 0.004$). In multivariable analysis, ultramarathon participation was not an independent predictor ($p = 0.212$), while higher HBI scores were associated with mental condition ($p < 0.001$), stress coping ($p = 0.040$), and health motivation ($p < 0.001$); male sex was associated with lower HBI ($p = 0.003$).

Conclusions: Long-distance running does not automatically correspond to a high level of health-promoting behaviors. Despite positive self-rated health, the high prevalence of pain and continued training despite symptoms highlight the need for targeted educational strategies focusing on recovery management and on mental well-being, self-regulation, and health-oriented motivation.

KEYWORDS

marathon, ultramarathon, physical activity, health behaviors, predictors

INTRODUCTION

Long-distance running has been increasingly undertaken by runners in recent years. Ultramarathons pose both physical and mental challenges, leading to specific health consequences, and participants may appear to present distinctive clinical characteristics [1]. Completing a marathon distance is the result of long-term and well-structured preparation, including appropriately planned physical training and effective recovery strategies [2]. Errors made during the preparatory phase – such as excessive training load, inadequate balance between exercise and recovery, or failure to adjust training intensity to individual capacity – may lead to

musculoskeletal injuries and discouragement from further participation in physical activity [3,4,5,6]. Therefore, a comprehensive approach to the training process is essential, encompassing not only the development of endurance but also the maintenance of both physical and mental health. Such lifestyle-related actions are commonly referred to as health behaviors [7,8,9,10]. Regardless of the definition adopted, they play a crucial role in disease prevention and include actions undertaken by individuals to maintain or improve health, prevent disease, and manage existing health conditions [7].

Among long-distance runners, including marathon and ultramarathon athletes, health behaviors play a particularly important role in both sports performance and injury prevention [11]. Because ultramarathon runners train and compete over longer distances, a higher incidence of injuries in this group might be expected. However, studies conducted by American researchers have not demonstrated differences between long- and short-distance runners, indicating similarities in the prevalence of stress fractures, sleep quality, and attempts to modify body weight to improve performance [1,12]. As noted by Hoffman and Krouse [13], long-distance runners are often characterized by high levels of intrinsic motivation and a strong achievement orientation, which may promote the continuation of physical activity despite awareness of potential negative health consequences, thereby increasing the risk of injury. In this context, running-related musculoskeletal injuries are defined as pain localized in the lower extremities occurring during training or competition that results in the need to reduce or discontinue running activity. This includes situations in which the athlete must decrease training volume, distance, intensity, speed, or frequency for at least one week, or miss three consecutive scheduled training sessions [14].

Although several studies have already described differences between runners competing at different race distances, including training patterns, health status [2,15], and motivational profiles, less is known about which factors independently explain variability in health-promoting behaviors among long-distance runners. However, despite the growing interest in long-distance running, it remains unclear whether participation in marathon and ultramarathon events is associated with a higher level of overall health behaviors. Previous literature suggests that race distance alone may not be sufficient to explain health-related lifestyle patterns, as behavioral and psychological factors [16,17], such as motivation, self-perceived health, and mental well-being, also contribute to how runners function in everyday life [18,19]. Furthermore, there is a lack of studies using the Health Behavior Inventory (HBI); therefore, the authors aimed to fill this gap.

Accordingly, the present study was designed not only to compare marathon and ultramarathon runners, but also to identify the independent sociodemographic, training-related, health-related, psychological, and motivational correlates of health behaviors in this population.

The findings may provide a basis for the development of targeted health-promotion and preventive strategies tailored to different age and social groups of runners. Further research in this area is warranted, particularly focusing on the long-term effects of various forms of physical activity-both competitive and recreational-on health behaviors.

MATERIAL AND METHODS

Participants

The study included long-distance runners participating in marathons held in Poland between 2021 and 2024. Data were collected through direct contact with participants following marathon and ultramarathon events using self-administered questionnaires distributed to 2,550 runners aged over 18 years. Age and completion of a marathon or ultramarathon constituted the primary inclusion criteria. A total of 1,566 completed questionnaire sets were returned. The flow diagram is presented below.

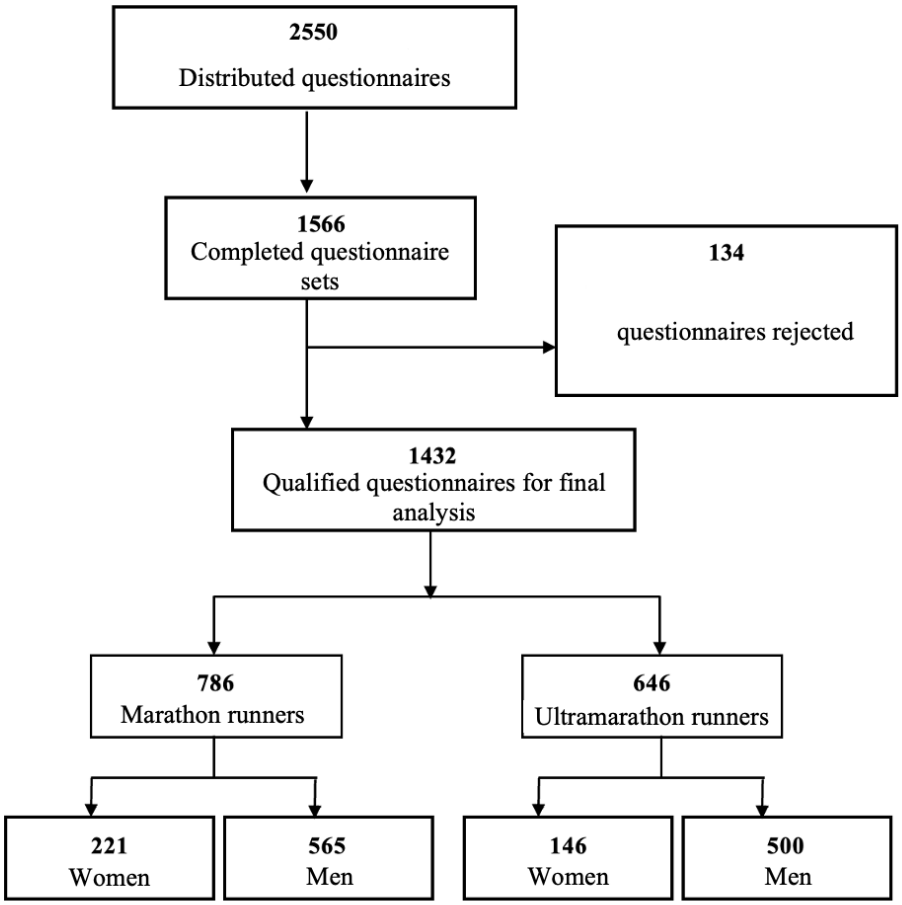

Fig. 1. Flow diagram of participant selection

A total of 1,432 fully completed questionnaires were included in the final analysis, comprising 786 marathon runners (Group I) and 646 ultramarathon runners (Group II). The study population

consisted of 367 women aged 20 to 60 years (mean ± SD: 40.75 ± 10.94) and 1,065 men aged 18 to 73 years (mean ± SD: 39.90 ± 11.51). A detailed sociodemographic and training-related characteristics of the participants are presented in Table I.

Table I. Age, body height, body mass, and BMI in the studied groups

Group	Sex	Variable	X	SD	Me	Min	Max
I	Women (n = 221)	Age (year)	39.43	11.34	38.00	20.00	60.00
		Height (cm)	166.18	9.40	166.00	150.00	182.00
		Weight (kg)	61.26	8.65	61.00	47.00	85.00
		BMI	22.44	4.21	22.28	14.79	36.40
	Men (n = 565)	Age (year)	39.56	11.53	40.00	20,.0	73.00
		Height (cm)	180.41	11.26	181.00	160.00	200.00
		Weight (kg)	78.32	10.62	78.00	55.00	105.00
		BMI	24.31	4,33	24,00	14,14	38,67
II	Women (n = 146)	Age (year)	42.75	10.00	44.50	20.00	60.00
		Height (cm)	165.79	9.51	166.00	150.00	182.00
		Weight (kg)	61.70	8.52	61.50	47.00	83.00
		BMI	22.67	4.14	22.22	14.81	35.49
	Men (n = 500)	Age (year)	40.27	11.48	41.00	18.00	69.00
		Height (cm)	179.95	11.48	180.00	160.00	200.00
		Weight (kg)	77.66	10.72	78.00	55.00	108.00
		BMI	24.28	4.64	23.84	14.25	39.84

X – mean; SD – standard deviation; Me – median; Min – minimum value; Max – maximum value; I – marathon runners; II – ultramarathon runners; BMI – body mass index

The studied groups did not differ in terms of age ($Z = -1.269$; $p = 0.204$); however, as expected, they differed significantly in body height, body mass, and BMI (all $p < 0.00001$). The majority of participants had higher education (72.28%), while the smallest proportions had primary and vocational education (1.05% and 5.52%, respectively). The least numerous group comprised rural residents (15.43%), whereas the remaining participants lived in urban areas, most commonly in cities with populations exceeding 100,000 inhabitants (44.97%).

The recruitment procedure

The study was conducted between 2020 and 2024. Participants were recruited in person during four mass running events (marathons and ultramarathons) organized in Poland. Questionnaires

were distributed directly to runners in the start and finish areas, as well as at race offices. Adult individuals who voluntarily agreed to participate in the study were invited to take part. Additionally, the questionnaire was distributed online to running clubs across Poland and on internet forums dedicated to runners. A convenience sampling method was applied, involving the inclusion of individuals available at the time and place of data collection.

A total of 2,550 runners were invited to participate in the study, of whom 1,566 correctly completed the questionnaire, yielding a response rate of 61.4%.

The study was anonymous and voluntary. Participants were informed about the purpose of the study and their right to withdraw at any stage without providing a reason. Completion of the questionnaire was considered as providing informed consent to participate in the study. The study obtained approval from the Bioethics Committee of the Medical University of Silesia in Katowice (No. PCN/0022/KB/226/20; date: 28 January 2021).

The questionnaires

The study was conducted as a diagnostic survey. Data were collected using questionnaire-based research tools. One instrument was an original questionnaire developed by the authors, consisting of both closed-ended questions (single- and multiple-choice) and open-ended questions allowing respondents to provide free-text answers. The questionnaire was divided into three sections: the first concerned running training characteristics, the second addressed self-rated health, and the third focused on diet and supplementation. For the purposes of the present analysis, only the first two sections were included.

The second instrument was the Health Behavior Inventory (HBI) developed by Juczyński [20], a standardized tool comprising 24 statements describing specific health-related behaviors. The inventory assesses the overall intensity of health-promoting behaviors as well as four distinct categories: proper dietary habits, preventive behaviors, positive mental attitude, and health practices. Respondents evaluate the frequency of each behavior using a five-point Likert scale (1 – almost never; 5 – almost always). The total score ranges from 24 to 120 points, with higher scores indicating a greater intensity of health-promoting behaviors. The overall score is subsequently converted—taking sex into account—into sten scores: 1–4 indicates low, 5–6 average, and 7–10 high levels of health behaviors.

Statistical analysis

All collected data were integrated into a single database and analyzed using Microsoft Excel and Statistica v.13 (StatSoft). Descriptive statistics were calculated, including frequencies, percentages, means, medians, standard deviations, and minimum and maximum values. The normality of

distribution for each variable was assessed. Due to non-normal distribution patterns, nonparametric tests were applied. Group comparisons between two independent samples were performed using the Mann–Whitney U test, whereas comparisons involving more than two groups were conducted using the Kruskal–Wallis ANOVA. Relationships between variables were evaluated using Spearman's rank correlation coefficient. In addition to descriptive statistics and group comparisons, multivariable linear regression analyses were performed to identify independent correlates of health behaviors. The dependent variable in the primary model was the raw total score of the Health Behavior Inventory (HBI). Separate regression models were also constructed for the four HBI subscales: proper dietary habits, positive mental attitude, preventive behaviors, and health practices. These included sex, age, BMI, ultramarathon participation, self-rated health, self-rated mental condition, stress-coping ability, training despite injury and/or medical advice, heart-rate monitoring during training, knowledge of maximal heart rate, warm-up habits, monthly training mileage, weekly training frequency, average duration of a training session, motivation related to maintaining fitness and good health, and the number of pain complaint sites. Regression coefficients (B), standardized coefficients (β), confidence intervals (95% CI), p-values, and coefficients of determination (R^2 and adjusted R^2) were reported. The level of statistical significance was set at $p < 0.05$.

RESULTS

Analysis of participants according to marathon and ultramarathon characteristics

The largest subgroup consisted of runners who had completed 2–10 marathons (n = 861; 60.21%). Men had completed significantly more marathons than women (t = 4.755; p < 0.00001). The mean age at completion of the first marathon was 31.65 ± 9.08 years in women (range: 20–56 years) and 30.29 ± 9.01 years in men (range: 18–62 years), with statistically significant differences between groups (Z = −2.65; p = 0.008). Men achieved significantly better performance outcomes in both marathon personal best time (min) (Z = −16.32; p < 0.00001) and best running pace (m/min) (Z = 16.38; p < 0.00001).

Participation in an ultramarathon was reported by 646 individuals (45.11%), significantly more often by men than women (46.95% vs. 39.78%; p = 0.018). The mean ultramarathon distance was 95.98 ± 42.31 km, with a mean completion time of 659.04 ± 437.07 minutes and an average pace of 155.24 ± 29.36 m/min. Ultramarathon runners covered significantly greater monthly training distances compared to marathon runners (t = 11.394; p < 0.00001).

Participants trained on average 4.04 ± 1.43 times per week, with single training sessions lasting between 25 and 180 minutes (mean 81.23 ± 22.19 minutes). No differences were observed

between women and men (all $p > 0.151$) or between marathon and ultramarathon runners regarding training frequency or duration ($t = 0.636$; $p = 0.525$). Training sessions were performed with similar frequency on asphalt (including cobblestone), forest trails, and synthetic tracks.

Health status and training behaviors of the participants

Most runners rated their overall health as very good (37.71%) or good (36.73%), while only a small proportion reported poor or very poor health. Regarding mental health, good (46.58%) and very good (41.69%) ratings predominated, and the majority declared good or very good stress-coping abilities.

Completion of a marathon resulted in increased self-esteem in 68.16% of respondents and was considered a life achievement by 54.19%. However, 21.86% did not confirm a positive impact of marathon running on health, and over 60% had no opinion on this issue. Neither sex nor type of race (marathon vs. ultramarathon) significantly differentiated responses ($p > 0.05$; $Z = -0.571$; $p = 0.5618$).

The majority of participants monitored heart rate during training ($n = 1081$; 75.49%), 7.75% did so irregularly, and 16.76% did not monitor heart rate at all. Ultramarathon runners monitored heart rate significantly more frequently than marathon runners ($Z = -2.125$; $p = 0.003$). Most respondents (79.40%) declared awareness of their individual training heart rate zones, and 88.72% reported maintaining heart rate within the range of 133–172 beats per minute.

Pain complaints were reported by 81.42% of respondents ($n = 1166$), most commonly involving the lower extremity joints: knee (25.0%), hip (24.65%), and ankle (21.01%), as well as spinal regions: thoracic (22.84%), lumbar (21.93%), and cervical (20.88%). No significant differences were found in the prevalence of pain according to sex ($Z = 0.665$; $p = 0.506$) or type of race ($Z = -0.276$; $p = 0.782$). The mean pain intensity was 5.43 on a 10-point Visual Analogue Scale (VAS). More than half of the participants (51.33%) reported continuing training despite experiencing pain.

Annual preventive medical examinations were reported by 46.02% of respondents, whereas 28.98% underwent such examinations less frequently than every two years; no sex-related differences were observed ($\chi^2 = 0.143$; $df = 3$; $p = 0.986$).

Health behaviors according to the Health Behavior Inventory

Overall, a high level of health-promoting behaviors was observed in 400 runners (27.95%), whereas only 4.33% presented a low level (Table II).

Table II. Sten norms of the Health Behavior Inventory (HBI)

Sten	Marathon runners (n=786)			Ultramarathon runners (n=646)		
	Women N (%)	Men N (%)	Total N (%)	Women N (%)	Men N (%)	Total N (%)
1	-	-	-	-	1 (0.15)	1 (0.15)
2	-	-	-	-	-	-
3	2 (0.25)	4 (0.51)	6 (0.76)	3 (0.46)	7 (1)	10 (1.46)
4	24 (3)	6 (0.76)	30 (3.76)	14 (2)	14 (2)	28 (4)
5	81 (10)	84 (11)	165 (21)	58 (9)	80 (12)	138 (21)
6	78 (10)	292 (37)	370 (47)	50 (8)	234 (36)	284 (44)
7	30 (4)	154 (20)	184 (25)	17 (3)	141 (22)	158 (25)
8	4 (1)	21 (3)	25 (4)	3 (0.46)	20 (3)	23 (3.46)
9	2 (0.25)	3 (1)	5 (1.25)	1 (0.15)	2 (0.31)	3 (0.46)
10	-	1 (0.13)	1 (0.13)	-	1 (0.15)	1 (0.15)

No significant differences were observed between marathon and ultramarathon runners (p = 0.61). In both groups, the majority of participants demonstrated an average level of health behaviors (Figure 2).

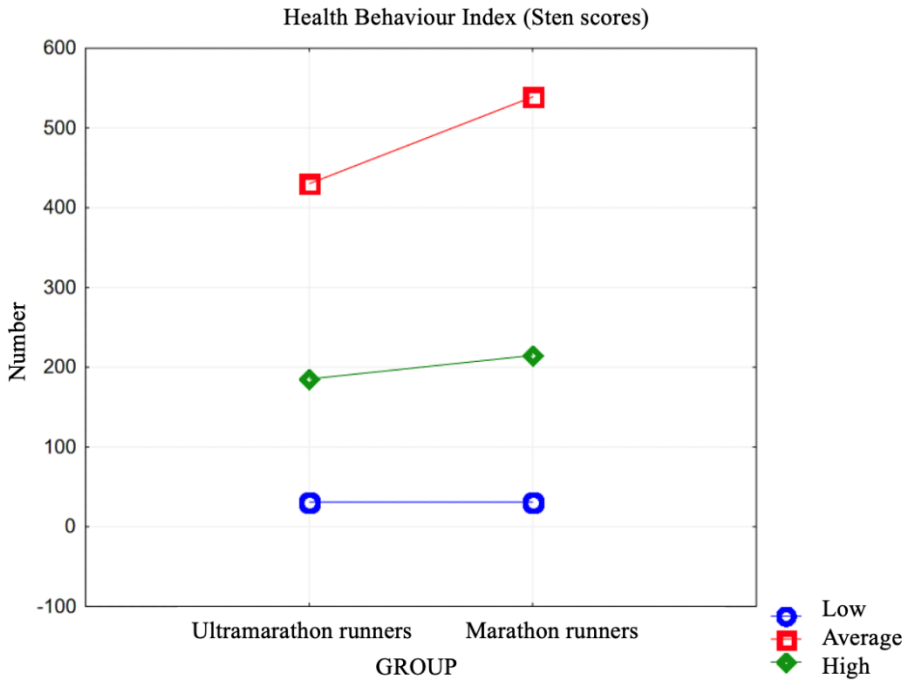

Fig. 2. Comparison between marathon and ultramarathon runners in terms of the health behavior index

Statistically significant differences were observed in the overall health behavior index. In the marathon group, men demonstrated a higher level of health-promoting behaviors compared to women (p = 0.004). A similar trend was noted in the ultramarathon group (p = 0.00001) (Figure 3). Detailed results for each group are presented in Table III.

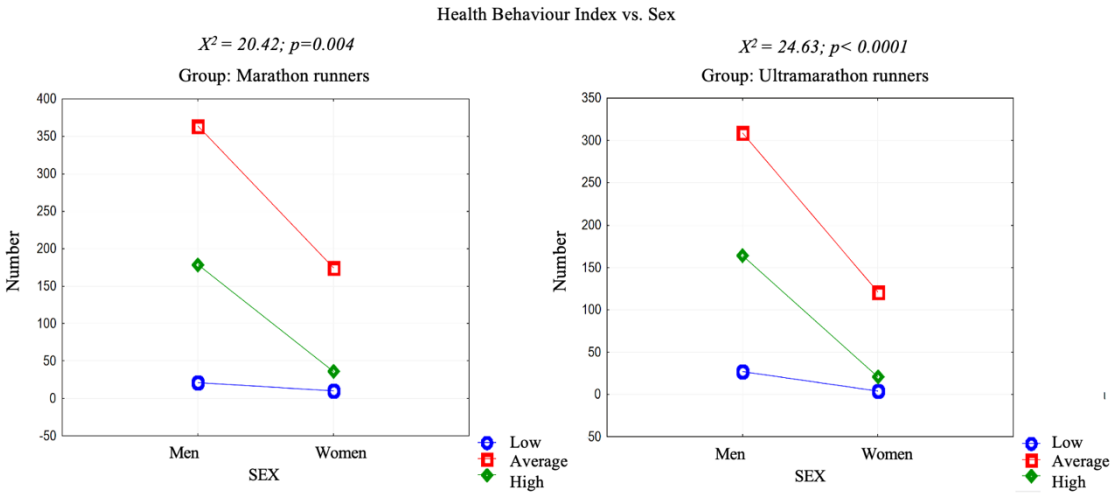

Fig. 3. Comparison of HBI sten scores between men and women: left – marathon runners; right – ultramarathon runners

Table III. Health Behavior Inventory (HBI) results by categories of health behaviors in marathon and ultramarathon runners

Group	Variable	N	X	SD	Me	Min	Max
I	**Total HBI score**	786	84.19	6.09	84.00	64.00	116.00
	HBI (sten scores)	786	6.02	0.93	6.00	3.00	10.00
	Proper dietary habits	786	3.52	0.46	3.50	2.17	5.00
	Positive mental attitude	786	3.78	0.44	3.83	2.17	4.84
	Preventive behaviors	786	3.86	0.56	3.80	2.20	6.00
	Health practices	786	3.52	0.44	3.50	2.17	5.00
II	**Total HBI score**	646	83.69	6.68	84.00	49.00	112.00
	HBI (sten scores)	646	5.98	1,.01	6.00	3.00	10.00
	Proper dietary habits	646	3.51	0.47	3.50	2.00	5.00
	Positive mental attitude	646	3.75	0.45	3.83	1.83	5.00
	Preventive behaviors	646	3.88	0.62	3.80	1.60	5,.60
	Health practices	646	3.47	0.45	3.50	2.00	4.83

X – mean; SD – standard deviation; Me – median; Min – minimum value; Max – maximum value; I – marathon runners; II – ultramarathon runners

In the marathon group, women demonstrated significantly more health-promoting behaviors in the domain of proper dietary habits ($p = 0.005$), whereas no significant sex differences were observed in the remaining health behavior categories.

Multiple comparisons revealed significant differences between individuals with primary and vocational education ($p = 0.04$). Runners with vocational education presented a higher level of health-promoting behaviors. Place of residence and marital status did not significantly differentiate the level of health behaviors. Marathon runners with an average level of health behaviors most frequently reported good (27.38%) and very good (23.56%) self-rated health, similarly to ultramarathon runners ($p > 0.05$), regardless of sex ($p = 0.74$) (Figure 4).

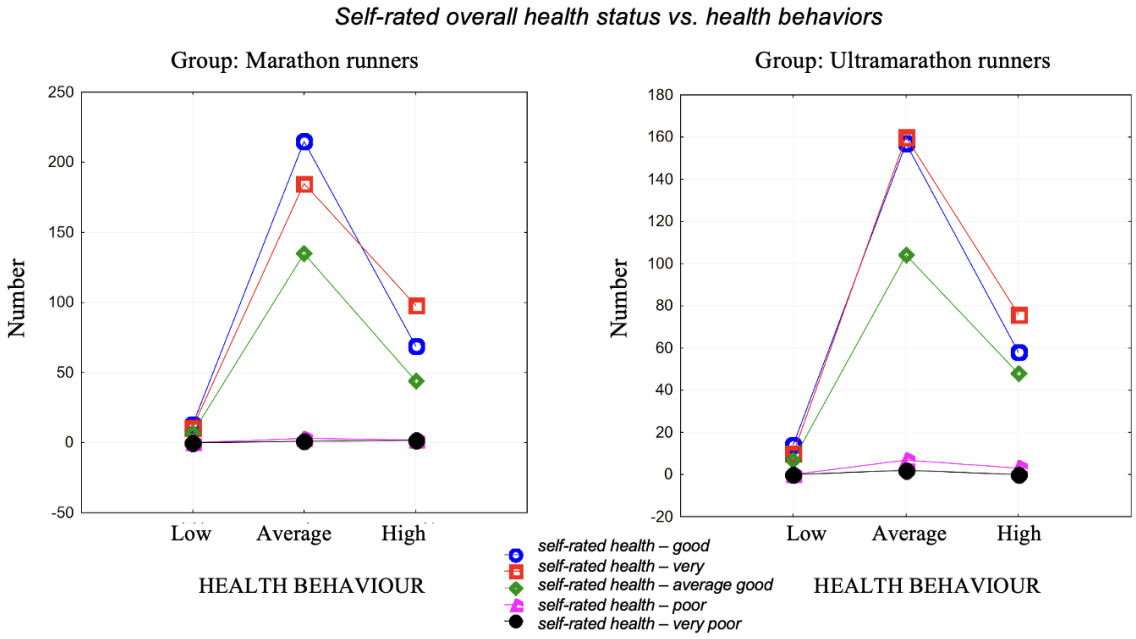

Fig. 4. Interactions between health behaviors and self-rated health status in marathon and ultramarathon runners

Independent correlates of health behaviors

To address whether race category alone explains health-promoting behaviors, a multivariable linear regression model was constructed for the raw HBI total score. The overall model was statistically significant, although the proportion of explained variance was modest ($R^2 = 0.039$; adjusted $R^2 = 0.028$), indicating the multifactorial nature of health behaviors (Table IV).

Table IV. Summary of multiple linear regression models for the total HBI score and HBI subscales

Dependent variable	R	R^2	Adjusted R^2	F	p	Std. error of estimate
Total HBI score	0.197	0.039	0.028	3.571	<0.001	6.268
Proper dietary habits	0.118	0.014	0.003	1.239	0.230	0.459
Positive mental attitude	0.165	0.027	0.016	2.481	<0.001	0.439
Preventive behaviors	0.132	0.017	0.006	1.553	0.074	0.583
Health practices	0.146	0.021	0.010	1.916	0.016	0.439

Note: Complete-case analysis was used for all models (n = 1429). The primary dependent variable was the raw total Health Behavior Inventory (HBI) score. Predictors included sociodemographic, training-related, health-related, psychological, and motivational variables external to the HBI construct.

After adjustment for the analyzed covariates, ultramarathon participation was not an independent predictor of the total HBI score. Higher HBI scores were associated with better self-rated health, better mental condition, greater stress-coping ability, and stronger health-oriented motivation. Male sex was associated with lower total HBI scores. Detailed results are presented in Table V.

Table V. Multiple linear regression model for the total HBI score

Predictors	B	SE	β	t	p	95% CI for B	
						LL	UL
Intercept	72.554	2.561		28.327	<0.001	67.530	77.578
Sex (1 = male)	-1.137	0.388	-0.078	-2.928	0.003	-1.898	-0.375
Age (years)	0.007	0.015	0.012	0.459	0.647	-0.022	0.036
BMI (kg/m²)	-0.016	0.038	-0.012	-0.434	0.664	-0.091	0.058
Ultramarathon participation (1 = yes)	-0.439	0.351	-0.034	-1.249	0.212	-1.127	0.250
Self-rated health	0.396	0.202	0.051	1.961	0.050	0.000	0.792
Self-rated mental condition	0.838	0.224	0.099	3.738	<0.001	0.398	1.277
Stress-coping ability	0.442	0.215	0.054	2.055	0.040	0.020	0.865
Pain during training (1 = yes)	-0.044	0.430	-0.003	-0.103	0.918	-0.887	0.799
Training despite injury/medical advice (1 = yes)	-0.550	0.334	-0.043	-1.648	0.100	-1.205	0.105
Heart-rate monitoring	-0.150	0.220	-0.018	-0.679	0.497	-0.582	0.282
Knowledge of HRmax (1 = yes)	-0.334	0.414	-0.021	-0.806	0.420	-1.147	0.479
Warm-up before training	0.155	0.211	0.019	0.732	0.464	-0.260	0.569

Predictors	B	SE	β	t	p	95% CI for B	
						LL	UL
Monthly training mileage (km)	0.000	0.002	-0.006	-0.228	0.820	-0.003	0.003
Training frequency (sessions/week)	0.017	0.117	0.004	0.145	0.885	-0.213	0.247
Average training duration (min)	0.008	0.008	0.028	1.064	0.288	-0.007	0.023
Motivation: fitness and good health	0.626	0.174	0.095	3.592	<0.001	0.284	0.968

B – beta; SE – standard error; β – differentiated beta; t-test coefficient; p – statistical significance of the t-test; LL – lower confidence interval; UL – upper confidence interval

In subscale-specific analyses, healthier dietary habits were positively associated with health-oriented motivation and negatively with male sex. Positive mental attitude was lower among ultramarathon participants and those training despite injury, but higher with stronger health motivation. Preventive behaviors were linked to better self-rated mental health and health motivation, while being lower in men. Health practices were positively associated with both self-rated health and mental well-being (Table VI).

Table VI. Significant predictors in multivariable models for HBI subscales

Dependent variable	Predictor	B	SE	β	t	p	95% CI	
							LL	UL
Proper dietary habits	Male sex (1 = male)	-0.062	0.028	-0.059	-2.192	0.029	-0.118	-0.007
	Motivation: fitness and good health	0.033	0.013	0.069	2.589	0.010	0.008	0.058
Positive mental attitude	Ultramarathon participation (1 = yes)	-0.054	0.025	-0.061	-2.201	0.028	-0.102	-0.006
	Training despite injury/medical advice (1 = yes)	-0.056	0.023	-0.063	-2.397	0.017	-0.102	-0.010
Positive mental attitude	Motivation: fitness and good health	0.031	0.012	0.068	2.567	0.010	0.007	0.055
Preventive behaviors	Male sex (1 = male)	-0.084	0.036	-0.063	-2.329	0.020	-0.155	-0.013
	Self-rated mental condition	0.062	0.021	0.079	2.979	0.003	0.021	0.103
	Motivation: fitness and good health	0.038	0.016	0.063	2.363	0.018	0.006	0.070
Health practices	Self-rated health	0.034	0.014	0.064	2.411	0.016	0.006	0.062
	Self-rated mental condition	0.045	0.016	0.076	2.852	0.004	0.014	0.076

B – beta; SE – standard error; β – differentiated beta; t-test coefficient; p – statistical significance of the t-test; LL – lower confidence interval; UL – upper confidence interval

DISCUSSION

The aim of the present study was to assess the level of health behaviors among marathon and ultramarathon runners and to determine their association with training characteristics, self-rated health, and the occurrence of pain complaints and to determine whether these behaviors are independently associated with selected sociodemographic, training-related, health-related, psychological, and motivational factors.

A high level of physical activity, as well as training intensity or volume, is not equivalent to a high level of health-promoting behaviors, as running for marathoners appears to serve primarily as a means of achieving psychological and social well-being rather than as a tool for maintaining health. Participation in competitions provides an opportunity for self-actualization. The fact that only about one-fifth of runners perceive marathon running as a health-promoting activity clearly indicates that health may not be the primary explicit motivation. The absence of differences between marathon and ultramarathon runners suggests that race distance and greater training volume do not determine a higher level of health-promoting lifestyle. This finding may indicate that participation in demanding long-distance events does not necessarily translate into comprehensive and conscious health care [15,21].

Additional multivariable analyses substantially extend the interpretatio of the present findings, however, the explained variance of the model was Modest. Although a simple comparison between marathon and ultramarathon runners did not reveal significant differences in the overall level of health behaviors, regression models demonstrated that race category itself was not an independent determinant of the total HBI score. Instead, health behaviors were more strongly associated with psychosocial and motivational factors, particularly self-rated mental condition, self-rated health, stress-coping ability, and health-oriented motivation. This finding is important, as it shifts the interpretation from a simple distance-based comparison toward a broader behavioral model of long-distance runners.

The present findings are supported by both recent Polish [22] and international literature, which indicates that running is associated with improved psychological well-being, reduced stress, and increased self-efficacy. At the same time, it is emphasized that the extent of these benefits largely depends on individual psychological characteristics, such as coping ability, emotional regulation, and level of motivation. This suggests that the impact of running on health is not solely a consequence of physical activity itself, but rather results from the interaction between physical exertion and psychosocial and motivational factors [23,24].

Furthermore, studies indicate that endurance runners are characterized by a specific psychological profile, including high mental resilience, effective stress-coping ability, and a well-developed sense of agency and motivation. The role of mental toughness and resilience, as highlighted by Zeiger and Zeiger [25] and Diotaiuti et al. [26], is considered a key feature of this group, enabling effective functioning under conditions of high physical and psychological load. Additionally, long-distance runners are described as demonstrating high levels of perseverance, motivation, and the ability to cope with pain, which further supports the existence of a distinct psychosocial profile in this population [27]. These factors are closely related to the adoption of health behaviors and may explain why, in the present study, psychosocial rather than training-related variables emerged as significant predictors. Consequently, the findings support a shift from a training-based interpretation toward a more complex behavioral model, in which psychological and motivational determinants play a central role.

The obtained results suggest that participation in more demanding endurance events does not automatically translate into a more health-promoting lifestyle. In other words, more advanced running does not necessarily mean healthier everyday functioning. This interpretation is consistent with previous literature indicating that race distance differentiates training and motivational profiles, but does not fully explain broader health-related functioning. Therefore, the present study adds value by identifying factors that remain associated with health behaviors after adjusting for multiple covariates.

Sex differences are noteworthy. In the present study, men demonstrated a higher overall health behavior index, which partially contrasts with population-based data indicating that women more frequently declare health-promoting behaviors [28,29,30]. At the same time, women achieved higher scores in the domain of proper dietary habits, which is consistent with the literature. A similarly inconclusive pattern of sex differences among physically active individuals was reported by Wachten et al. [31]. The present findings, in which a low level of health behaviors was observed in only a small percentage of respondents, present a more favorable profile compared with the results reported by Anyżewska and Lewczuk [32], where the proportion of individuals with low health behavior scores was considerably higher. This discrepancy may be explained by the fact that completing a marathon or ultramarathon requires a high level of commitment, regularity, and self-discipline, which may promote more frequent engagement in health-promoting behaviors

Subscale-specific analyses provide additional insights. Proper dietary habits were more strongly associated with health-oriented motivation than with training characteristics. Preventive behaviors and health practices were mainly linked to self-rated mental and general health. In contrast, a positive mental attitude was lower among runners who reported training despite injury

and/or medical advice, which may reflect a discrepancy between athletic commitment and actual health-promoting self-regulation.

A cognitive–behavioral inconsistency was also observed in the studied group. On the one hand, runners engage in health-promoting behaviors; on the other hand, they continue training despite pain or neglect recovery. This may represent a characteristic feature of endurance sports, where discomfort and overload are treated as normal, and potentially risky behaviors are perceived as a sign of commitment or even obsessive passion [33].

The present study showed that over 60% of runners would not be able to give up training, and the majority reported an increase in self-esteem after completing a marathon. Findings by Lichtenstein et al. [34] indicate that individuals with symptoms of exercise addiction are characterized by high levels of achievement striving and sensation seeking, which may hinder maintaining a balance between sport and other areas of life. Similar findings were reported in Spanish studies, where higher intrinsic motivation was associated with a greater number of injuries among long-distance runners, potentially reflecting a tendency to push personal limits and disregard overload symptoms [35]. Although a high level of training awareness should be emphasized. Such associations between long-distance running and perceived competence and psychological well-being have been previously described, demonstrating increased self-efficacy during preparation and after marathon completion [36]. This highlights the important psychosocial dimension of running, strengthening a sense of competence and agency and promoting self-actualization and positive identity changes in runners [37].

The limitations of the study include its cross-sectional design and the use of self-reported data, which is associated with the risk of reporting and recall bias. An additional limitation is the lack of a comparison group of runners covering shorter distances, although similar analyses are available in the literature. It is also possible that the reported level of health behaviors was overestimated, as data collection coincided with a period of peak athletic performance. Nevertheless, the homogeneity of the group, the large sample size, and the use of a validated instrument (HBI) provide valuable insight into health behaviors among long-distance runners. In future studies, it is recommended to complement self-reported data with objective indicators. This may include somatic measurements, training data, and activity monitoring, which would enhance the reliability of the obtained results.

CONCLUSIONS

An average level of health behaviors predominates among marathon and ultramarathon runners, regardless of race distance, indicating that participation in long-distance running does not

automatically translate into a higher level of health-promoting lifestyle. Health-promoting behaviors appeared to be more strongly associated with psychosocial and motivational factors than with ultramarathon participation itself. Better self-rated mental condition, better self-rated health, greater stress-coping ability, and stronger health-oriented motivation were associated with higher levels of health behaviors.

The findings highlight the need to intensify educational and preventive interventions aimed not only at training optimization but also at effective recovery management and early response to overload symptoms and on mental well-being, self-regulation, and health-oriented motivation.

Acknowledgements

The authors thank all people who participated in this investigations.

Conflict of interest

The authors declare no conflicts of interest.

Use of AI tools statement

ChatGPT (GPT-5.5; OpenAI) was used for vocabulary correction in the English translation and to format the references according to the Vancouver citation style.

Authors' contribution

Study design – G. Marsik, A. Brzęk

Data collection – G. Marsik

Data interpretation – G. Marsik, J. Sołtys, M. Gruszczyńska, A. Knapik, A. Brzęk

Statistical analysis – G. Marsik, J. Sołtys, A. Brzęk

Manuscript preparation – G. Marsik, A. Knapik, J. Sołtys, M. Gruszczyńska, M. Jochemczak, A. Brzęk

Literature research – G. Marsik, M. Gruszczyńska, M. Jochemczak, J. Sołtys, A. Brzęk

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