

Participation trends and performance analysis of Turkey's long-distance runs between 2007–2017

Authors' Contribution:

- A Study Design
- B Data Collection
- C Statistical Analysis
- D Data Interpretation
- E Manuscript Preparation
- F Literature Search
- G Funds Collection

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abstract

Background: Long-distance running events have gained more popularity worldwide over years. However, the number of participants to such events, age and sex distribution of participants may vary by country.

Material and methods: We have investigated participation trends and performances of the finishers of three different courses (15km, half-marathon, marathon) in two of the biggest running events in Turkey (the Antalya and Istanbul marathons) between 2007-2017.

Results: Our results have shown that runners who completed the 15km course were the highest and marathon finishers were the lowest in number each year. Among native runners, male participation in each distance and event is higher than female participation. Native female marathon finishers increased only by 0.23% in 6 years. In all distances, women run at a lower average speed than men each year. Between 2007-2017, the mean average speed of women were 9.10km/h (± 0.18), 9.71km/h (± 1.62) and 9.72km/h (± 1.73) and the mean average speed of men were 10.45km/h (± 2.02), 10.89km/h (± 1.83) and 10.40km/h (± 1.80) at 15km, 21km and 42km respectively.

Conclusions: An important sex gap was observed in participation in long-distance runs in Turkey, which is more pronounced in marathons. Performance analysis showed that females' mean average speed is lower than males' in all distances.

Key words: long-distance run, marathon, marathon participation, runner.

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INTRODUCTION

Over the past 15 years, there has been a huge increase in the popularity of all kinds of long-distance runs around the world [1, 2]. This is very pleasing in terms of public health because running has numerous favorable effects on human physiology [3]. Protective effects of running against coronary heart diseases were proposed as early as the 1970s [4]. Today it is well known that runners have 30–40% lower risk of all-cause and cardiovascular mortality compared to non-runners [3, 5].

For decades, running has been a popular sport among men, whereas women had been banned from competitive long-distance runs until the 1970s [6, 7]. Katherine Switzer completed the Boston Marathon despite the ban in 1967, this action was followed by other pioneering activities supporting women's distance running that led to the International Olympic Committee's decision to sanction a women's marathon at the Los Angeles Games for the first time in 1984 [8]. Since then, female performances have improved, and sex differences in running a marathon have attracted scientific interest [9].

Participants of marathons are not only elite athletes, indeed an overwhelming majority of marathon participants are non-elites with a wide range of ages [10]. According to literature, the number of participants in New York City Marathon increased between periods of 1980–1989 and 2000–2009 from 170,523 to 350,919 [11]. In addition, in 1983–1999, at the same event, most of the participants were over 50 years old [12]. Like marathons, the popularity of half-marathons is also growing [13]. According to Zillmann et al. [14], in the last 20 years, the percentage of finishers in the United States increased by 73% in half-marathons and by 52% in marathons.

Although research shows that long-distance running events have been gaining more popularity over years [15], number of participants in such events, and their sex and age distribution may vary by country. Research on this subject is mainly focused on the USA and European countries' data [13, 15, 16, 17]. Generalizing the US- and Europe-specific data to the whole world can obviously lead to incorrect inferences. The purpose of this study was to contribute to this generalization by analyzing participation trends and performance of participants at long distance runs in Turkey over the years (2007–2017). In this context, we hypothesized that the number of participants in long-distance runs in Turkey has increased between 2007 and 2017, and the number of participants is not evenly distributed among sexes, with male participants constituting the majority.

MATERIAL AND METHODS

The study was approved by Local Ethics Committee (no:2018/1335), with a waiver of the requirement for informed consent given that the study involved analysis of publicly available data and that the data would be used after being anonymized.

The Istanbul and Antalya marathons, organized on a regular basis for decades, are the two largest city marathons in Turkey. The Istanbul marathon has an additional 15 km course and the Antalya marathon has an additional half-marathon course. The results of these races are posted online at www.departiming.com and www.taf.org.tr. Participants who registered to a race but failed to complete for any reason (i.e., those who did not start, did not finish or were disqualified) were not included in this study. Information that

is published online every year includes participants' age, name, nationality, sex and completion times. Results of the Antalya Marathon between years 2010–2017 and the Istanbul Marathon between 2007–2016 are within the scope of this study.

STATISTICAL ANALYSIS

Descriptive statistics are given, and mean ages of participants are compared using ANOVA (Analysis of Variance). SAS University Edition 9.4 software is used for calculations and the p value < 0.05 is considered significant.

RESULTS

The study includes records of 67,075 finishers. The number of native and foreign finishers of 15 km, 21 km and 42 km courses in the Antalya and Istanbul marathons from 2007 to 2017 are displayed on Table 1. The number of runners who completed the 15 km course were the highest among finishers of other courses and the number of marathon finishers were the lowest each year.

Table 1. The number of finishers of 15 km, 21 km and 42 km courses across years in Antalya and Istanbul

	TUR				Foreign			
	Istanbul		Antalya		Istanbul		Antalya	
	15 km	42 km	21 km	42 km	15 km	42 km	21 km	42 km
2007	1429	226	-	-	327	368	-	-
2008	1112	229	-	-	362	438	-	-
2009	1565	299	-	-	666	610	-	-
2010	1710	314	604	131	875	959	354	249
2011	2116	404	629	157	931	1103	383	263
2012	2869	663	919	194	1236	1640	264	154
2013	3502	837	1059	198	1488	1950	272	193
2014	4146	1102	1282	182	1720	2763	262	107
2015	3968	1110	1396	302	1014	1673	161	71
2016	3889	1123	1602	250	303	298	105	59
2017	-	-	1582	259	-	-	75	20

Figure 1 presents the number of finishers at three different distances by sex and nationality. The 15 km race is run only in Istanbul, and the 21 km race is run only in Antalya; however, 42 km is run both in Istanbul and Antalya events. Therefore, Figure 1 shows the total number of finishers of 42 km runs in both events. Among foreign runners, an uptrend in participation is observed at every distance in both sexes until 2014, but a sudden decrease is observed after 2014 (Fig. 1).

When only native participants are taken into consideration, it is clearly seen in Fig. 1 that male participation at each distance and event is higher than that of females, and the increase in male participation is more striking. Table 2 shows the number of native male and female participants in 2010 and 2016 (2010–2016 is the widest overlapping year interval in which data for both the Istanbul and Antalya marathons are available). Although a modest increase in the percentage of native female runners is observed at 15 km and 21 km courses (12.96% and 4.7%, respectively), native female marathon finishers increased only by 0.23% in 6 years.

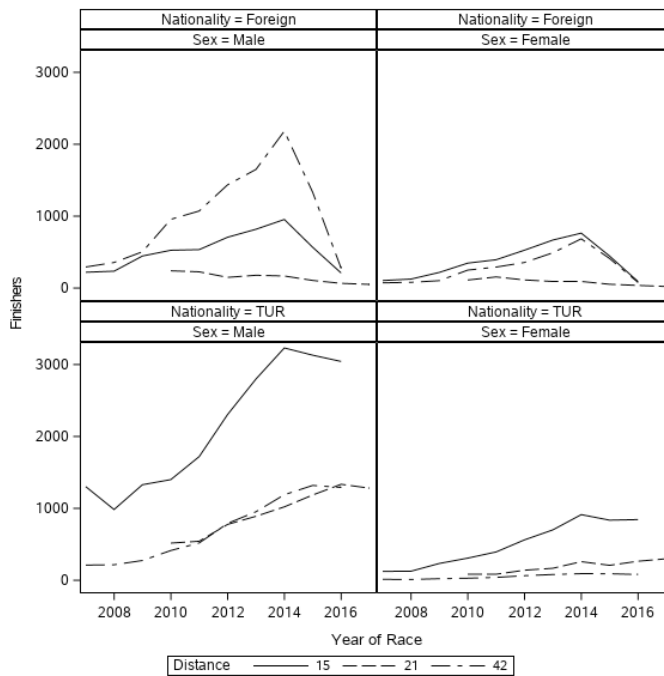


Fig. 1. The number of finishers in different courses by sex and nationality

Table 2. The number of native finishers in years 2010 and 2016 at all 3 distances

	15 km		21 km		42 km	
	2010	2016	2010	2016	2010	2016
Female	125	845	86	300	24	81
Male	1304	3044	518	1282	415	1292
Female %	8.74	21.7	14.2	18.9	5.46	5.89

Mean ages of male and female finishers are significantly different at all three courses ($p < 0.0001$). The mean age of male participants is higher at every distance. The difference between the mean age of male and female participants is at most 3.94 years at 21 km and at least 2.45 years at 15 km. Mean ages tend to be higher in longer distances, whilst male runners' mean ages in half and full marathons are similar (Table 3).

Table 3. Mean ages of all (native & foreign) male and female finishers in all distances

Age	Female			Male		
	15 km	Half-marathon	Marathon	15 km	Half-marathon	Marathon
Mean	38.19	40.01	41.31	40.64	43.95	43.88
SD	10.41	9.67	10.65	11.46	10.86	10.83

SD - standard deviation

Runners aged over 50 years are called master runners. The ratio of native master runners to all native runners is at its lowest among 15 km participants. Among 21 and 42 km finishers, this ratio is found quite approximate, intersecting several times over the years (Fig. 2).

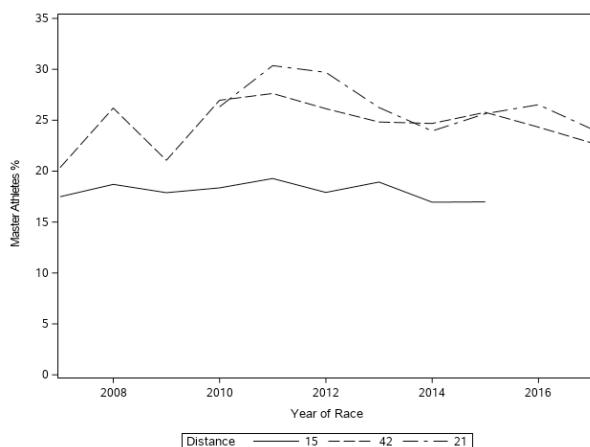


Fig. 2. The percentage of native master runners to all native runners in all distances across years

As seen in Table 4, the ratio of master runners to all runners is remarkably lower in females in all three distances, and this difference is more pronounced for native runners.

Table 4. The percentage of male and female master runners at all distances [%]

Distance	Female		Male	
	TUR	Foreign	TUR	Foreign
15 km	7.83	21.08	20.25	31.65
Half marathon	11.13	27.42	29.33	44.33
Marathon	14.29	24.42	25.85	33.38

At all three distances women run at a lower average speed than men each year. When all years are taken into consideration, the mean average speed of women were 9.10 km/h (± 0.18), 9.71 km/h (± 1.62) and 9.72 km/h (± 1.73), and the mean average speed of men were 10.45 km/h (± 2.02), 10.89 km/h (± 1.83) and 10.40 km/h (± 1.80) at 15 km, 21 km and 42 km courses, respectively.

The maximum average speeds of men were higher than those of women in all years and at all distances. The overall maximum average speeds were 18.75 km/h, 16.95 km/h and 17.09 km/h for women and 20.86 km/h, 19.05 km/h and 19.29 km/h for men at 15 km, 21 km and 42 km courses, respectively.

DISCUSSION

Our study aimed to investigate the participation trends and performance of runners competing in the two largest long-distance running events in Turkey between 2007 and 2017. We found much higher attendance in 15 km courses than in half-marathons and marathons. This finding correlates favorably with that of Knechtle et al. [18], who reported that in Switzerland more runners participated in half-marathons than marathons between years 1999 and 2014. A further analysis in our study showed that the number of male participants increased each calendar year in every event and distance. In the period of 2003–2005, 65 half-marathons and 69 marathons were held in Germany. Men participated 4.85 times and 2.6 times more often than women in these races, respectively [19]. Between 2014 and 2016 at the Göteborgs Varvet, the largest half-marathon in the world, men participated in larger numbers than women in each age group [20]. However, in Switzerland, men-to-women ratio decreased

significantly in half-marathons, but it remained unchanged for marathons [18]. At the New York City Marathon more men than women finished the race, but from 1980 to 2010, the men-to-women ratio decreased [21]. The striking result to emerge from our study is that the number of native women participants in marathons increased only by 0.23% in 6 years, whereas the sex gap in participation seems to be narrowing in 15 km and half-marathon courses. In 2014, female half-marathoners in Turkey were 20% of all half-marathoners; this percentage was 29% in Switzerland. In the same year 20% of marathon finishers were female in Switzerland and only 7% in Turkey [18]. The male-to-female ratio in the New York City Marathon was 2.47:1 in 1999, and declined to this level from 5.6:1 in 1983. Female runners were roughly 28% of all marathon runners in the New York City Marathon in 1999 [15]. These findings strongly support the idea that female participation at long-distance runs varies remarkably from country to country. Our results also showed that the percentage of native female marathon runners and the rate of its increase are very low in Turkey when compared to several western countries.

Another surprising result is that the number of foreigners and native participants increased until 2014. Thereafter we observed a decrease in both groups, particularly in foreign men. Unfortunately, this might be related to numerous terrorist attacks that happened during this time [22].

We found that the mean age of male runners was higher than that of females at every distance. Our study shares a number of similarities with Nikolaidis et al. [23]. They stated that among participants who finished the New York City Marathon between 2006 and 2016, women were younger than men by 3.3 years on average. On the other hand, in the study by Hunter et al. [24], where the age difference between sexes during the Chicago (1998–2009) and London (2001–2009) marathons were analyzed, women were 2.5 and 2.1 years older than men, respectively.

In our study, participation of native master runners, aged above 50, was found to be the lowest at the 15 km course. During the period of 1983–1999, at the New York City Marathon, the number of master participants increased at a greater rate compared to their younger counterparts [15]. In contrast to the aforementioned study, the ratio of master runners-to-all runners in our study is significantly lower among female finishers than among male finishers at all three distances, and this difference is more prominent among native runners.

Women in our study were slower than men at all three distances. This finding is consistent with a study by Hunter et al. [21], where the finishing time of the first 10 men and women between 1980–2010 at New York City Marathon were analyzed. However, these findings differ from the results of Knechtle et al. [18], who reported that women were faster than men in both half-marathon and marathons that were held in Switzerland.

CONCLUSIONS

This research demonstrates an astonishing sex difference in participation in long-distance runs in Turkey. Although marathons are becoming more popular and the number of participants is increasing in general, this increase is not represented equally in both sexes. Participation trends of long-distance runs in different countries and the determinants of sex distribution of runners is a subject of interest. Sociological, economic and psychological factors that contribute to the differences in long-distance run participation trends raise curiosity and may be a subject of further research.

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