

Sex and Age-Based Participation and Performance Trends in a Community 5k Race: A Retrospective Analysis of the Doc Dash (2018-2025)

Megan Mooberry¹, Linder Wendt² and J Brooks Jackson^{1*}

¹Department of Pathology, University of Iowa, Iowa City, IA 52242, USA.

²Institute of Clinical and Translational Science, University of Iowa, Iowa City, IA 52242, USA.

*Correspondence:

Brooks Jackson MD MBA, Carver College of Medicine, 500 Newton Road ML 1025, Iowa City, Iowa, Tel: 410-926-2647.

Received: 02 Aug 2026; **Accepted:** 17 Aug 2026; **Published:** 30 Aug 2026

Citation: Megan Mooberry, Linder Wendt, J Brooks Jackson. Sex and Age-Based Participation and Performance Trends in a Community 5k Race: A Retrospective Analysis of the Doc Dash (2018-2025). J Med - Clin Res & Rev. 2026; 10(8): 1-4.

ABSTRACT

Objective: To determine the demographic characteristics and performance outcomes of runners in an annual 5k community running event held six times from 2018 to 2025.

Methods: Age, sex, and finishing chip times of 2421 runners were obtained from TruTime for the University of Iowa Carver College of Medicine Doc Dash 5k held in 2018, 2019, 2022, 2023, 2024, and 2025.

Results: 2421 runners finished the race. 55% of all runners were female; females comprised the majority of runners every year. 55% of the runners were between the ages of 20 and 34, and 5.2% were 60 years and older. 937/1105 (85%) were female one-time event runners vs 703/862 (82%) of males. 327 of 1967 (16.6%) were repeat runners. 4.8% of runners ran the event more than twice, and only one ran in all 6 events. Median male finishing times were at least 4 minutes faster than female times for each age category >15 years old, and at least 7.5 minutes faster in >50-year-old runners. The fastest male time for all six events was 15:36, and 18:18 for the fastest female time. There was a trend in the number of decreasing runners in the event from 2018 to 2025, but it was not statistically significant.

Conclusion: Our data are consistent with data reported nationally for community 5k races in the United States, in which the majority of runners were female, repeat event runners were a minority, and median and fastest male times were faster than female times.

Keywords

5k Community race, Runner sex age, Race results.

Introduction

Endurance running has become increasingly popular in recent years. Data from RunSignup [1], a platform representing nearly half of the United States running event market, reported more than 97,000 races encompassing nearly 12.2 million participants in 2025. This represented a 5% increase from numbers reported in 2024 [2]. The 5k is the most popular race distance in the United States, likely due to its accessibility across a wide range of fitness levels.

Road race participation patterns have been shown to vary by both sex and age. Prior studies have demonstrated increasing female participation, with females comprising the majority (53%) of

race participants in both 2024 and 2025 [2,3]. Most participants are younger than 40 years of age, with approximately 20% falling within the 30-39 age category. Participation declines progressively with increasing age, with only 2.5% of participants in the 70-79 age group in 2025 [2].

Performance outcomes are also strongly associated with both sex and age. A recent analysis of more than 2.2 million 5k results found median finish times of about 32 minutes for males and 39 minutes for females [4]. For both sexes, the fastest median times were observed in younger age groups, with peak performance occurring in late adolescence to early adulthood. Increasing age is associated with progressively slower median finish times for both males and females, likely reflecting age-related declines in aerobic capacity and muscle mass [4]. The top quartile of finishing times for males ranges from 21:53 in the 15-18 year-age group to 29:21

in the 60–69-year-old category. For females, the top quartile of finishing times ranges from 28:13 in the 15–18-year-old age group to 36:01 in the 60-69 age group [4]. Overall, 5k running time tends to increase about 1 minute per decade for competitive runners [4].

Despite well-described national trends, there are limited studies providing a longitudinal analysis of participation and performance within individual community-based races. Evaluating a single recurring event over time allows for a more detailed assessment of local demographic patterns that may not be captured in larger datasets. The Doc Dash is an annual community-based 5k race held in Iowa City, Iowa. It is held at the Carver College of Medicine, University of Iowa, and is organized as a fundraiser to raise money for the local free health clinic. The objective of this study was to evaluate sex and age-based participation and performance trends in the Doc Dash community 5k race from 2018-2025.

Methods

A total of 2,421 race finishes were recorded during the study period. Age, sex, and finishing chip times for each performance were obtained from TruTime race results, which are publicly available at <https://www.uidocdash.com/race-results>. Data were collected for six 5k events (University of Iowa Carver College of Medicine Doc Dash) held in 2018, 2019, 2022, 2023, 2024, and 2025. All events occurred in late April or the first weekend of May. The course distance was measured to be exactly 5 kilometers and was nearly identical in terms of route, except in 2025 when there was a minor detour due to road construction. Registration fees were approximately \$23 for students and \$45 for non-student participants. Anyone from the public could enter in addition to students and faculty.

Counts and percentages were used to summarize categorical data while medians and inter-quartile ranges were used to summarize continuous data. The relationship between age and finish time was modeled separately for males and females. A quadratic term was used for age to appropriately account for runners getting faster as they get older until reaching an inflection point where they begin getting slower. A log-transformed Gamma model was used to model this relationship due to the right-skewed nature of the finish times. A linear model was used to assess the relationship between the year of the race and the number of participants to examine whether there was a change in the popularity of the race. R, version 4.5.2 was used for all analyses.

Results

From 2018-2025, the Doc Dash was held on six occasions. The race was cancelled in 2020 and 2021 due to the COVID-19 pandemic. A total of 2,421 race finishes were recorded during the study period. Annual participation, defined as the number of individual finishers in the event, peaked in 2023 with 522 total participants and was lowest in 2024 with 273 participants. Following COVID-19 related cancellations, participation increased in 2022 and 2023, before declining in 2024. There was a modest rebound of participation in 2025. The linear model estimated an average decrease of about 15 participants per year, though this change was not statistically

significant (95% CI [-54, 23], $p = 0.34$). Over the course of the study period, 55% of Doc Dash finishes were from females, 45% were from males, and 0.2% were from nonbinary runners. A slight predominance of female participants was observed consistently across the study period, ranging from 52% in 2025 to 59% in 2018. This is further summarized in Figure 1.

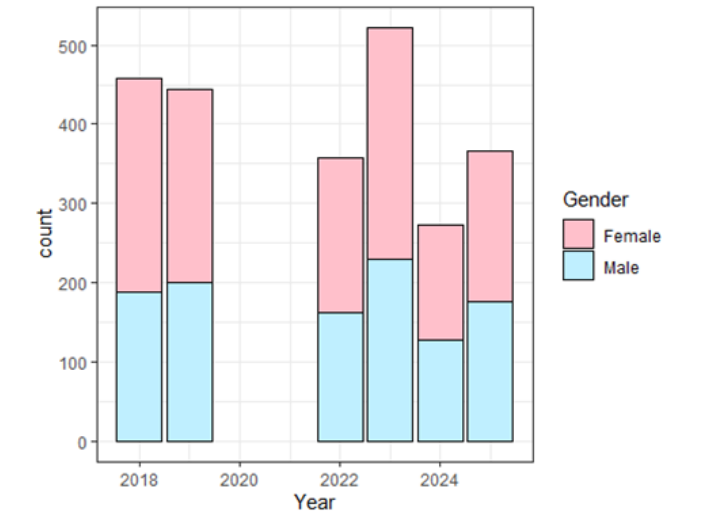


Figure 1: Number of female and male participants by year.

The 20-24 age group accounted for the largest proportion of finishes over the study period (23.6%), followed by the 25-29 age group (21.5%). Participation declined progressively with increasing age; only 5.2% of all finishes were from runners 60 years of age and older. These findings are further summarized in Table 1.

Table 1: Age distribution of races finished by sex among participants in the Doc Dash 5k (2018-2025). Values are represented as a number (percentage) of total race finishes.

Characteristic	Overall N = 2,421 ¹	Female N = 1,337 ¹	Male N = 1,084 ¹
Age Category			
14 and Under	127 (5.2%)	63 (4.7%)	64 (5.9%)
15-19	104 (4.3%)	56 (4.2%)	48 (4.4%)
20-24	572 (23.6%)	353 (26.4%)	219 (20.2%)
25-29	520 (21.5%)	293 (21.9%)	227 (20.9%)
30-34	240 (9.9%)	121 (9.1%)	119 (11.0%)
35-39	201 (8.3%)	116 (8.7%)	85 (7.8%)
40-44	137 (5.7%)	65 (4.9%)	72 (6.6%)
45-49	115 (4.8%)	66 (4.9%)	49 (4.5%)
50-54	150 (6.2%)	87 (6.5%)	63 (5.8%)
55-59	129 (5.3%)	70 (5.2%)	59 (5.4%)
60-64	68 (2.8%)	30 (2.2%)	38 (3.5%)
65-69	30 (1.2%)	12 (0.9%)	18 (1.7%)
70+	28 (1.2%)	5 (0.4%)	23 (2.1%)
In (%)			

Sex distribution varied by age group. Females accounted for the

majority of finishes in the younger and middle age categories, including 61.7% of runners in 20-24 age category and 56.3% of runners in the 25-29 age group. The lowest proportion of female participants was observed in the 70+ age group. In contrast, there was a male predominance in older age categories, particularly those 60 years and older.

A total of 327 participants (16.6% of all participants) were identified as repeat runners. Only 15% of female participants competed in more than one event, compared with 18% of male participants. Most repeat runners were between the ages of 20 to 40, with highest representation in the 25-29 age group, followed by the 20-24 age group. Only 4.8% of participants ran the event more than twice. There was only one participant that competed in all 6 events.

Median finish times differed by sex, with males demonstrating faster finish times than females across all age groups. Median male finishing times were at least 4 minutes faster than female times for each age category over 15 years of age and at least 7.5 minutes faster in age categories over 50 years of age. The fastest male finish time during the study period was 15:36, while the fastest female time was 18:18.

Across both sexes, the fastest median finish times were observed in younger age groups, particularly among participants aged 15-29. Median finish times increased progressively with age, with the slowest times observed in participants 60 and older. For example, median finish times for males ranged from 25:24 in the 25-29 age group to 34:54 in the 70+ age group. For females, median times ranged from 30:12 in the 15-19 age group to over 56 minutes in the 65-69 age group. Quadratic modeling estimated that, on average, men had their fastest times at 31.5 years of age while women had their fastest times at 24.5 years of age, as shown in Figure 2. Median finish times remained relatively stable across different race years.

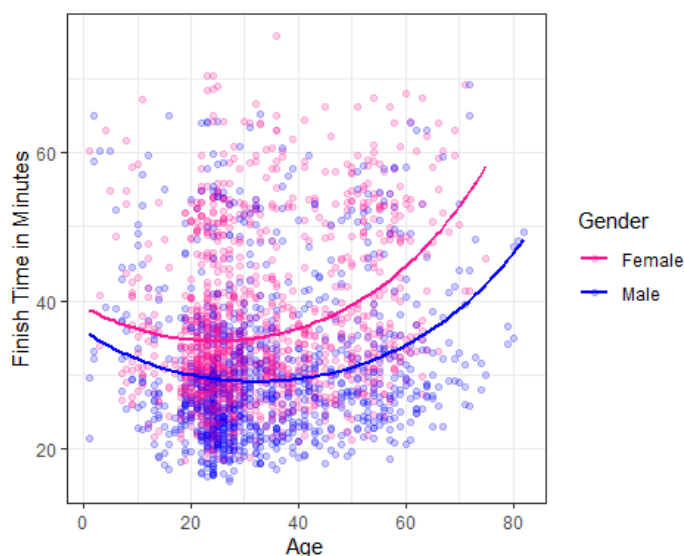


Figure 2: Median finish time (in minutes) by age and sex. Quadratic lines

of best fit for each sex were determined using a log-transformed Gamma model.

Discussion

In this longitudinal study of a community-based 5k race, we observed a consistent predominance of female participants, with females comprising 55% of all runners. This finding aligns with national trends, where females now represent approximately 53% of all road race participants.

Participation in the Doc Dash was highest among individuals aged 20-29, which differs slightly from other studies that demonstrate peak participation in the 30-39 age group. This discrepancy likely reflects the local context of the race, which is held at a medical school and may preferentially attract students. In a broader setting, higher participation rates among young adults may be driven by greater time flexibility and increased interest in social and group-based fitness activities. In contrast, the progressive decline in participation with increasing age observed in our cohort is consistent with national trends. This decline is likely multifactorial and may be driven by decreased physical capacity and higher rates of injury and comorbidities in older populations [5].

Sex-based differences in performance observed in this study were also consistent with national findings. Males demonstrated faster median finish times than females across all age groups. This finding is consistent with well-established physiologic differences, including higher maximal oxygen uptake (VO₂ max), greater lean muscle mass, and higher hemoglobin concentrations in males compared to females [6]. However, other factors, such as differences in training intensity and desire to approach the race competitively may also contribute. Notably, in our study, differences in performance between male and female participants were more pronounced in older age groups. Findings from prior studies examining the relationship between age and sex-based performance gaps have been mixed [6,7].

As expected, performance declined with progressively increasing age. The fastest median finish times in our cohort were observed in younger participants, particularly those 15-29 years of age. Prior studies have shown that maximal oxygen uptake, or VO₂ max, for elite 5k runners occurs at 25 to 27 years of age. There is a gradual decline in VO₂ max beginning at age 35, with a greater decrease occurring after age 70 [7]. Although these trends are most clearly defined in elite athletes, similar patterns are observed in recreational runners. In addition to physiologic changes, age-related differences in performance may also reflect behavioral factors, such as reduced training volume, in older individuals.

Previous data sets have demonstrated an approximately 1-minute increase in 5k finishing time per decade, starting around age 40. Among female participants in our cohort, this trend was true until age 50, after which the rate of decline became more pronounced. In contrast, male participants demonstrated relatively stable median finish times between the ages of 50 to 70, suggesting possible differences in training patterns or participation bias. It is important

to consider the median finish times among older participants in this study may be more variable due to smaller sample sizes in those age groups.

Participation trends over time were also analyzed in this study. Participation rates increased in 2022 and 2023 following COVID-19 related cancellations. Rates then decreased in 2024 before experiencing a slight rebound in 2025. Overall, there is no statistically significant temporal trend in participation numbers. Variance from year to year may be related to factors such as weather, advertising, and timing in relation to other local events.

Overall, only 16.6% of participants competed in more than one Doc Dash event. The majority of repeat runners were in the 20-29 age category, which likely reflects year-to-year engagement with students who currently enrolled at the University of Iowa. Only 4.8% of participants competed in 3 or more events, representing a relatively low retention rate. Reasons for a lower retention rate could have been due to weather conditions, competing weekend activities, and/or upcoming exams early the next week.

This study has several strengths. It provides a longitudinal analysis of participation and performance patterns across multiple years within a single, recurring race. This allows for the assessment of trends that may be missed in larger data sets. It also utilizes real-world data from a community-based race comprised largely of recreational runners, a population that is underrepresented in existing literature. Finally, the inclusion of repeat participants offers insight into engagement and retention over time, something that is not commonly reported in similar studies.

Several limitations should be considered when interpreting these findings. This study represents data from a single race in a specific geographic setting, which may limit its generalizability to other populations. For example, the location of the race, at a medical school, likely influenced the age and health patterns of the participants. Additionally, the sample size in older age groups, particularly those over 60, was relatively small. This likely contributed to the variability of findings reported. Furthermore, there were no data on training patterns, prior running experience, or overall fitness status of participants, all of which can greatly effect running performance outcomes as can the weather.

Conclusions

This study evaluated the demographic characteristics and performance trends in a community-based 5k over a seven-year

time period. Female participants comprised the majority runners, consistent with national trends. Participation was highest among those age 20-29. Median male finish times were faster than female times across all age groups, with this gap becoming more pronounced in older participants. Finish times were progressively slower with increasing age. Participation trends did not show a significant change in number of participants from year to year. A minority of participants, 16.6%, competed in multiple Doc Dash events.

Funding

The Mark Gilbert and Karen Simmonds Research Gift Fund.

Research reported in this publication was supported by the National Center for Advancing Translational Sciences of the National Institutes of Health under Award Number **UM1TR004403**. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

References

1. Run Signup. cited 2026 Apr 23. <https://runsignup.com/>
2. Race Trends Annual Industry Report 2025 From RunSignup. cited 2026 Apr 10. <https://info.runsignup.com/wp-content/uploads/sites/3/2026/02/25-Race-Trends-FOR-ONLINE-compressed-1.pdf>
3. 24-Race-Trends-V3-Online-compressed_1.pdf. cited 2026 Apr 13. https://info.runsignup.com/wp-content/uploads/sites/3/2025/02/24-Race-Trends-V3-Online-compressed_1.pdf
4. Rock B. run Internet cited 2026 Apr 13. What's a 'Good' 5K Time? Here's What the Latest Data Says. 2025. <https://run.outsideonline.com/road/road-racing/whats-a-good-5k-time-heres-what-the-latest-data-says/>
5. Marcia R Franco, Allison Tong, Kirsten Howard, et al. Older people's perspectives on participation in physical activity a systematic review and thematic synthesis of qualitative literature. Br J Sports Med. 2015; 49: 1268-1276. <https://bjsm.bmj.com/content/49/19/1268.long>
6. Hallam LC, Amorim FT. Expanding the Gap An Updated Look Into Sex Differences in Running Performance. Front Physiol. 2022; 12: 804149.
7. Tanaka H, Seals DR. Endurance exercise performance in Masters athletes age-associated changes and underlying physiological mechanisms. J Physiol. 2008; 586: 55-63.