

ORTHO

Age and relationships factors in team games performance

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LITERATURE OVERVIEW

- **Ornella Darova and Anne Duchene. Diversity in teams: Collaboration and performance in experiments with different tasks.** MPRA Paper, (122453), 2024. URL <https://mpra.ub.uni-muenchen.de/122453/>.
- **Wei Peng and Gary Hsieh. The influence of competition, cooperation, and player relation-ship in a motor performance centered computer game.** Computers in Human Behavior, 28(6):2100–2106, 2012. ISSN 0747-5632. doi: <https://doi.org/10.1016/j.chb.2012.06.014>. URL <https://www.sciencedirect.com/science/article/pii/S0747563212001641>.
- **Katarzyna Potega vel Żabik, Dor Abrahamson, and Ilona Ilowiecka-Tańska. It takes two to ortho: A tabletop action-based embodied design for the cartesian system.** Digital Experiences in Mathematics Education, 10(2):189–201, 8 2024. ISSN 2199-3254. doi: [10.1007/s40751-024-00139-8](https://doi.org/10.1007/s40751-024-00139-8). URL <https://doi.org/10.1007/s40751-024-00139-8>.
- **Yilei Zeng, Anna Sapienza, and Emilio Ferrara. The influence of social ties on performance in team-based online games,** 2018. URL <https://arxiv.org/abs/1812.02272>.
- **Fan Zhang, David Kaufman, Robyn Schell, Glaucia Salgado, Erik Tiong Wee Seah, and Julija Jeremic. Situated learning through intergenerational play between older adults and undergraduates.** International Journal of Educational Technology in Higher Education, 14(1):16, 7 2017. ISSN 2365-9440. doi: [10.1186/s41239-017-0055-0](https://doi.org/10.1186/s41239-017-0055-0). URL <https://doi.org/10.1186/s41239-017-0055-0>

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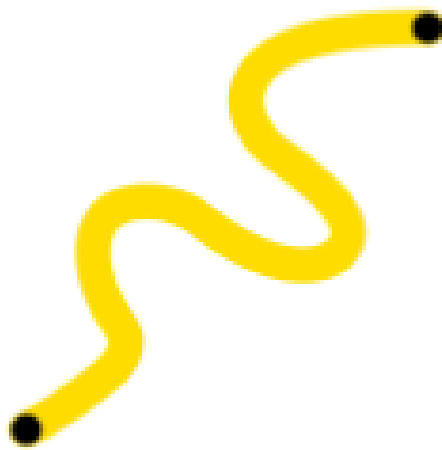
<https://www.kopernik.org.pl/en/exhibitions/livinglab>

- An **interactive game** conducted at the **Copernicus Science Centre**.
- The game involves **two participants** cooperating to move a **virtual ball** to a target point. Each player controls **only one coordinate** — either **x** or **y**.
- During the game, **data are collected** on the ball's position, the shape and difficulty of the board, the outcome (success or failure), as well as **participants' age** and the **relationship** between them.

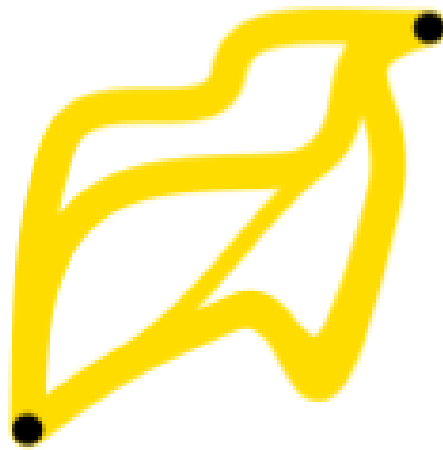
TRACKS



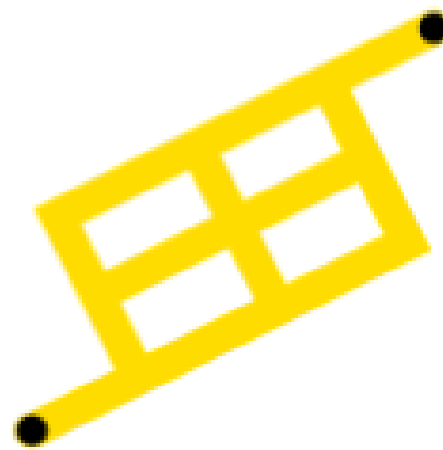
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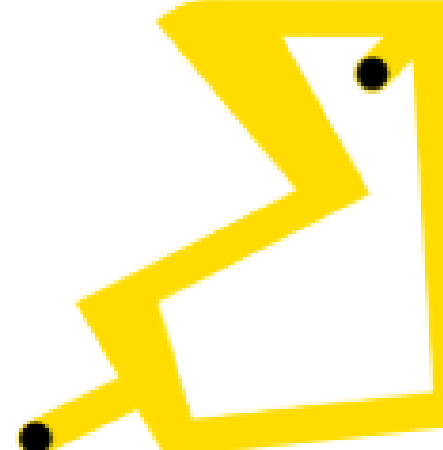
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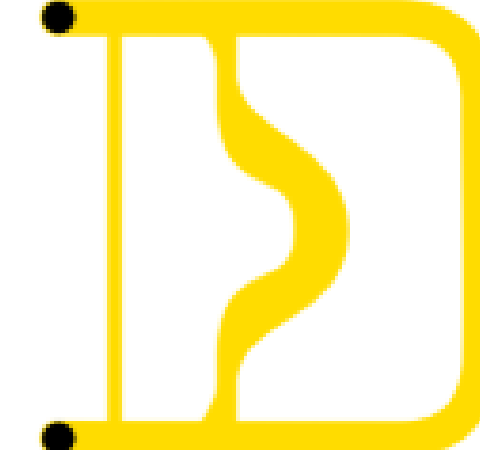
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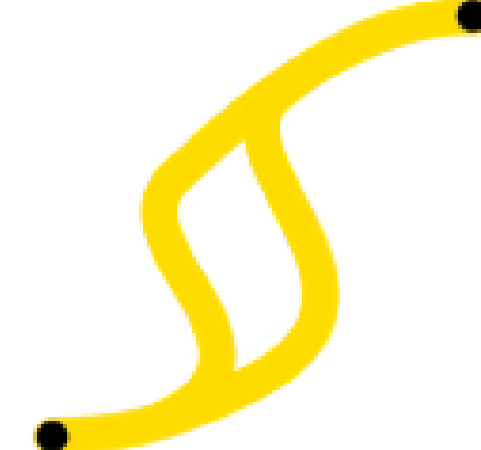
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6



7

**Is the best performance achieved by
teenage players and by those who
maintain a friend–friend relationship?**

AGE BRACKETS

under 18

18-29

30-44

45-59

60+

RELATIONSHIP TYPES

Family-Family

Friend-Friend

Stranger-Stranger

Significant Other-Significant Other

Complicated

EXPERIMENTS

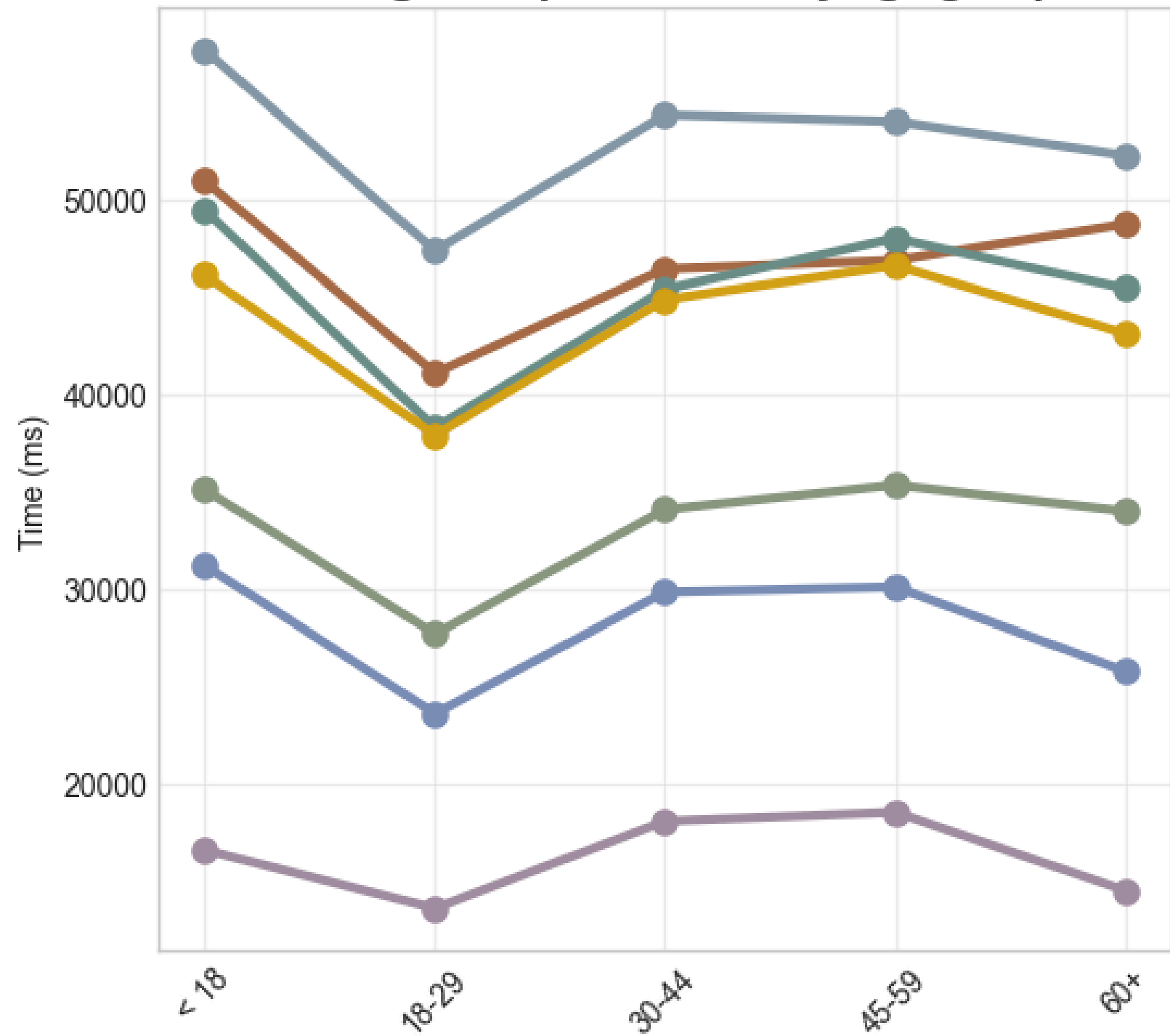
Age Group	Total Sample Size	Avg. Time (ms)	Avg. Error Rate	Avg. Rank
under 18	74,753	41,004	0.504	4.4
18-29	49,212	32,787	0.491	1.0
30-44	40,943	38,991	0.486	3.0
45-59	12,985	39,911	0.479	4.1
60+	5,829	37,687	0.544	2.4

Table 1: Aggregated performance metrics by age groups across all tracks. Average Rank represents the mean ranking position of each age group across all seven tracks, based on the mean completion time on every track.

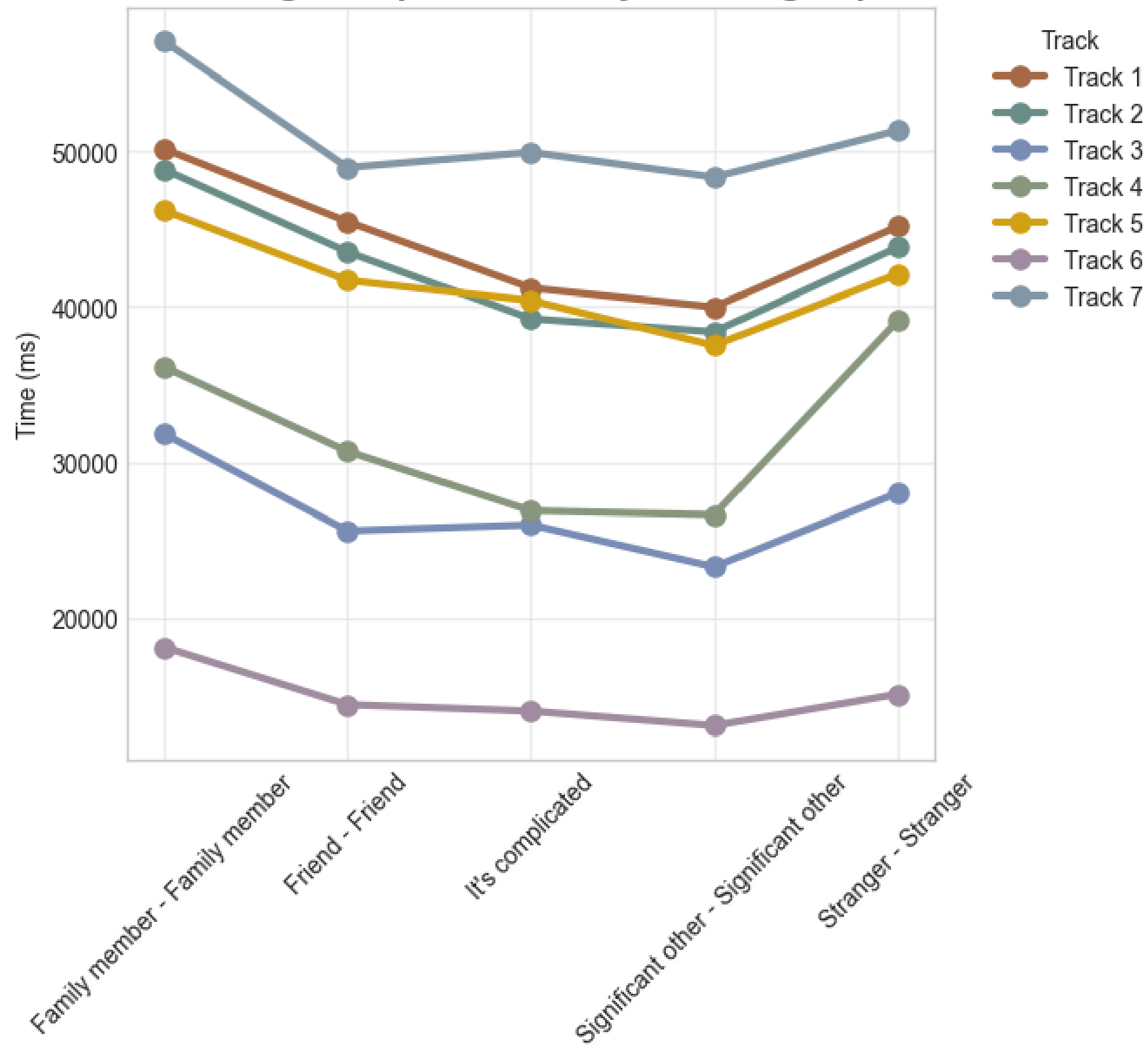
Relationship	Total Sample Size	Avg. Time (ms)	Avg. Error Rate	Avg. Rank
Significant Other	11,117	32,465	0.496	1.0
Complicated	11,114	33,950	0.529	2.3
Friend	20,449	35,760	0.527	2.9
Stranger	2,356	37,799	0.525	4.0
Family	46,825	41,166	0.472	4.9

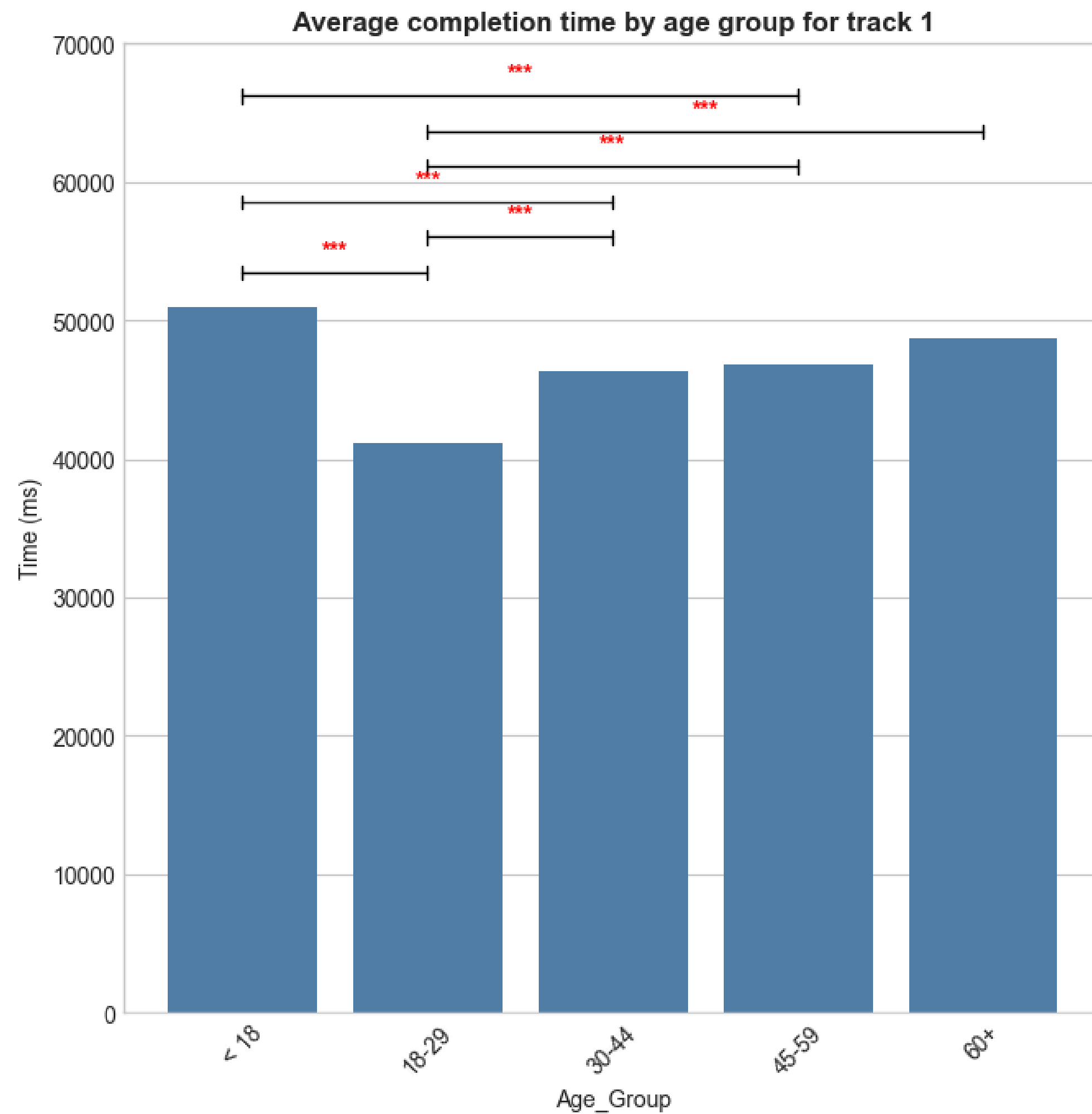
Table 2: Aggregated performance metrics by relationship types across all tracks. Average Rank represents the mean ranking position of each relationship type across all seven tracks, based on the mean completion time on every track.

Average completion time by age group

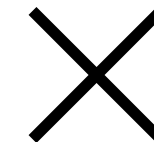
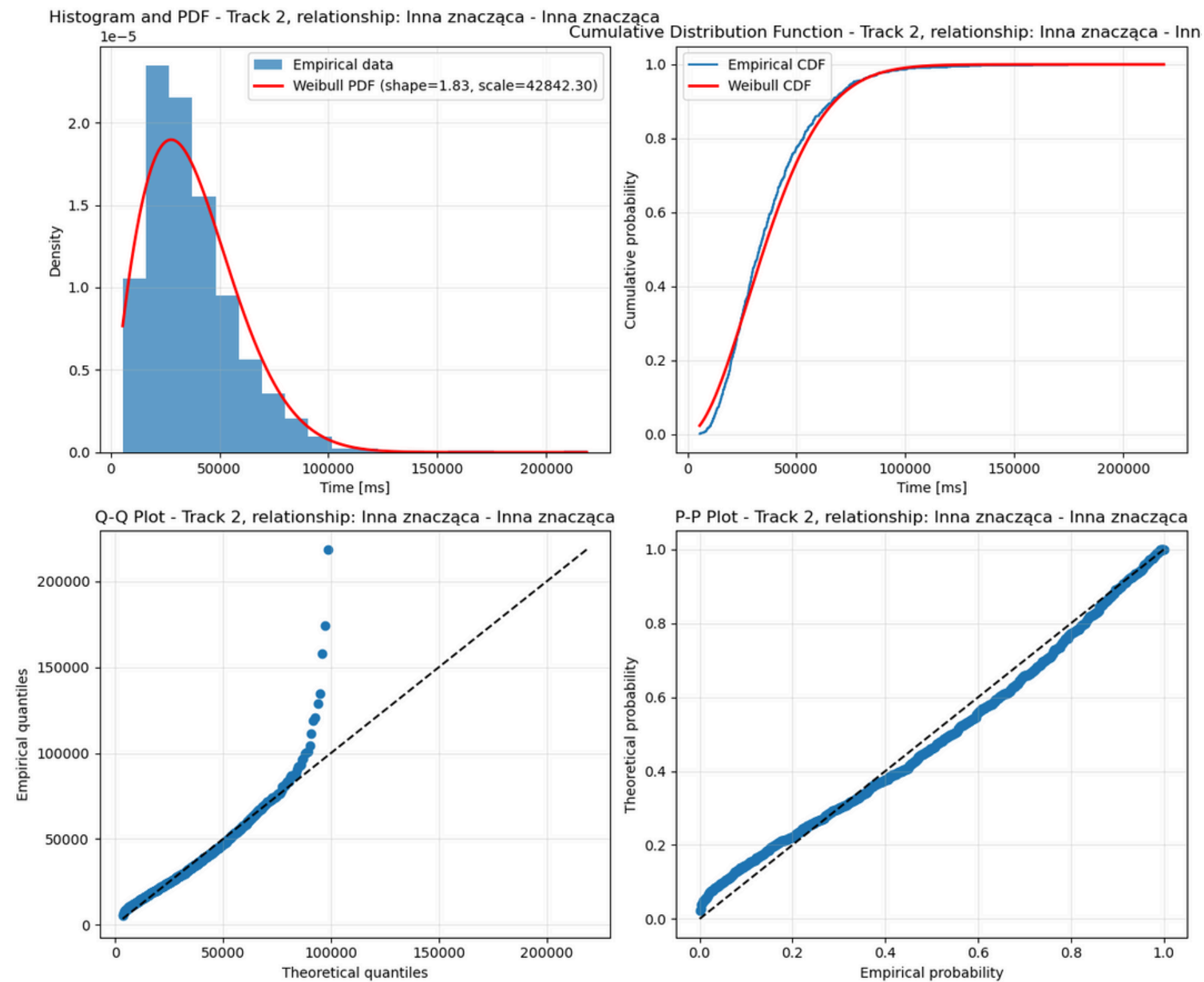
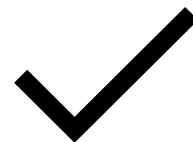
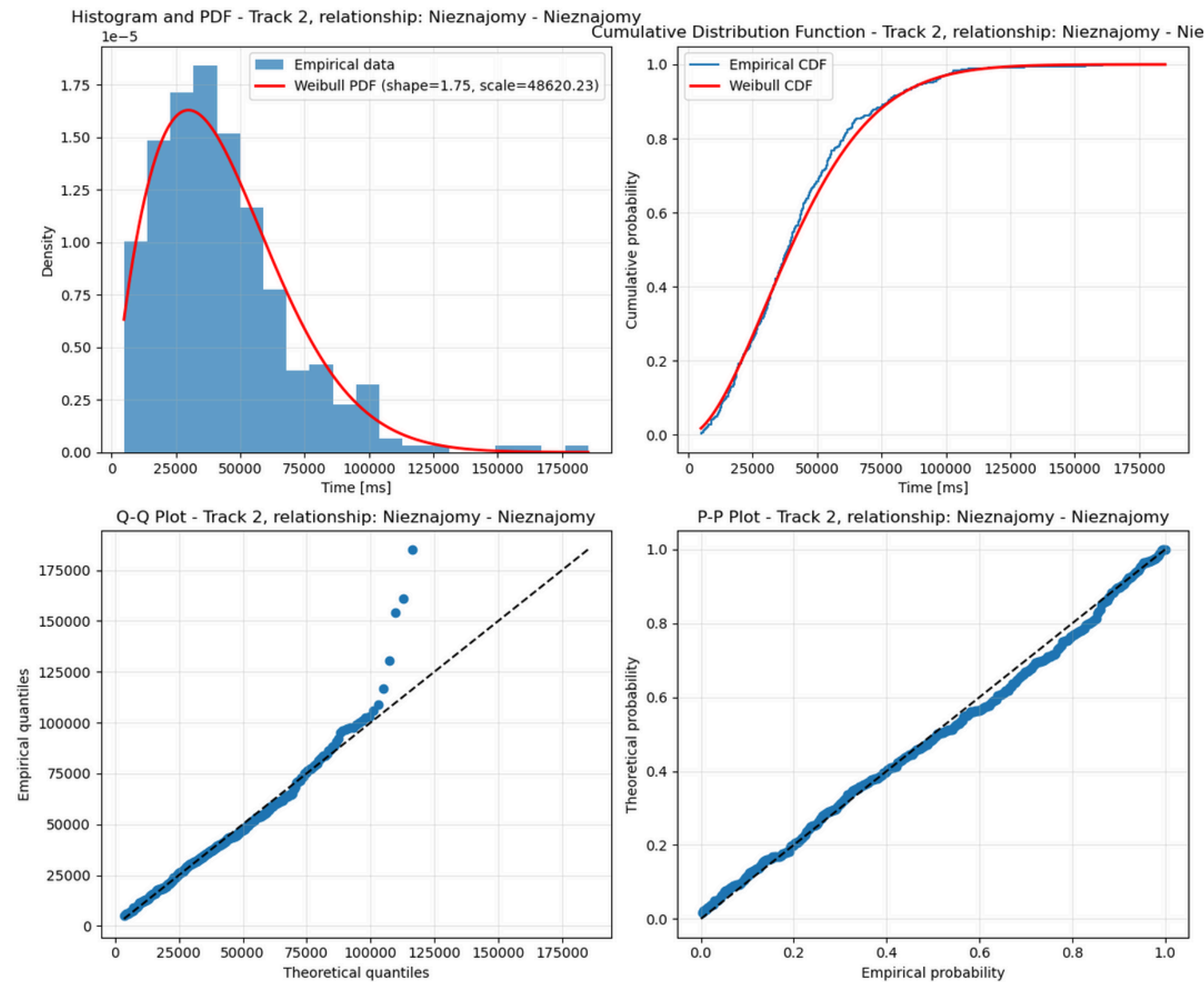


Average completion time by relation group

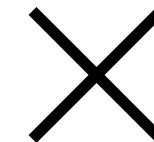
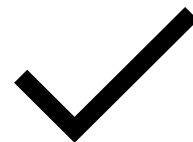
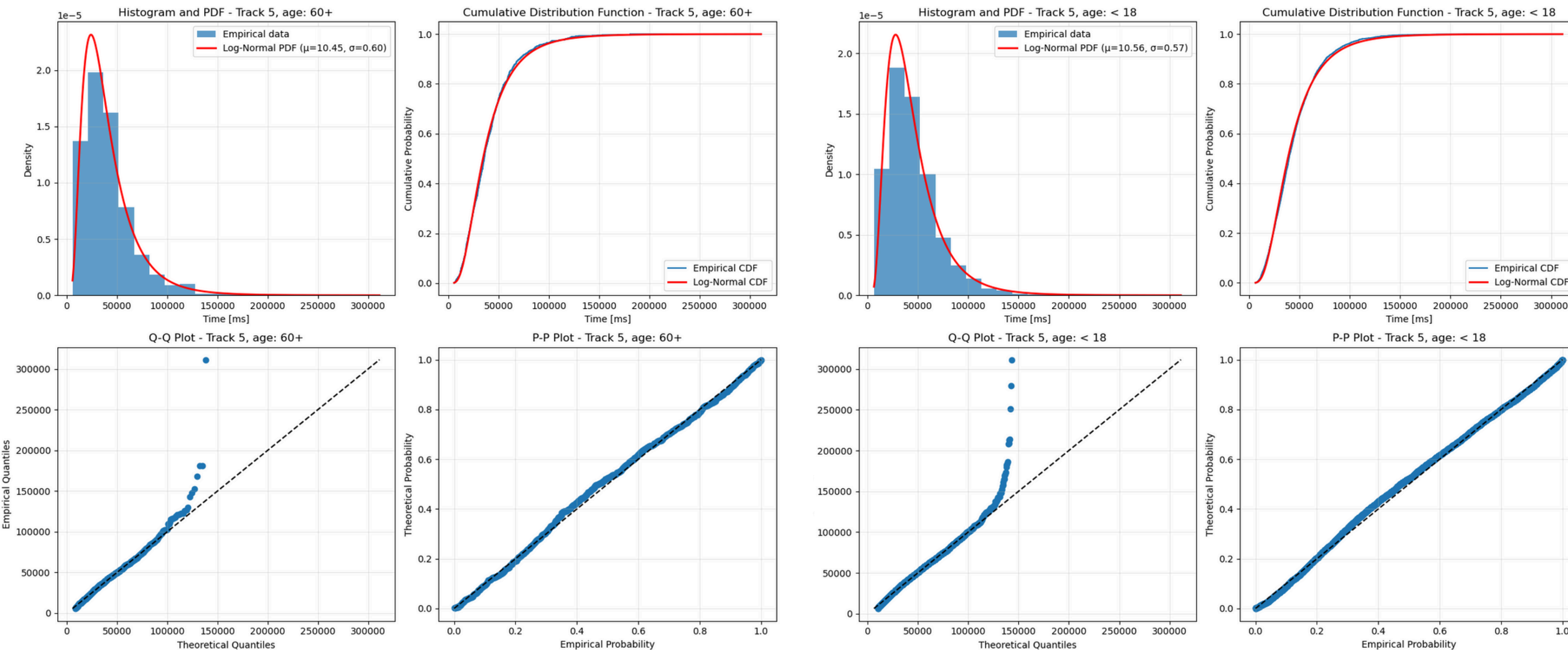




WEIBULL

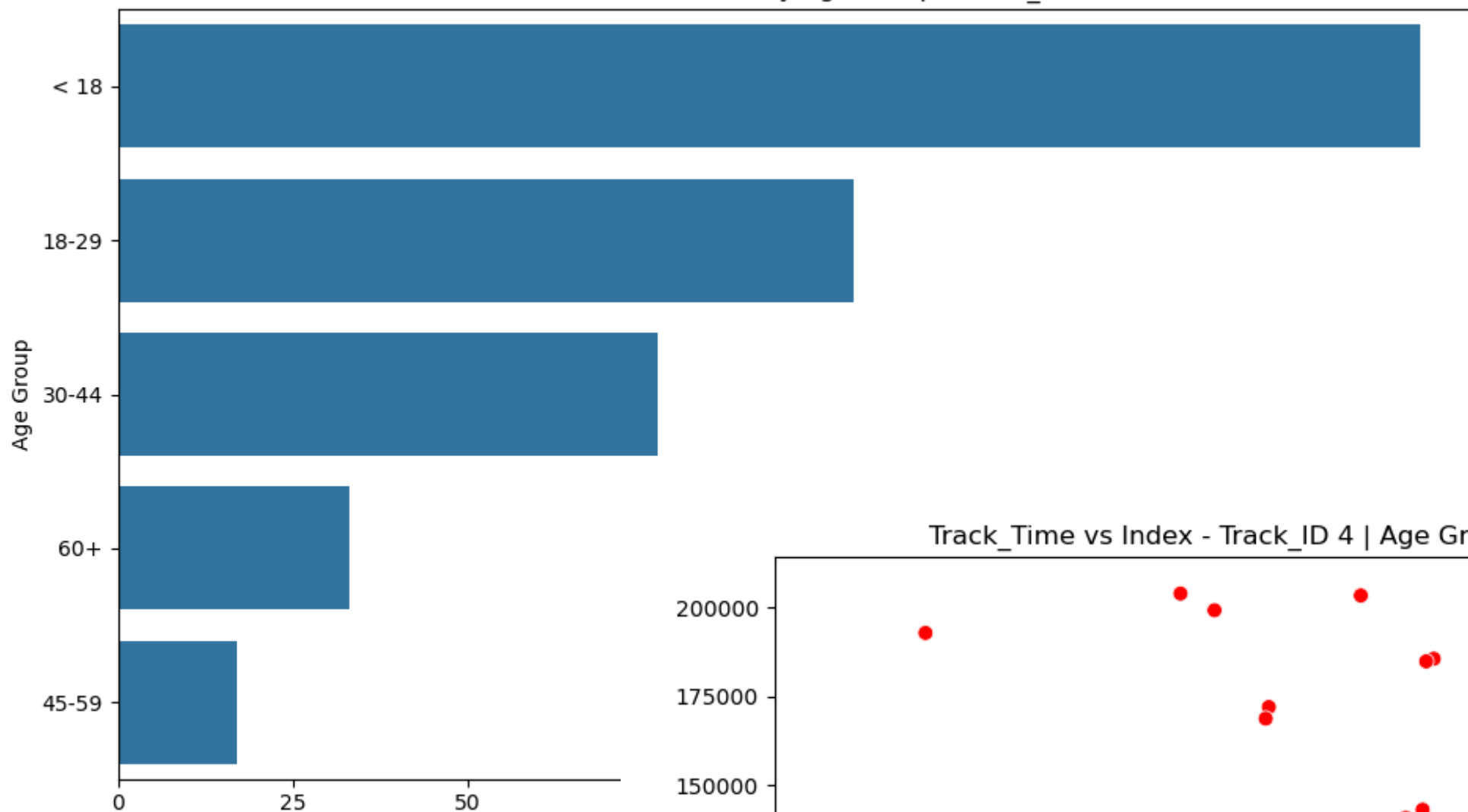


LOGNORMAL

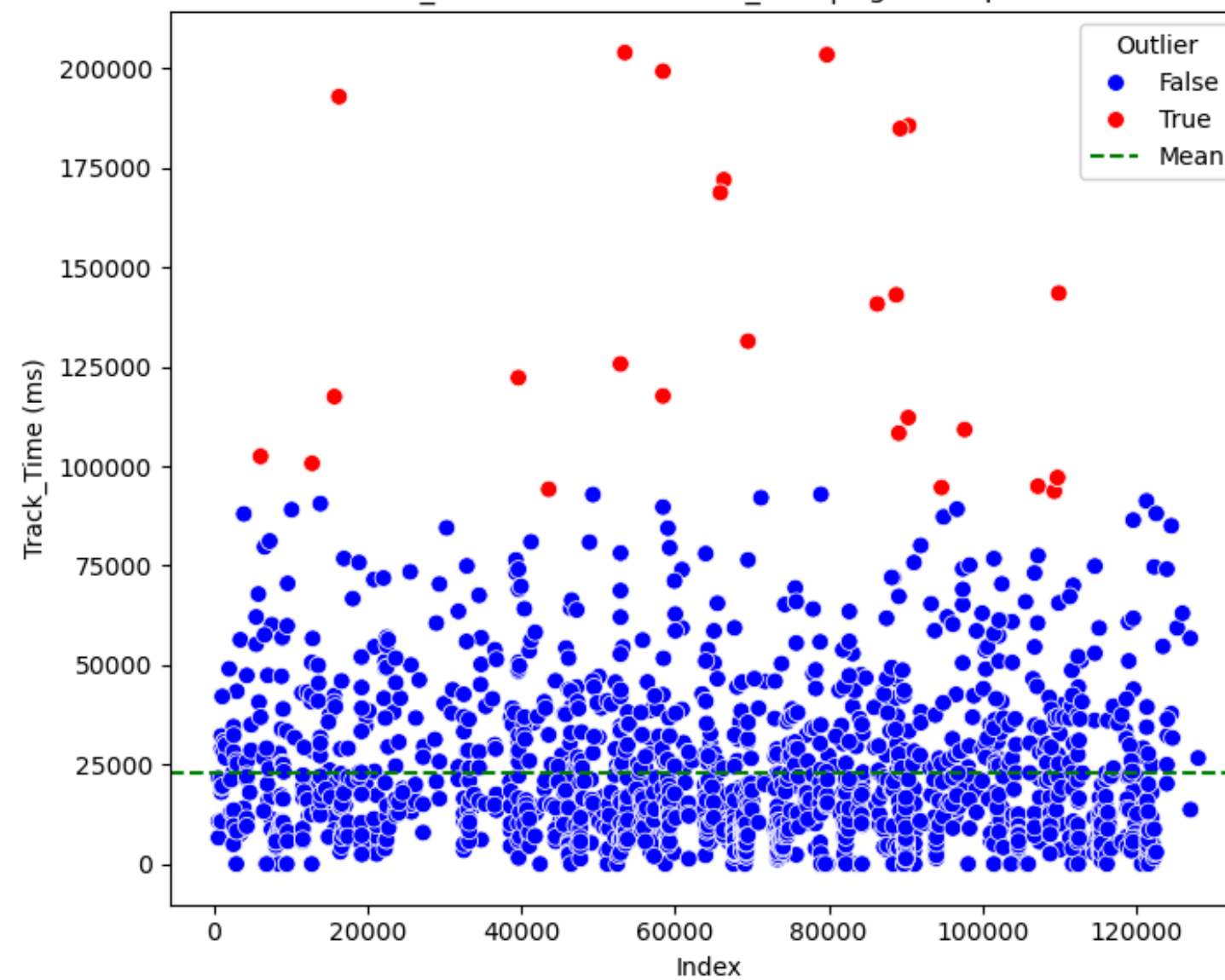


OUTLIERS

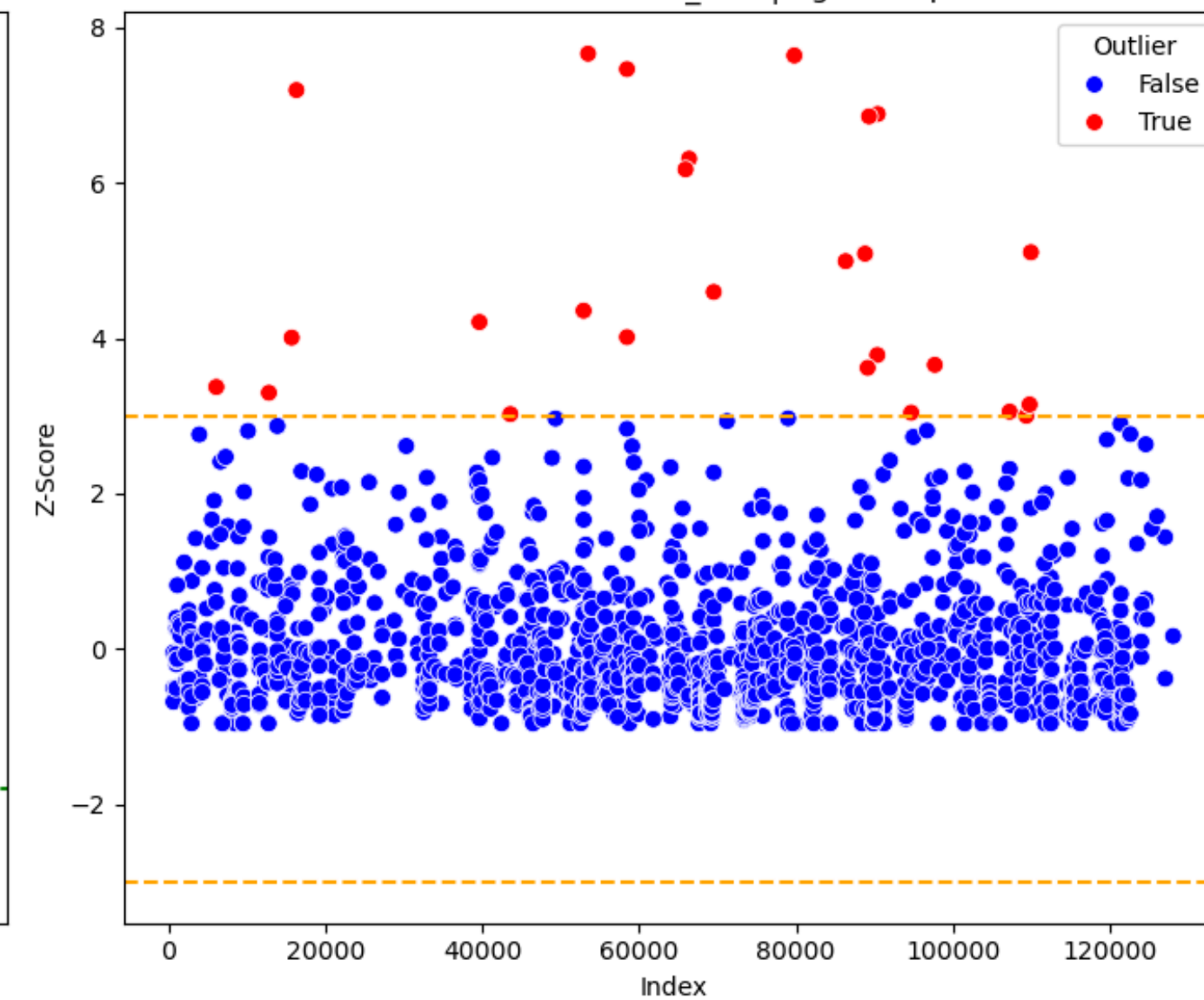
Number of Outliers by Age Group - Track_ID 4



Track_Time vs Index - Track_ID 4 | Age Group 60+



Z-Score vs Index - Track_ID 4 | Age Group 60+



SUMMARY

Is the best performance achieved by teenage players and by those who maintain a friend–friend relationship?

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Is the best performance achieved by teenage players and by those who maintain a friend–friend relationship?

The best performance is achieved by young players (18-29).
and by those who maintain a significant other relationship.

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