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Age and Gender Demographics of Amateur Badminton Participation in Chongqing, China: A Cross-Sectional Analysis of 5,502 Tournament Participants

Wei Zou, Changhai Xue*

School of Physical Education, Southwest University, Chongqing 430070, China

*Corresponding author email: 2457969584@qq.com

Abstract

Background: Badminton ranks among the most widely practiced sports in China, yet systematic demographic investigations of amateur tournament participants remain scarce. This cross-sectional study analyzes 5,502 unique participants across 40 amateur badminton tournaments held in Chongqing, Chinas largest municipality, between 2023 and 2025.Methods: Participant data were extracted from official tournament registration records with rigorous deduplication using national ID numbers. Variables included age, sex, event type, team affiliation, tournament category, and ranking.Results: Mean age was 17.16 years (SD = 8.73, median = 15, mode = 14). Minors (≤18 years) comprised 65.82% (n = 3,621). Males outnumbered females 3,508 vs. 1,994 (ratio 1.76:1). Children (5-12) accounted for 23.34%, adolescents (13-18) 42.48%, and young adults (19-25) 21.45%. The gender gap peaked in the 13-18 group (M:F = 2.10:1), narrowed to parity at 46-55 (1.00:1), and reversed at 56-65 (0.69:1). Only 23 participants (0.42%) were aged 56+. School-level tournaments contributed 45.9% of all participants. Conclusions: This first large-scale demographic profile of amateur badminton in Southwest China reveals a youth-dominated structure with significant female underrepresentation and steep participation decline after age 25.

Keywords

Badminton; amateur sport; age distribution; gender disparity; mass participation; China; youth sport.

1. Introduction

Badminton holds a unique status in Chinas sporting culture. With 47 Olympic medals (16 gold) through Tokyo 2020, Chinas international dominance is matched by widespread grassroots popularity (Zhao et al., 2026). The sports low equipment and venue requirements have contributed to its accessibility across age groups. Even among elite athletes, Li et al. (2026) found a 56.4% prevalence of depressive symptoms among 117 elite Chinese badminton players, underscoring the importance of understanding the broader participant base.

Chinas National Fitness Program , 1995-present) and Healthy China 2030 initiative have promoted mass sport participation as a national priority, with badminton listed as a key grassroots sport. Chongqing, Chinas largest municipality (~32 million residents), represents an ecologically valid study site whose rapid urbanization mirrors broader inland trends.

Despite policy emphasis, systematic demographic data on amateur badminton participants remain limited. Existing studies focus on elite performance and biomechanics (Chen et al., 2026; Gaikwad et al., 2026), training interventions (Wei et al., 2026), or historical development (Zhao et al., 2026), with few examining amateur participation demographics. This study analyzes 5,502 unique participants from 40 Chongqing tournaments to answer: (1) age distribution, (2)

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sex differences across ages, (3) under-/over-represented segments, and (4) tournament category patterns.

2. Methods

2.1. Study Design and Data Source

This cross-sectional study retrospectively analyzed official registration records from 40 amateur badminton tournaments held in Chongqing (2023-2025), including youth championships, school-level tournaments, corporate events, university games, commercial brand events (YONEX, VICTOR), senior tournaments, comprehensive events, and the Chongqing 7th Paralympic Games badminton competition. All organizers provided anonymized data.

2.2. Data Processing and Quality Control

A four-stage cleaning protocol was applied:

(1) Deduplication: National ID numbers served as unique identifiers, reducing the dataset to 5,502 unique individuals, eliminating multi-event duplicates. (2) Age validation: Birth dates from ID numbers were cross-validated against self-reported ages. Final range: 5-64 years. (3) Sex validation: The 17th ID digit (odd=male, even=female) was cross-validated against self-reported sex, achieving 100% agreement. (4) Format consistency: Records missing essential fields were excluded at <1%. No imputation.

2.3. Variables

Variables included age (continuous and grouped), sex (male/female), event type participation (singles, doubles, mixed doubles, team events), team affiliation (institutional vs. individual), tournament category, and ranking.

2.4. Age Group Classification

Participants were classified into eight age groups: Children (5-12), Adolescents (13-18), Young Adults (19-25), Early Middle Age (26-35), Late Middle Age (36-45), Early Older (46-55), Older (56-65), and Senior (66-80). Table 1 presents the classification.

Table 1. Age group classification scheme with participant distribution.

Age Group	Chinese Label	n	%	Characteristics
5-12	Children	1,284	23.34%	Basic learning, interest cultivation
13-18	Adolescents	2,337	42.48%	Competitive development
19-25	Young Adults	1,180	21.45%	Peak fitness, social
26-35	Early Middle Age	388	7.05%	Stable fitness, time constraints
36-45	Late Middle Age	178	3.24%	Health management
46-55	Early Older	112	2.04%	Leisure, social engagement
56-65	Older	22	0.40%	Light activity, health
66-80	Senior	1	0.02%	Minimal demand

2.5. Statistical Analysis

Descriptive statistics were calculated for the full sample and subgroups. Age distribution was characterized by mean, median, SD, and mode. Between-group comparisons used chi-square tests and t-tests/ANOVA ($p < 0.05$). Analysis used Python 3.11 (SciPy, StatsModels).

2.6. Ethical Considerations

All personal identifiers were removed after deduplication. Only aggregate demographic patterns were analyzed. The research conforms to the Declaration of Helsinki.

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3. Results

3.1. Sample Characteristics

The final sample comprised 5,502 unique participants: 3,508 male (63.76%) and 1,994 female (36.24%), ratio 1.76:1. Participants came from 40 tournaments representing 808 institutions. Individual (unaffiliated) participants numbered 951 (17.3%).

3.2. Age Distribution

Mean age was 17.16 years (SD = 8.73), median 15.00, mode 14.0, range 5-64. Participants ≤18 years comprised 65.82% (n = 3,621). Single-year analysis revealed peak participation at age 13 (n = 503, 9.1%), followed by ages 12 (n = 452, 8.2%) and 14 (n = 441, 8.0%).

Table 2. Age distribution of amateur badminton tournament participants in Chongqing (N = 5,502).

Age Group	n	% Total	Cum. %	Male (%)	Female (%)	M:F Ratio
5-12 (Children)	1,284	23.34	23.34	62.4	37.6	1.66:1
13-18 (Adolescents)	2,337	42.48	65.82	67.7	32.3	2.10:1
19-25 (Young Adults)	1,180	21.45	87.27	62.4	37.6	1.66:1
26-35 (Early Middle)	388	7.05	94.32	59.8	40.2	1.49:1
36-45 (Late Middle)	178	3.24	97.56	53.9	46.1	1.17:1
46-55 (Early Older)	112	2.04	99.60	50.0	50.0	1.00:1
56-65 (Older)	22	0.40	100.00	40.9	59.1	0.69:1
66-80 (Senior)	1	0.02	100.00	0.0	100.0	—
Total	5,502	100.00	—	63.76	36.24	1.76:1

Three youth groups (5-25 years) comprised 87.27% (n = 4,801); only 12.73% (n = 701) were aged ≥26.

3.3. Sex Differences Across Age Groups

The widest gender disparity was in the 13-18 group (M:F = 2.10:1). Single-year ratios peaked at age 18 (2.53:1). The gap narrowed monotonically: 1.49:1 at 26-35, 1.17:1 at 36-45, parity at 46-55 (1.00:1), and reversal at 56-65 (0.69:1). Chi-square confirmed significant association ($\chi^2 = 57.38$, df = 7, $p < 0.001$).

3.4. Single-Year Age Distribution

The age trajectory mirrored the educational life course: ages 5-6 minimal (n = 10); ages 7-12 rapid growth from 103 to 452; ages 13-15 peak years (503, 441, 385) with severe gender imbalance (2.24-2.31:1); ages 16-18 decline (271 to 152, ratio 2.53:1 at age 18); ages 19-22 university plateau (198-261, improved ratio 1.25-1.66:1); ages 23-35 steady attrition (130 to 11).

3.5. Event Type Participation

Singles events had highest participation (mens singles: n = 1,991, 36.2%; womens singles: n = 1,040, 18.9%). Doubles: mens doubles n = 1,221 (22.2%), womens doubles n = 748 (13.6%), mixed doubles n = 811 (14.7%). Male participants preferred singles; female participation was proportionally higher in mixed doubles.

3.6. Tournament Category Analysis

The 40 tournaments were classified into seven categories (Table 3).

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Table 3. Demographic profiles across tournament categories.

Tournament Category	n	% Total	Male	Female	M:F	Avg Age
School-level	2,528	45.9%	1,525	1,003	1.52:1	13.5
Youth Competitions	1,132	20.6%	859	273	3.15:1	11.2
University	972	17.7%	560	412	1.36:1	23.0
Commercial/Brand	460	8.4%	314	146	2.15:1	27.3
Crossover/Community	155	2.8%	119	36	3.31:1	19.5
Corporate/Employee	19	0.3%	12	7	1.71:1	42.9
Other/Mixed	235	4.3%	119	116	1.03:1	37.0

School-level tournaments constituted 45.9% (n = 2,528). The 2024 Chongqing Primary and Secondary School Badminton Competition was the single largest (n = 810). Youth competitions showed extreme gender imbalance (M:F = 3.15:1). University tournaments had the most balanced ratio (1.36:1). The Li Xue Rui Cup (named after the Olympic gold medalist) was the largest commercial tournament (n = 312, mean age 29.7, M:F = 1.79:1). Corporate/employee and senior events together accounted for <0.4% of total.

3.7. Team Affiliation

Individual participants numbered 951 (17.3%). The remaining 82.7% represented 808 distinct teams. Leading institutions included Chongqing No. 1 Bilingual School (n = 42), Chongqing College of Humanities, Science and Technology (n = 41), and Chongqing No. 7 Middle School (n = 37). Non-local teams from Fujian, Sichuan, Shanghai, and Ningbo suggest incipient cross-regional participation.

4. Discussion

4.1. Youth Dominance and Systemic Implications

The extraordinary youth concentration—65.82% aged ≤18, median age 15—resembles a junior development pipeline rather than a mature mass sport system. This contrasts with European and North American amateur badminton where adult recreational participants form the majority (European Badminton Union, 2022).

Three structural factors likely drive this: (1) school curricula integration (45.9% of participants from school tournaments); (2) the national elite sport development system channeling resources toward youth talent; (3) underdeveloped workplace wellness and senior-friendly programming. The participation cliff after age 25 (87.27% ≤25 to 12.73% ≥26) represents a critical weakness. Yu et al. (2026), using CHNS longitudinal data, demonstrated that working-age adults show lowest physical activity persistence, consistent with our findings. Tournament formats requiring full-day commitments likely exacerbate adult attrition.

4.2. Gender Disparity and Age-Narrowing Pattern

The overall 1.76:1 ratio exceeds the 1.5:1 figure for general Chinese amateur sport (General Administration of Sport of China, 2021). The 2.10:1 adolescent gap is consistent with global sport dropout among girls (Crane & Temple, 2015), likely amplified by high school and college entrance examination pressures in China. Youth competitions show extreme 3.15:1 ratios, suggesting competitive formats disproportionately deter female participation.

The narrowing gap with age is encouraging: parity at 36-55 suggests Chinese women re-engage once life-stage barriers recede. The 56-65 reversal (59.1% female) parallels global findings on older womens health-oriented physical activity (WHO, 2020). Zhao et al. (2026) noted badmintons mixed-sex format made co-participation "thinkable and practicable" historically, yet full tournament equity remains aspirational.

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4.3. Single-Year Trajectory Insights

The single-year age trajectory closely mirrors the educational life course, strongly suggesting tournament participation is education-driven rather than recreation-driven. The gender ratio peak at age 18 (2.53:1) coincides with the college entrance examination year , indicating female students disproportionately withdraw from organized sport during this high-stakes period.

4.4. Tournament Category Implications

School and university tournaments (63.6% of participants) show relatively balanced sex ratios (1.52:1 and 1.36:1), suggesting institutional frameworks provide more equitable access. Youth competitions show extreme imbalance (3.15:1). The near-absence of senior tournament participation represents a significant gap given Chinas 297 million citizens aged 60+ (National Bureau of Statistics, 2024) and the documented health benefits of racket sports for older adults (Stamm et al., 2024).

4.5. Limitations

This study has limitations. The sample is geographically confined to Chongqing. Only tournament participants are captured; informal recreational play is not included. Socioeconomic variables were unavailable. The cross-sectional design precludes causal inference. The 2023-2025 post-COVID period may have influenced participation patterns. Variable registration completeness across 40 tournaments may introduce selection bias.

5. Conclusion

This first comprehensive demographic analysis of amateur badminton in Southwest China (5,502 participants, 40 tournaments) yields four principal conclusions:

(1) Extraordinary youth concentration (median 15; 65.82% aged ≤18) reflects education-system integration but raises retention concerns. (2) Significant male overrepresentation (1.76:1) is most severe during adolescence (2.10:1) and narrows to parity in middle age. (3) Tournament participation is heavily education-mediated, with school and university events accounting for 63.6% of participants. (4) Substantial demographic gaps affect working-age adults (26-45) and older adults (56+), representing missed public health opportunities.

These findings contribute empirical evidence to mass sport participation literature in China. Future research should extend to other regions, incorporate qualitative methods, and develop longitudinal tracking of participation trajectories.

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