



The Presence of Gender Performance Differences in Secondary Mathematics Competitions

2017-2018 Mathematics Education Team
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Abstract

The presence of mathematics competitions originates from the International Mathematical Olympiad (IMO). The IMO began in 1959 in Romania and is the largest and most prestigious scientific Olympiad for high school students around the world [1]. The competition consists of six, 42-point problems varying in subject. The questions are primarily based on pre-calculus, which is a common level of mathematics for high school students. Subjects beyond high school level are also incorporated into the competition such as projective and complex geometry, functional equations, and number theory [2].

Abstract (continued...)



MATHCOUNTS and the American Mathematics Competitions are just two examples of mathematics competitions open to middle and high school students [3]. MATHCOUNTS is a multi-level national program established in 1983 that provides students the opportunity to compete with their peers [4]. The American Mathematics Competitions (AMC) are a series of examinations based on curriculum materials that focus on building problem-solving skills and mathematical knowledge [5].

Abstract (continued...)



The most important value of a math contest is to kindle student's interest in mathematics while encouraging them to value intellectual activities. Students will often turn an activity into a contest; they love games and always want to be the best at what they do. Math competitions can inspire them to become good at mathematics in the same sense that sports encourage physical fitness. Competitions train students to deal with successes, failures, and proves that practice is effective to their performance. In our daily lives we often have to deal with elements of pressure. Competitions can be a model by which students learn how to cope with and overcome pressure [3].

Abstract (continued...)



The discussion of our research is focused extending friendly mathematics competitions to local and surrounding high school students in the 9th grade, examining how their mathematics knowledge plays a role in their competition performance, and discussing the importance of student participation in mathematics competitions.

Objectives



- ❑ Importance and benefits that mathematics competitions hold
- ❑ Presence of gender dominance in mathematics
- ❑ Role of parents and teachers in the students' involvement in mathematics competitions
- ❑ Result of implementing mathematics competitions in the classrooms

Research Questions



- What is a mathematics competition and its purposes?
- What influences contribute to a student's willingness to participate in mathematics competitions?
- Is gender a contributing factor in students' mathematical performance in the classroom?

Factors Influencing Student Involvement in Mathematics Competitions



- Attitude/perception
- Teacher and/or parent involvement
- Gender dominance

Methodology



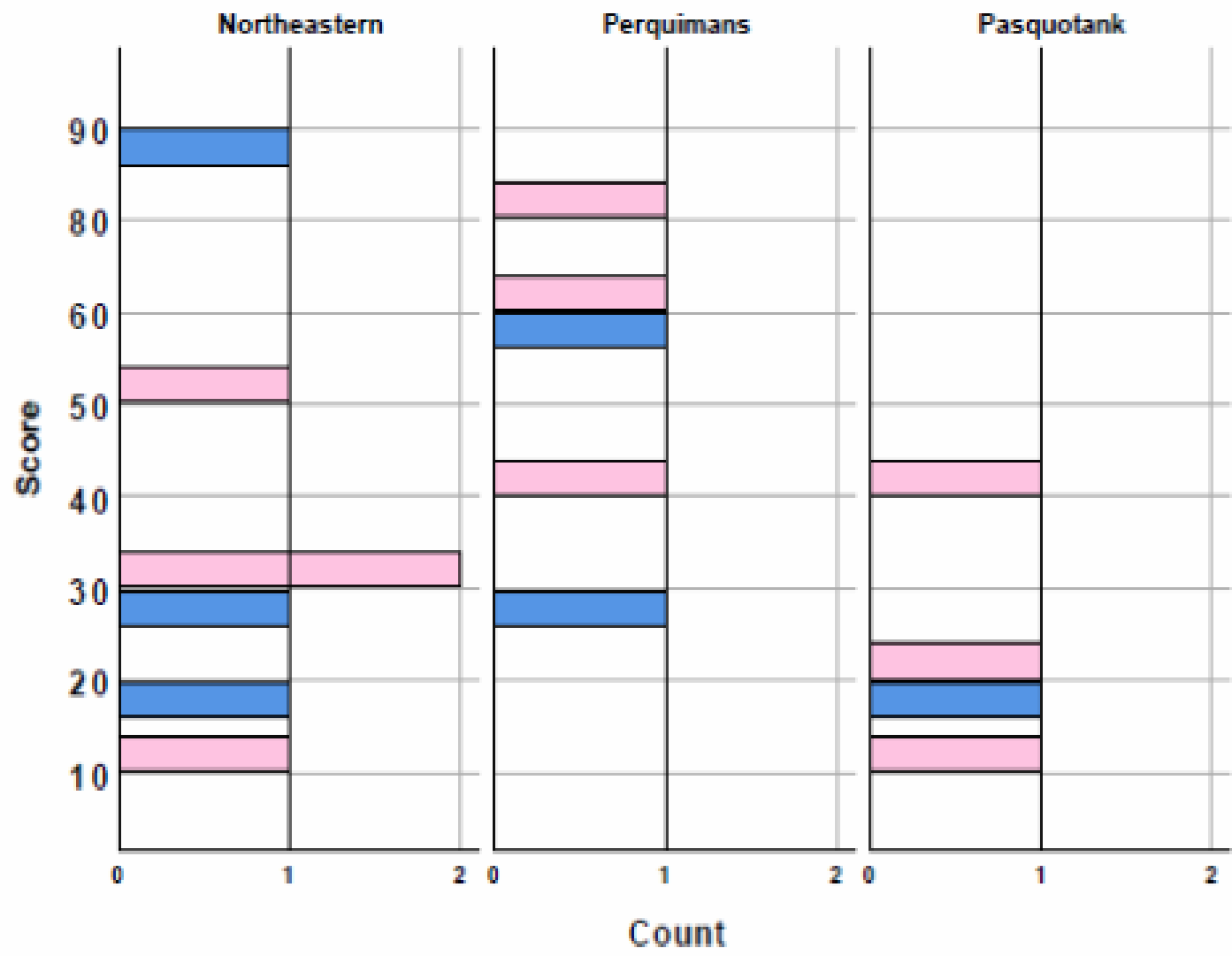
- Local and surrounding high schools
 - Northeastern High School
 - Perquimans County High School
 - Pasquotank County High School
- Maximum of 8 students of average performance in the mathematics classroom
 - 4 girls, 4 boys
 - 9th grade
- 1 hour long competition
 - 30 minutes individually (with calculator*), 30 minutes as a group
- 20 questions
 - SAT prep
 - Algebra, Geometry, Quadratic Equations, Polynomials
- Survey
- Certificate

Summary of Individual Scores

School

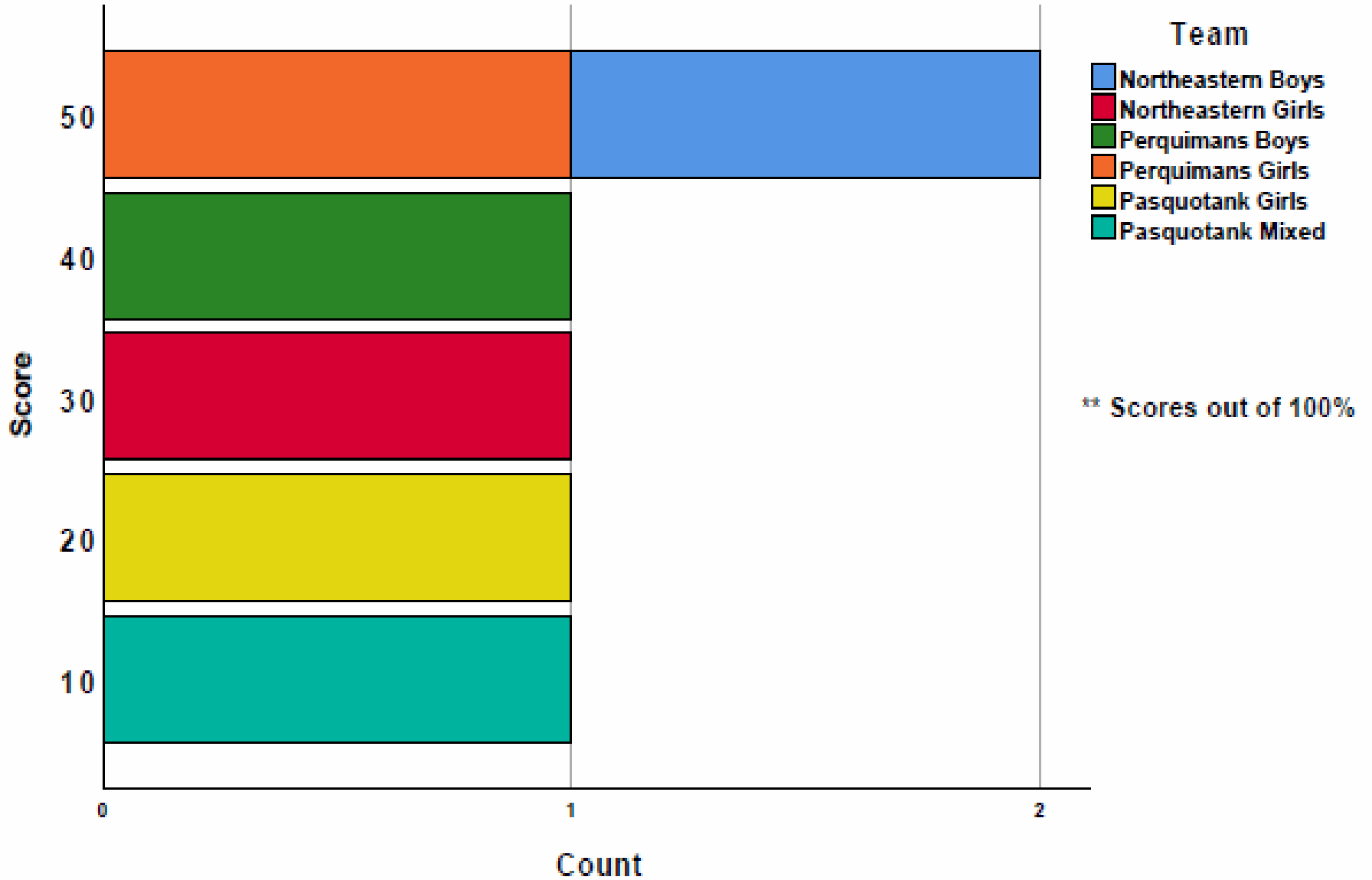
Gender

- Male
- Female



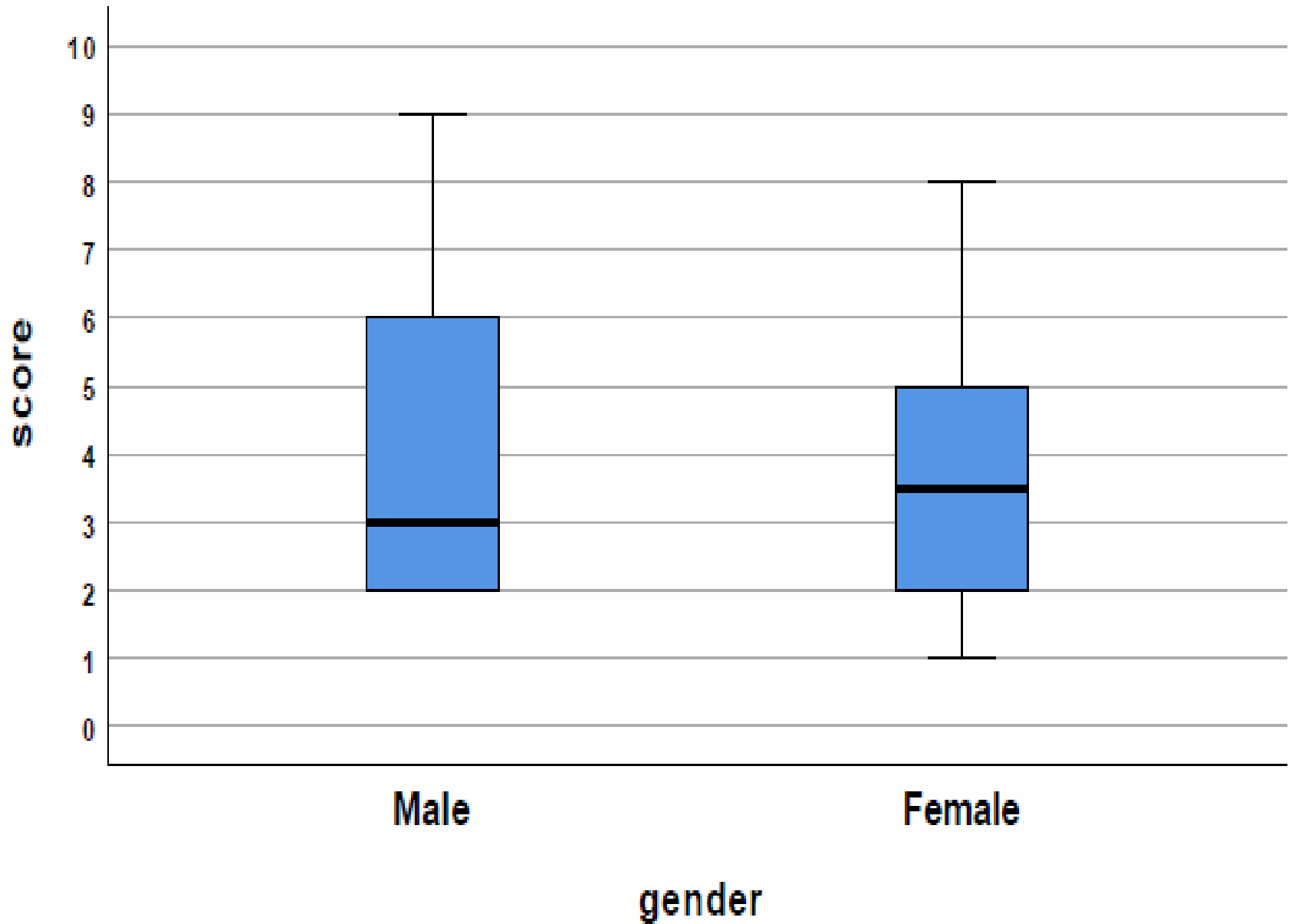
**Scores are out of 100%

Summary of Team Scores



** Scores out of 100%

Summary of Individual Scores



Results Summary

Girls (10)

- Average for Individual = 37.0
- Average for Group = 40.0
- Maximum Score for Individual = 80

Boys (6)

- Average for Individual = 41.7
- Average for Group = 45.0
- Maximum Score for Individual = 90

Details:

- The boys scored higher than the girls in the competition
- 4.7 difference in the individual average
- 5.0 difference in the group average
- 10.0 difference in maximum score

Statistical Analysis: Independent, 2-sample T-test



	GENDER		Independent Samples Test T-test for Equality of Means (Equal variances not assumed)	
SCORE	Male	Female	t	DF
N	6	10	.349	8.801
Mean	4.17	3.70	Sig. (P-value)	Mean Difference
Std. Deviation	2.787	2.214	.735	.467

Math Sprint Competition

Student Survey

Directions:

1. Identify your gender (circle one): MALE or FEMALE
2. Please indicate your agreement or disagreement to the 5 statements listed by checking the appropriate box to the right of each statement.

Survey Statement	1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree
1. I felt prepared for this math competition.					
2. I have seen these types of math problems in my math class.					
3. I feel a math competition can help prepare me for a math test.					
4. I am comfortable working with my peers during a math competition.					
5. I am willing to participate in another math competition.					

Complications and Challenges



- Participating high schools
- Even number of participants
- Size of data pool

Future Work

- Involvement of STEM high schools
- NC standards vs. VA standards comparison (Chesapeake, Virginia)
- Single gender settings



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References



- “59th International Mathematical Olympiad–IMO 2018”, *IMO 2018.org*, 2018.[Online].Available:<http://www.imo2018.org/index.html>. [Accessed: 21-Mar-2018].
- “International Mathematical Olympiad”, *GH Math Site*, 2018.[Online]. Available:<https://ghmathsite.weebly.com/international-mathematical-olympiad.html>. [Accessed:21-Mar-2018].
- R. Rusczyk.“Articles: Pros and Cons of Math Competitions-Art of Problem Solving”, *Artofproblemsolving.com*, 2018.[Online].Available:<https://artofproblemsolving.com/articles/competitions-pros-cons>. [Accessed:21-Mar-2018].

References (continued...)



- “MATHCOUNTS Competition Series | MATHCOUNTS”, *Mathcounts.org*, 2018. [Online]. Available: <https://www.mathcounts.org/programs/competition-series>. [Accessed: 21-Mar-2018].
- Mathematical Association of America. “American Mathematics Competitions | Mathematical Association of America”, *Maa.org*, 2018. [Online]. Available: <https://www.maa.org/math-competitions>. [Accessed: 21-Mar-2018].
- “Articles: Pros and Cons of Math Competitions - Art of Problem Solving”, *Artofproblemsolving.com*, 2018. [Online]. Available: <https://artofproblemsolving.com/articles/competitions-pros-cons>. [Accessed: 14-Apr-2018].

**Questions
Or
Comments**

