The “No Child Left Behind” initiative imposed upon American educators was in response to achievement gaps and falling test scores of American students in comparison to international students. Curiously, as to what factors were possibly behind the decline, Varsho and Harrison asked:

"Which factors are the most influential to a student's academic performance and attitudes in mathematics?"

All data collection was done through an online survey created by Varsho. The survey was composed of equations centered on each factor found in the initial literature review to be influential ([3], [2], [3], [4], and [5]) to students' performance and attitudes. Websurvey software provided by UW-Eau Claire was used to create the survey which consisted of the following items and included 61 "testable" variables:

- Multiple choice (single and multiple selection) -- which utilized a Likert Scale
- Open ended comments only

The pilot survey was administered via email to all freshmen as defined by the Registrar. Some respondents were offered extra credit in math classes for participation. Respondent data were then filtered by the following:

- Completion of survey
- Between 18-20 years old
- Self-Reported freshman status

Cross tabulations were performed utilizing chi² and gamma significance tests (p < .01, .05, .001) as well as Cramer’s V and Somer’s D for strength tests where appropriate.

Respondents were able to comment upon the different aspects during the survey. Some of these comments are posted below. All quotes are followed by the characteristic of the respondent following the form: GENDER, PERFORMANCE, FEELINGS, CLASS.

It should be noted, the survey favored those individuals who had internet access, were offered extra credit and read emails. It is the view of the primary researcher that although gender still affects students' attitudes, there is no significant influence on performance in mathematics.

### Findings

#### Overview

The response rate for the survey (381 of 3937 for 18.7%) was acceptable for this project. After using operational definitions as well as completion status to filter the 381 students who responded to the survey, a sample size of 337 resulted. There was not enough racial diversity for analysis. Approximately 83% of the 337 respondents performed well on math ability tests and reported that they liked the subject. A high level of significance (p < .001) and extremely strong strength (r > .50) between a student's performance and feelings in math was found. Students reported the following as the top five factors influencing their performance and feelings:

- Math Ability
- Previous Teachers
- Math Ability
- Teaching Style
- Previous Counselors
- Personal Feelings
- Family Expectations

Also found was a significant, extremely strong association between performance and feelings to student response of the following statements:

**I will never be good at math.**

**I will never be good at math.**

Out of the 337 respondents: 265 (78.1%) were female, 73 (21.1%) were male and 1.0% selected "other". The last case was eliminated during the gender analysis, thus the sample size was 336. Out of the 61 variables, 16 variables were statistically significant ranging from weak to moderate in strength (1.01 < r < 0.30). On many statements females were more likely to respond neutrally while males more often agreed or disagreed. Through the analysis females were found to be more likely to:

- dislike mathematics
- be placed into low or non-advanced classes
- agree they have never been good in math
- disagree math connects to their major/minor
- complete their homework more often
- disagree with "women in math are strange"

#### Gender Analysis

Respondents identified a “math placement” based upon one of three options:

- the math class I am currently taking
- the math class I would have taken
- I meet my math competency at the following level

After recording the variable into three categories, feelings, showed 7%, 23.3%, 59.4% were advanced students, 236 (70%) were college and 26 (7.7%) were review. Twenty six variables were statistically significant (10 more than gender) ranging from weak to strong in strength (1.01 < r < .40). After analysis one can conclude students in “review” math were more likely to:

- perform poorly in mathematics
- dislike mathematics
- have poor attitudes towards math
- have high levels of anxiety in class and on tests
- experience negative incidents in the classroom
- have effective teachers
- have families who supported math/school

#### Math Placement at UWEC

In both cases “math ability” becomes stronger with a larger percentage of respondents selecting this placement. As well as a complete summary of the results.

### Final Thoughts

It is the view of the primary researcher that although gender still affects students' attitudes, it is not the most influential. Although respondents reported math ability, previous teachers, teaching style, previous courses and personal feelings as the top factors, these factors do not change for females or respondents in review math classes. In both cases “math ability” becomes stronger with a larger percentage of respondents selecting this option. Surprisingly, the same results were not echoed within the survey questions with the exception of personal feelings (one of the strongest associations). There are many reasons why this may be the case:

1. No previous studies asked, only questions about performance and attitudes of students.
2. Many respondents reported both excellent and poor math teachers
3. Questions about teaching style were focused upon the different activities teachers used in class
4. It is impossible to compare classes and curriculum from different schools

Future research is needed focusing on these issues and ways to measure them more accurately. A deeper analysis of the data collected is planned. A handbook is available for those who may be interested in a complete list of the variables which were statistically significant as well as a complete summary of the results.

### Recommendations for Future Teachers

- Remember, teachers are the most prominent factor in influencing students’ performance and feelings about math.
- Utilize activities to increase math’s likeability as students who do not like math are more likely to perform poorly.
- Integrate ways to improve math confidence daily into classes since those who don’t like or don’t perform well are lacking in these areas.
- Incorporate anxiety reduction techniques because many students (those who don’t like, don’t perform well or are in lower classes) produce higher levels of anxiety in class and on tests.

### Thanks and Acknowledgements

- Faculty/Student Collaborative Research Grant
- U.S. National Science Foundation Grant
- Mathematics Department at UWEC
- Mathematics Education Research Team
- Faculty Support
- Students for their time, support and thoughts