MATHEMATICS ANXIETY AMONG YOUNG FILIPINO LEARNERS: INVESTIGATING THE INFLUENCE OF GENDER AND SOCIO-ECONOMIC STATUS

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ABSTRACT: *The quantitative study explored the mathematics anxiety of the five hundred sixteen (516) junior high school students with age ranging from eleven (11) to seventeen (17). Data collection was realized through the administration of an adopted research questionnaire with declared reliability of 0.85. The analysis of the data revealed that the anxiety of the respondents towards Maths is characterized as 'moderate anxiety'. In addition, there is a gender difference in the MA of the respondents with females having a higher one. However, the established difference is not statistically significant. Lastly, the result also exposed that the socio-economic status of the respondents does not impact significant difference in the students' mathematics anxiety.*

Keywords: mathematics anxiety, gender and socio-economic status

1. INTRODUCTION

The importance of mathematics is primarily found in its being a tool in solving problems in science and in providing solution to concerns in real life [1]. Sadly, however, despite the great importance of the said subject, many students seem to develop anxiety towards it; hence, owing to the importance of the subject, researches were conducted to determine anxiety towards mathematics with the end goal of finding what induces it and how to minimize it among learners.

Others [2], pointed out that research on mathematics anxiety [henceforth be MA] can be traced to have begun in the 1960s. The earliest definition of the construct is noted to be given by [3]. They defined MA as simply as a reaction, emotional in nature. Their definition suggests that MA is an emotional response evoked by maths and arithmetic. In another light, [4] maintained that MA is more than the feeling of not liking maths; instead, it is a response characterized to be negative when doing mathematics-related tasks. Moreover, MA is claimed to induce multiple unpleasurable feelings such as, but not limited to, worry, frustration, tension and fear [5]. [6], on one hand, claimed that MA is a form of panic. On another hand, [7] explained that MA is an illogical fear that distresses students, hindering performance and learning. It can be noted, along this line, that MA is one emotional aspect that detriments students performance. In fact, mathematics anxiety has been identified to impact negatively mathematics performance of learners – to this affect students' overall academic performance [8].

In addition, an investigation of the impact of gender on students' MA is also purposed by this present study. Studies like that of [9] and [10] have found that MA difference exists across gender with females found to be of higher anxiety than their male counterparts. Supportive of this is the empirical study of [2] which yielded the result that disclosed females to be more anxious than males; however, the difference established was not significant.

Additionally, most of the studies on mathematics anxiety among young learners are conducted in the context of foreign lands. None or at best very few were conducted in the Philippines. The dearth of literature investigated in the provided context prompted the conduct of this empirical work. Addedly, the study included the variable socio-economic status in the investigation of MA among determined young learners.

2. RESEARCH QUESTIONS

This research study aimed at identifying the mathematics anxiety of grade seven (7) Filipino learners intended to answer three (3) questions, to wit:

1. What is the mathematics anxiety of the respondents?
2. Is there a significant difference in the mathematics anxiety of the respondents when data is grouped according to gender (male and female)?
3. Is there a significant difference in the mathematics anxiety of the respondents when data grouped according to socioeconomic status?

3. HYPOTHESES OF THE STUDY

H_o – There is no significant difference in mathematics anxiety of the male and female respondents

H_o – There is no significant difference in the mathematics anxiety of the respondents across socio-economic status.

4. METHODOLOGY

4.1 RESEARCH DESIGN

The current study, aimed at determining the influence of gender and socio-economic status of the respondents, employed a quantitative-descriptive design. [11] in [12] explained that studies carrying an objective of providing a description to trends and phenomenon is considered as descriptive. Such is the case of this study which intended to characterize descriptively the mathematics anxiety of the respondents. In addition, [13] cited in [14] discussed that a descriptive study is a form of investigation that includes processes such as gathering, analyzing and interpreting data with the use of statistics limited to simple ones.

Moreover, the study's data collection was realized through the use of an instrument which according to [15] may either be a survey-questionnaire, standardized test or a checklist; however, for this present study a survey-questionnaire was used which according to [16] in [17], a means of data collection described to be both practical and cost-efficient especially when collection involves a large number of respondents as in the case of this study which sampled over five hundred grade, seven students,.

As regards the time of data gathering, the current investigation is considered cross-sectional. According to [18]

found in [19], studies can either be cross-sectional or longitudinal. This classification relates to the time data collection was realized. If the gathering of data is done within a short period of time, usually performed in one shot, it is considered as cross-sectional. On the other hand, if data gathering is performed over a long period and usually done in multiple shots, it is considered as longitudinal.

Lastly, the current research is noted to be none experimental as no control group was established and no intervention was utilized **[20]** in **[21]**.

4.2 PARTICIPANTS OF THE STUDY

The study gathered data from a large number of respondents inspired from the contention of [15] that the larger number of participants enlisted in the study '*the stronger the case for applying the results to a large number of people* (p.14)'. Characterization of the respondents are provided in three (3) tables, to with Table 1 presents the respondents' distribution across gender cross-tabulated with age; Table 2 provides the respondents' distribution across the variable socio-economic status and age; and, Table 3 gives the distribution of the respondents across the demographic profile gender cross-tabulated with socio-economic status.

Table 1: Demographics: Gender cross-tabulated with Age

Age	Gender		Total
	Male	Female	
11	36	47	83
12	136	174	310
13	67	41	108
14	5	5	10
15	1	1	2
16	1	1	2
17	1	0	1
Total	247	269	516

It can be noted that majority of the respondents of the current study are females, composing 52.1% of the total population sampled in the investigation. Moreover, the age range of the respondents is 11 to 17 with a mean (M) score of 12.12 and standard deviation (SD) of 0.761. The demographic data present that most of the respondents are aged 12. Addedly, the distribution of the respondents according to age is concentrated among ages 11, 12 and 13. This is expected because the entry age for grade 1 is 6 – 7 years old; hence, by the time students reach grade 7, the learners' age is within the range of 11 to 13. Those aged 14 to 17 may have entered primary school late or have stopped in the course of their elementary education. These are the reason seem to explain the limited number of respondents from the mentioned age bracket (14 – 17).

It can be gleaned from the table that most of the respondents have reported coming from the lower class (combined family income of Php.10,000 to Php. 25,000). On another note, the least number of learners surveyed in the study come from the Upper Class (combined income of Php.125,001 to Php.150,000). This suggests that the distribution of respondents according to socio-economic status is disproportionate as many come from lower classes than those coming from upper classes. Addedly, with the exception of those from Class C, as the socio-economic status increases, the number of students belonging to higher the brackets decreases. In addition, it can be further noticed that most of the respondents aged 11 and 12 come from the lowest socio-economic class.

Table 2: Demographic: Socioeconomic Status (SES) cross-tabulated with Age

Age	Socio-economic classes						Total
	E	D2	D1	C	B	A	
11	28	16	13	19	7	0	83
12	100	57	47	64	31	11	310
13	27	20	17	30	10	4	108
14	7	1	0	1	1	0	10
15	1	1	0	0	0	0	2
16	2	0	0	0	0	0	2
17	1	0	0	0	0	0	1
Total	166	95	77	114	49	15	516

Table 3: Demographic: SES cross tabulated with Gender

SES	Gender		Total
	Male	Female	
Class E	71	95	166
Class D2	53	42	95
Class D1	41	36	77
Class C	57	57	114
Class B	23	26	49
Class A	2	13	15
Total	247	269	516

It can be noticed that both for the male and female respondents, mostly come from Class E (Lower Class). On another note, the least number of males and females come from Class A (Upper Class).). Moreover, the least number of males and females both come from Class A.

4.3 RESEARCH TOOL

According to **[15]**, in order to measure, observe or document quantitative data, an instrument or also known as the tool is needed. Moreover, the tool contains both questions and response developed, validated and pilot tested for reliability. For this study, the Modified Abbreviated Math Anxiety Scale (MAMAS) adapted from **[22]** was adopted. The same authors claimed that most of the developed scale aimed at determining mathematics anxiety was only appropriate to be used with adults or older adolescents. However, the questionnaire used in the study was evaluated for the scale's reliability, factor structure, and divergent reliability. It was concluded in their study that the instrument is both a valid and reliable scale for measuring mathematics anxiety even of children. Moreover, the researchers were also able to establish that the tool indeed can measure mathematics anxiety as a distinct variable from test anxiety and general anxiety. The questionnaire was declared to have a 'very good' ordinal alpha (0.89) for the whoel scale, and a Cronbach's alpha of 0.85 (with 95% confidence interval).

The instrument is of five-point Likert scale ranging from 1(low anxiety) to 5 (high anxiety). In addition, to facilitate students understanding of the scale, emoticons were used – a happy one placed above the scale 1 – low anxiety and a frowning one above the scale 5- high anxiety. Moreover, the instrument is composed of two parts. Part 1 is the demographic profile which solicited from the learners their

information relating to their gender, socio-economic status and age. Part 2 is the main mathematics anxiety questionnaire. It contains only nine (9) items.

4.4 PROCEDURE OF THE STUDY

The gathering of the data for this study started with the adoption of the research instrument. Upon determination of the appropriateness of the tool, request letters seeking permission to grant access to respondents were sent to five (5) schools heads. The researchers also personally sought an audience with respective school heads after a couple of days the letters were sent. Discussion about the nature of the endeavor was provided and the schedule for data collection to identified respondents was set. On the date of data gathering, students were first oriented that participation in the investigation is purely voluntary in nature and that they may withdraw at any time without them having to explain the reason. Moreover, it was explained to the learners that no additional points be given to those who participate, and no deduction would be given to those who would wish not to take part.

The general instruction was read to the learners and time was allotted for them to ask questions relating to the directions on how to go about in answering the survey given. When all questions were answered, the administration of the tool was done. The students were further instructed to submit the instrument at their will. The data collection lasted for about twenty minutes.

4.5 ANALYSIS PROCEDURE OF THE DATA

The nominal variable gender, which in this study is taken to simply mean the classification of the respondents as male and female, is coded as 1 for males (M) and 2 for females (F). For the ordinal variable socio-economic status, the following code was utilized: 1 for Class E, 2 for Class D1, 3 for Class D2, 4 for Class C, 5 for Class B, and 6 for Class A.

For the responses in the Mathematics Anxiety, the following coding procedure is utilized: 1 for low anxiety (LA), 2 for some anxiety (SA), 3 for moderate anxiety (MA), 4 for quite a bit anxiety (QA), and 5 for high anxiety (HA). Moreover, the responses of the students were tabulated to determine the arithmetic mean. In addition, to give interpretation to the mean score of the responses, the following table of interpretation (Table 4) is used.

Table 4: Mathematics Anxiety Scale

Interpretation for responses per item in the Questionnaire	Adjectival Interpretation of the computed mean score	Interpretation for the overall Mathematics Anxiety
Range	**Interpretation**	**Range**
4.2 to 5.0	High Anxiety	37 to 45
3.4 to 4.19	Quite a bit Anxiety	29 to 36
2.6 to 3.39	Moderate Anxiety	21 to 28
1.8 to 2.59	Some Anxiety	13 to 20
1.0 to 1.79	Low Anxiety	5 to 12

4.6 STATISTICALTREATMENTS

The study utilized one descriptive and two inferential statistics to answer the questions aimed to be answered by the study. Descriptive statistics specifically mean and the standard deviation is employed to determine the mathematics anxiety of the respondents. Inferential statistics were used, specifically independent sample t-test, to determine the significant difference in the MA among respondents across gender. Another inferential statistics, the statistical treatment is known as one-way Analysis of Variance (ANOVA), was used to determine the significant difference in the MA of the respondents across socio-economic status.

5. RESULTS AND DISCUSSION

5.1 MATHEMATICS ANXIETY OF THE RESPONDENTS

To answer the question 'What is the mathematics anxiety of the respondents?' the responses from the collected survey questionnaire were coded, tabulated and analyzed. Table 4 presents a descriptive analysis of the data.

Table 4: Students Overall Mathematics Anxiety

Variable	Mean	Std. Dev.	Interpretation
Mathematics Anxiety	22.84	6.01	Moderate Anxiety

The table gives the overall anxiety of the respondents. The data exposes that the arithmetic mean of 22.84 (6.01) corresponds to the adjectival equivalent of 'moderate anxiety'. This suggests that the respondents, in the scale of math anxiety, reported their anxiety towards Mathematics, on the average, to be at the middle. Further probing of the data was performed to determine the students' anxiety per item in the instrument. This is presented in Table 4.1

Table 4.1: MA per item in the instrument

Item	M	SD	Interpretation
1	2.24	1.06	Some Anxiety
2	2.22	1.08	Some Anxiety
3	2.22	1.12	Some Anxiety
4	2.48	1.83	Some Anxiety
5	3.41	1.32	Quite a bit anxiety
6	2.28	1.09	Some Anxiety
7	2.23	1.13	Some Anxiety
8	3.82	1.31	Quite a bit Anxiety
9	1.94	1.05	Some Anxiety

From the table, it can be gleaned that item 8 '*Finding out you are going to have a surprise maths quiz when you start your maths lesson*' gained the highest mean score of 3.82 interpreted as 'quite a bit anxiety'. The result implies, in comparison to other items in the questionnaire, that the respondents are 'most' anxious when an unannounced test is given. The absence of preparation in taking an exam in mathematics is the seen reason to explain this. Moreover, the second highest-rated is item number 5 '*Being given homework with lots of difficult questions that you have to hand in the next day*'. There are two reasons seen for the identified level of anxiety. One is the difficulty of the questions given. If homework is with many difficult problems to solve, most likely students are able to feel anxious because there may be no one available to provide assistance should they encounter difficult – unlike when one is in school where the teacher could always provide clarification and assistance. Second is the short time given to solve the assignment results to the anxious feeling among the respondents. The limited-time given to understand, sort out and solve the maths

assignment posts a challenge to students especially if many of the items are difficult to solve.

Moreover, it can be noticed that out of the 9 items only two of the items were rated by the respondents to be 'Quite a bit of Anxiety' and the remaining items are scored to 'Some Anxiety'. In addition, the item least rated by the respondents is number 9 'Starting a new topic'. This means that students do not find it threatening to learn a new topic. Perhaps, it is because new topics have novelty and such stirs interest and excitement.

5.2. MATHEMATICS ANXIETY OF THE RESPONDENTS ACROSS GENDER

To determine the significant difference in the MA between the male and female respondents of the study, t-test for the independent sample was the statistical treatment used to analyze the data. Table 5 provides the result of the analysis.

Table 5: Mathematics Anxiety across male and female respondents

Variable	Gender	Mean	Std. Dev.	Sig. (2-tailed)
Mathematics Anxiety	Male	22.70	5.99	0.623
	Female	22.96	6.13	

Table 5 shows that analysis of the data on the mathematics anxiety of the respondents across gender. The data divulged that the females, in general, are more anxious than the males as suggested by the mean difference of 0.26. This to an extent supports the claim of previously conducted investigations **[9]** and **[10]**. However, along this line, it must be emphasized that the difference, statistically, is not significant. Therefore, males and females do not significantly vary in terms of MA. It further means that, in the case of these respondents, there exist no gender difference in Mathematics Anxiety. This is corroborated with the result of the study of **[2]** who reported there is a difference in the MA between males and females but the difference is not supported statistically. In addition, with the given result of the study, the hypothesis '*There is no significant difference on mathematics anxiety of the male and female respondents*' is accepted.

5.3 MATHEMATICS ANXIETY OF THE RESPONDENTS ACROSS SOCIO-ECONOMIC STATUS

To determine the significant difference of the MA of the respondents across SES, the data drawn from the instrument was encoded, tabulated, computed, and analyzed. One-way Analysis of Variance (ANOVA) was the statistical tool used in treating the data. Table 6 shows the result.

Table 6: Mathematics Anxiety across SES

Variables	p-value	Interpretation
Mathematics Anxiety and Socio-economic Status	0.437	No Significant Difference

The table on Mathematics Anxiety across SES provides that there is no significant difference in the MA of the respondents from whatever socio-economic status they may come. This means that SES is not a factor influencing the difference in the MA of the respondents. Therefore, the null hypothesis '*There is no significant difference in the mathematics anxiety of the respondents across socio-economic status*' is accepted.

6. CONCLUSION

The results of the investigation are grounds for the following conclusion of the study:

First, the respondents have identified themselves to be of 'moderate anxiety'. Second, the study confirms previous reports there is a difference in anxiety level towards Maths between males and females. However, the said difference is not statistically supported. Third, the socio-economic status of the respondents does not relate to respondents' MA.

7. REFERENCES

[1] Unlu, M., Ertekin,E., & Dilmac, B. (2017). Predicting Relationships between Mathematics Anxiety, Mathematics Teaching Anxiety, Self-efficacy Beliefs towards Mathematics and Mathematics Teaching. *International Journal of Research in Education and Science*, 3(2), 636-645.

[2] Yavuz, G. (2018). Mathematics Anxiety of Ninth Grade Students. *Journal of Education and Training Studies*, 6(5), 21-27.doi:https://doi.org /10.11114 / v 6 i 5 3044.

[3] Dreger, R. M., & Aiken, L. R. Jr. (1957). The identification of number anxiety in a college population. *Journal of Educational Psychology*, 48(6), 344-351. doi: 10.1037/h0045894.

[4] Vinson, B. M. (2001). A comparison of preservice teachers' mathematics anxiety before and after a methods class emphasizing manipulatives. *Early Childhood Education Journal*, 29, 89–94.doi:10.1023/A:1012568711257.

[5] Eden, C., Heine, A., & Jacobs, A. (2013). Mathematics anxiety and its development in the course of formal schooling—A review. *Psychology*, 4(6), 27–35. doi: 10.4236/psych .2013.46A20 05.

[6] Buxton, L. (1981). *Do You Panic About Maths? Coping with Maths Anxiety*. London: Heinemann Educational Books Ltd.

[7] Morris, J. (1981). Mathematics Anxiety: Teaching to Avoid it. *Mathematics Teacher*, 74, 413-417.

[8] Ma, X., & Kishor, N. (1997). Assessing the relationship between attitude toward mathematics and achievement in mathematics: A meta-analysis. *Journal for Research in Mathematics Education*, 28(1), 26–47. doi: 10.2307/74966 2.

[9] Bieg, M., Goetz, T., Wolter, I., & Hall, N. C. (2015). Gender stereotype endorsement differentially predicts girls' and boys' trait-state discrepancy in math anxiety. *Frontiers in Psychology*, 6(1404), 1–8. doi: 10.3389/fpsyg .2015.01404 .

[10] Else-Quest, N. M., Hyde, J. S., & Linn, M. C. (2010). Cross-national patterns of gender differences in mathematics: a meta-analysis. *Psychological Bulletin*, 136(1), 103–127. doi: 10.1037/a0018 053.

[11] Johnson, B. (2000). Toward a New Classification of Nonexperimental Quantitaive Research. *Educational Researcher*, 3-13. In Alieto, E. (2019). Cognition as predictor of willingness to teach in the mother tongue and the mother tongue as a subject among prospective language teachers. Science International (Lahore), 31(1), 135-139.

[12] Alieto, E. (2019). Cognition as predictor of willingness to teach in the mother tongue and the mother tongue as a subject among prospective language teachers. *Science International (Lahore)*, 31(1), 135-139.

[13] Calderon, J. (2006). *Methods of research and thesis writing (2nd Ed.).* Mandaluyong City: National Bookstore. In Rillo, R. & Alieto, E. (2018). Indirectness Markers in Korean and Persian English Essays: Implications for Teaching Writing to EFL Learners. English as an International Language, 13(2.2), 165-184.

[14] Rillo, R. & Alieto, E. (2018). Indirectness Markers in Korean and Persian English Essays: Implications for Teaching Writing to EFL Learners. *English as an International Language*, 13(2.2), 165-184.

[15] Creswell, J. (2012). *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research (4th Edition).* Boston, MA: Pearson Education, Inc.

[16] Dillman, D., Smith, J., & Christian, L.C. (2009). Internet, mail and mixed-modesurveys:The tailored design method. *Hoboken, NJ:John Wiley and Sons*, . In Alieto, E. (2018). Language shift from English to Mother Tongue: Exploring language attitude and willingness to teach among pre-service teachers. TESOL International Journal, 13(3), 134-146.

[17] Alieto, E. (2018). Language shift from English to Mother Tongue: Exploring language attitude and willingness to teach among pre-service teachers. *TESOL International Journal*, 13(3):134-145.

[18] Setia, M. (2016). Methodology series module 3: Cross-sectional studies. *Indian Journal of Dermatology*, 61 (3), 261-264. In Buslon, J. & Alieto, E. (2019). Lexical inferencing strategies and reading comprehension in English: A case of ESL third graders. Asian EFL Journal, 22 (1), 73 - 94.

[19] Buslon, J. & Alieto, E. (2019). Lexical inferencing strategies and reading comprehension in English: A case of ESL third graders. *Asian EFL Journal*, 22 (1), 73 - 94.

[20] Thompson, C. (2007). Research study designs: non-experimental. *Air Medical Journal*, 26 (1), 18-22. doi:10.1016/j.amj.2006.10.003. In Perez, A.L., & Alieto, E. (2018). Change of "Tongue" from English to a local language: A correlation of Mother Tongue proficiency and Mathematics achievement. The Asian ESP Journal, 14(7.2):136-150.

[21] Perez, A.L., & Alieto, E. (2018). "Change of "Tongue" from English to a local language: A correlation of Mother Tongue proficiency and Mathematics achievement". *The Asian ESP Journal*, 14(7.2):136-150.

[22] Carey, E., Hill, F., Devine, A., & Szu, D. (2017). The modified abbreviated math anxiety scale: A valid and reliable instrument for use with children. *Frontiers in Psychology*, 8(11), 1-13. doi: 10.3389/fpsyg.2017.00011.