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To cite this article: A Alizamar *et al* 2019 *J. Phys.: Conf. Ser.* **1157** 042127

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# Are there statistical anxiety differences between male and female students?

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**Abstract.** This study aims to describe the differences in student statistics anxiety based on gender (male and female). The sample of this study was 368 students of Universitas Negeri Padang, who attended the Statistical courses in semester of January- June 2018. The result of research indicates that there are no differences in statistical learning anxiety on the gender aspect (male and female college students). Implications are discussed further

## 1. Introduction

Higher education curriculum in Indonesia, in general, requires scientific writing as a condition to complete the education. To obtain a proper quality scientific work, it is necessary to understand the correct research methodology, including the method of data analysis through statistical processing. Therefore, Universities in Indonesia requires statistical subjects as compulsory subjects for students as a prerequisite the completion of their studies. Statistics is the study of methods of data collection, processing, and interpretation of data, drawing conclusions and making decisions based on data that has been gathered objectively or actual facts [1]. In addition, by learning statistics students can collect and interpret data about certain things and draw conclusions in a situation where there are uncertainty and variation [2]. Thus, we can conclude that statistical study is about to understand the techniques of data collection, data processing techniques, data analysis techniques, drawing conclusions, and policy or decision making based on data and facts that are accurate. States that the statistics course has an influence on quantitative data analysis capabilities of students [3]. Given these functions make the science of statistics should be studied significantly by learners and educators from primary education institution to higher education as an effort to improve the quality of education. The role of statistics is increasingly evident and widespread in many aspects of life, delivering nearly every college with a variety of majors and courses recommended statistics as a compulsory subject to study by students.

But in reality, the statistical learning becomes difficult and complicated by some students who do not have a good mathematical basis [4,5]. Besides, statistical learning is also considered as subjects



that need serious thinking and not fun for some students, and they even try to avoid it, so it caused students tend to be anxious to statistical subjects [6,7]. Most students who enroll in a statistics class and quantitative study reported experiencing high levels of anxiety statistics. Also estimated that among all students taking statistics more than 65% had anxiety that cannot be controlled [8]. Statistical Anxiety is defined as worry or fear that occurs when a student dealing with the statistical concept [9]. Found a negative relationship between anxiety and achievement, which means the higher the anxiety of students get, the lower the achievements it is, and vice versa [10].

Furthermore revealed that students with less anxiety have a higher interest in statistics. In addition, students who have positive attitudes toward statistics class also tend to have higher confidence in their ability [11]. These findings may help teachers to plan a statistic learning strategy to help reduce student anxiety. Statistical anxiety is attributable to several factors that need to be considered (i.e., dispositional, situational, and environmental) [12,13]. The environment is one of the factors that affect the individual prior to study statistics, including gender, age, academic majors, and math experience [12,14–18]. Gender is one of the main socio-demographic predictors were mostly explored by researchers who study the statistical anxiety of students [6,7]. In addition, previous studies found that there is a difference in statistical learning strategies between male and female students, although it is not reviewed their anxiety level in statistics [19]. For that, it needs to know whether there is a difference in statistical anxiety between male and female students, in order to do a series of interventions to reduce statistical anxiety. In other words, the benefits of this research are that educators/teachers can design a treatment to reduce statistical anxiety which experienced by both students (male and female) so that they can think of statistics as an important thing to learn and fun, and it is no longer a scary thing as it happened recently.

## 2. Method

The study used a descriptive quantitative method at Universitas Negeri Padang academic year 2018, obtained through purposive random sampling. Data were collected through The Statistical Anxiety Rating Scale / STARS which was developed [20]. Adapted to use in the Indonesian and distributed online. Of the 449 students who fill out the questionnaire, the data can be processed only 368, because the rest is not complete charging the questionnaire. The questionnaire using 5 points Likert scale (from no anxiety to strong anxiety) in each of the situations for the first 23 items, and then participants were asked Reviews their level of agreement (from strongly agree to strongly disagree) on the remaining 28 items [18]. Results analysis of RASCH models indicates that scores the reliability of the person (Extreme and Non-Extreme) is 0.94. While the score of reliability is based on the value of Cronbach's alpha (KR-20) was 0.98, indicating that the interaction between the person and the items is good. Besides, the value of the sensitivity pattern of responses person (non-Extreme) +1.01 logit (INFIT MNSQ) and sensitivity values overall pattern of responses person (non-Extreme) +1.00 logit (OUTFIT MNSQ) indicate that they are in the ideal range ( $+0.5 > \text{MNSQ} < +1.5$ ) [21–23]. Further Rasch modeling analysis also found that the reliability of the items viewable score was 0.98, this means that the quality of the items used in the measurement is special. Besides, the value of the sensitivity pattern of response +1.00-person logit (INFIT MNSQ) and sensitivity values overall pattern of responses person +1.01 logit (OUTFIT MNSQ) indicate that they are in the ideal range ( $+0.5 > \text{MNSQ} < +1.5$ ). This indicates the items have a very good quality for the condition of the measurements made. Analysis of the data regarding the student statistical anxiety differences between male and female students using independent sample t-test.

## 3. Result and discussion

The results of t-test statistical anxiety between male and female students presented in table 1. In the table of Group Statistics, it represents the amount of data of male students was 76 and female students

292. While the results showed the mean average value for each group, the average value of anxiety statistics for groups of male students at 132.15 and the average value for a group of female students amounted to 135.32. Based on the average value does not look too different, but to make it clear whether there is a significant difference, it was used the t-test. In the table of *independent sample T-test*, F value is 1.249 with 0.265 which stated that the significance is greater than 0.05 ( $0.265 > 0.05$ ) then this explains the variant population is homogeneous. So that, the homogeneity requirements are met to examine differences in statistical anxiety among students male and female. Further anxiety hypothesis test indicates statistical value (sig = 0.436), it is stated  $p\text{-value} > 0.05$ . So, we can conclude the hypothesis is rejected. There is no statistical anxiety difference between male and female student. Further statistical anxiety condition of male dan female students presented in table 2.

**Table 1.** Results of *independent sample T-test* statistical anxiety in terms of gender.

Group Statistic			
	Gender	N	Mean
Statistical Anxiety	Male	76	132.15
	Female	292	135.32
<i>Independent Sample T-test</i>			
Values	Levene Test		T-test
	F	Sig.	Sig. (2-tailed)
Statistical Anxiety	1.249	.265	.436

**Table 2.** Statistical anxiety of male and female students.

Category	Interval Score	Male Students		Female Students	
		f	%	f	%
Very High	$\geq 214$ s/d $\leq 255$	0	0	2	0.6
High	$\geq 173$ s/d $< 213$	8	10.5	28	9.6
Moderate	$\geq 132$ s/d $< 172$	33	43.4	130	44.5
Low	$\geq 90$ s/d $< 131$	24	31.5	105	35.9
Very Low	$< 89$	11	14.4	26	8.9

In table 2 above it can be seen that in general statistical anxiety of male students in moderate category (43.4%) and general statistics anxiety female students in moderate category (44.5%). Based on the results of studies showing the average score of statistic anxiety of male and female students are not much different, as well as statistic anxiety conditions male and female students in the moderate category. So that, when tested with independent sample t-test, were no statistical anxiety differences between male and female students. But unlike other studies, explaining that there is a significant difference of anxiety statistics between male and female, seen from the average score of anxiety statistically female are higher than the average score of statistical anxiety of male, besides female are more concerned about the statistics than male [6,7,24,25]. Similarly, it is found female student are also more anxious about mathematics and science than the male student, because of the level of confidence the boys in math and science abilities higher than girls [26]. This is thought to occur because female students tend to fear and nervousness prior to work on the problems of statistics, so that before the count is already feeling anxious [24]. Besides, women are more concerned about the right or wrong answer they did their self, so it appears as an anxiety.

Gender difference in statistical anxiety is one of the many variables that are tested and debated [7]. Some studies show differences in anxiety statistical between male and female students [26,27] in which female students tend to have statistical anxiety higher than male students [28]. But unlike other

studies stating that male students have statistics anxiety level are higher than female students [6,19]. While the results showed no statistically significant difference between anxiety male students and female [29]. Nevertheless, differences in anxiety statistical student of men and women can occur in some circumstances, for example in the difference in the method of delivering the lecture material, as well as the research results Hedges [19] indicates when viewed from the learning method *face to face* and *online*, there are differences in anxiety stats of male and female student, where male students showed a higher percentage (54.9%) than female students (45.1%) in the class of direct (*face to face*), but in the *online* classes percentage of anxiety students is slightly higher in general, where male students have anxiety statistical percentage of 57.7%, and 42.3% female students. Differences anxiety statistical towards gender can also be explained by the presence of stereotype growing that subjects relating to the figures or calculations are more suitable for male students than female [30], so it caused a tendency to anxiety statistics higher in female students. In addition, differences in learning strategies can also affect the statistical anxiety in male and female students [28].

#### 4. Conclusion

The result showed that the statistical anxiety of male students in middle category (43.4%) and female students are also in the middle category (44.5%), and no significant statistical anxiety differences between male and female students. This study recommended the need for guidance and counselling services to help reduce anxiety when taking statistics courses. Furthermore, not only the responsibility of the counsellor, lecturer also played a role in reducing anxiety by providing an understanding that the statistics was easy, because students always think that the statistics it is difficult and confusing. Lecturers can create a fun learning design to attract the attention of students, so that the learning process can reduce fears of statistical subjects.

#### Acknowledgments

The authors would like to thank Cruise, Cash, and Bolton, and Hanna, D., Shevlin, M., and Dempster, for the opportunity to use the questionnaire STARS in this research project.

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