

# Correlations and Gender Differences between Self-efficacy and Test Anxiety in University Students

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**Abstract:** This study investigates whether there is a correlation between test anxiety and self-efficacy among university students, with a focus on whether there are differences in test anxiety and self-efficacy between male and female students. A sample of 1980 students was drawn from a Scottish university to participate in the study. The MSLQ questionnaire was used to measure the students' test anxiety and self-efficacy levels. Independent sample t-tests and Pearson correlation tests were conducted on the data collected. The independent samples t-test results showed that female students had significantly higher test anxiety and significantly lower self-efficacy than male students. Correlation analysis showed a significant negative correlation between test anxiety and self-efficacy. The findings of this study have important implications for further research into the reasons for the differences in the mindsets of male and female students facing examinations, and for addressing the dilemmas of female students about examinations and self-efficacy.

**Keywords:** Self-efficacy; Test Anxiety; University Students.

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## 1. Introduction

Testing is a common situation experienced by students. Even though university students have become so familiar with testing, test anxiety is still not uncommon among them that it has become an issue of concern. Test anxiety is usually the anxiety experienced by students in assessment situations such as exams or classroom tests (Putwain, 2008). It is also considered a context-specific personality trait and is generally thought to contain two psychological components: worry and emotional arousal (Sarason & Sarason, 1990). Test anxiety is usually caused when people believe that their intelligence, motivation and social competence are not sufficient to cope with the test (Zeidner, 2010). In other words, the results of people's assessments of their intelligence and abilities influence test anxiety. Self-efficacy, defined as the belief in one's ability to perform a particular task in a variety of situations, is a concept that measures the outcome of one's assessment of one's abilities (Putwain et al., 2013). Whether there is a correlation between self-efficacy and test anxiety levels is worth investigating.

There are many different perspectives on the factors associated with test anxiety in existing research, and self-efficacy has been the focus of much attention. It has been suggested that self-efficacy is a mediating variable between test anxiety and academic achievement, levels of test anxiety and self-efficacy can predict academic achievement and that self-efficacy can mitigate the effects of anxiety (Barrows et al., 2013). Mohammadyari (2012) compared the relationship between self-efficacy and test anxiety in relation to academic achievement and concluded that self-efficacy had a significant positive relationship with academic achievement, while test anxiety had a significant negative relationship with academic achievement. Although all the above studies dealt with test anxiety and self-efficacy, their focus was mostly on the factors influencing academic achievement, and there was a lack of direct research on the relationship between test anxiety and self-efficacy. Roick & Ringeisen (2017) further examined the relationship between academic achievement,

self-efficacy, and test anxiety, concluding that higher self-efficacy was associated with lower test anxiety and higher academic achievement. Onyeizugbo (2017) also identified self-efficacy as one of the moderators of test anxiety and concluded that there was a negative relationship between self-efficacy and test anxiety.

Another focus of research has been the differences in test anxiety and self-efficacy between different groups of students, and gender has been a variable that has received much attention in this regard. Although today's university education is very much focused on the topic of gender, women still face many problems in their studies. A study by McNabb et al. (2002) confirms that although female students have better average grades than their male counterparts, they are significantly less likely to achieve a first-class degree. Another study by Bonneville-Roussy et al. (2017) also concluded that female students would be under more pressure when faced with assessments. These studies illustrate that males and females continue to have very different experiences in the learning process. Do these differences in their experiences include differences in test anxiety and self-efficacy?

In the current study, differences in the performance of male and female students in terms of test anxiety are well documented. For example, a study by Bandalos et al. (1995) showed higher levels of test anxiety in females compared to males. Similarly, Balogun and Olanrewaju (2015), in a study on anxiety and self-efficacy for computer exams, concluded that female university students were more anxious about computer exams than male university students, and suggested that students with higher self-efficacy showed lower levels of anxiety. However, it still cannot be asserted that females experience more test anxiety than males. Sideeg (2015) found that although the quantitative analysis demonstrated higher levels of test anxiety among female than male college students, both genders exhibited the same types of anxiety symptoms with nearly equal severity and frequency in the qualitative data obtained for this study. Therefore, the question of whether there are gender differences in test

anxiety levels remains an open question. In terms of the relationship between gender and college students' self-efficacy, Huffman et al.'s (2013) study came to the interesting conclusion that gender roles are the leading cause of differences in technical self-efficacy. This suggests that there are indeed differences in self-efficacy across gender and that such differences are inextricably linked to the influence of gender roles. This conclusion is supported by a meta-analysis of 187 gender differences in academic self-efficacy (Huang, 2013). The meta-analysis revealed significant differences in self-efficacy between male and female students. However, there is a lack of conclusions as to whether gender differences in self-efficacy co-exist with gender differences in test anxiety.

Although there have been many studies related to test anxiety and self-efficacy, few existing studies have included the relationship between test anxiety and self-efficacy as a topic. In the studies that have been conducted, researchers have tended to focus on the relationship between test anxiety and academic performance. In these studies, researchers have only considered self-efficacy as an intermediate factor in regulating test anxiety and thus improving academic performance. On the other hand, in studies that have addressed the relationship between self-efficacy and test anxiety, self-efficacy has also tended to be only one of many moderating factors in models predicting test anxiety and has not been explored in greater depth. In terms of gender differences, existing research lacks the design idea of investigating gender differences in test anxiety and self-efficacy simultaneously, making it difficult to conclude whether gender differences in both exist. An investigation of the relationship between self-efficacy and test anxiety and gender differences may lead to a new understanding of both.

To discuss the relationship and gender differences between self-efficacy and test anxiety in more depth, the following three hypotheses were proposed for this study:

- University students with higher self-efficacy scores will report lower test anxiety.
- Female university students will show higher levels of test anxiety than male university students.
- Female university students will have lower levels of self-efficacy than male university students.

## 2. Method

### 2.1. Participant

In this study, a total of 2084 valid participants were obtained through the convenience sampling of questionnaires distributed through social media advertisements. 65% (n=1338) of the participants were female, and 31% (n=642) were male, with non-binary gender and unreported gender together making up approximately 3% of the sample (n=65). The mean age of the participants was 21 years (SD=6.28). As this study was conducted with male and female university students, the sample of participants who did not report their gender and non-binary gender were excluded, resulting in a final sample of 1980 eligible participants.

### 2.2. Materials

The Experimentum published questionnaire (DeBruine, 2019) was used to collect data for this study. The questionnaire was divided into two parts. The first part was designed to collect demographic information about the participants, including variables such as age, gender, whether they were English native speakers, employment status,

whether they lived in the school, level of study and the age at which they started their undergraduate studies. This section contains a total of eight questions. The second part is the Motivated Strategies for Learning Questionnaire (MSLQ), a scale used to assess the motivational orientations of university students and their different learning strategies for university courses (Pintrich, 1991). The MSLQ is divided into two sections, one measuring students' motivation, consisting of six sub-scales, and the other measuring students' learning strategies, consisting of nine sub-scales. 81 questions are included in the entire MSLQ, each containing a description such as "When I take a test, I think about how poorly I am doing compared with other students." (Pintrich et al., 1991). Participants will score the following on a scale of 1 to 7. The extent to which this description corresponds to one's situation is assessed, with 1 being "Not true of me at all" and 7 being "Very true of me".

Two motivational sub-scales, self-efficacy and test anxiety, were chosen as the main subjects of this study. Self-efficacy includes judgements about one's ability to complete a task, as well as confidence in one's skills to complete that task. Test anxiety, on the other hand, includes students' negative thoughts about their performance as well as emotional and physical anxiety (Pintrich et al., 1991). The two sub-scales consist of a total of 13 questions.

### 2.3. Procedure

After reading the project information and signing the consent form, the participants started answering the questionnaire. The questionnaire starts with demographic information, and the order of the questions is fixed. After submitting the demographic information, the participants will start answering the MSLQ, and the order of the questions will be randomized for each participant. Throughout the questionnaire, participants have the right to refuse to answer any question they do not wish to answer.

### 2.4. Design and Data Analysis

Two different analyses were conducted in this study. The variable to be measured was the average score on the two subscales of self-efficacy and test anxiety, and the independent variable was the gender of the participants (male/female). The first analysis used an independent samples T-test to test whether there was a difference between male and female participants on the mean scores on the self-efficacy scale and the test anxiety scale. In the second analysis, Pearson's correlation test was used to test whether there is a correlation between participants' self-efficacy and test anxiety.

## 3. Results

The two main variables involved in this study were the mean test anxiety score and the mean self-efficacy score. The data characteristics of these two variables can be described in Table 1.

**Table 1.** Characteristics of Variables

Variable	M	SD	Median	Min	Max	Skew
Anxiety	4.59	1.41	4.60	1.00	7	-0.24
Self-efficacy	4.84	1.12	4.88	1.88	7	-0.26

The first significant question in this study was whether there were differences in the mean scores of the two subscales, test anxiety and self-efficacy, in the MSLQ between male and

female university students. In the sample, the mean test anxiety score for male students was 4.13 (SD=1.4), while the mean test anxiety score for female students was 4.82 (SD=1.36). Moreover, the mean self-efficacy score for male students was 5.12 (SD=1.08), while the mean self-efficacy score for female students was 4.71 (SD=1.11). The distribution of the students' data for these two variables, grouped by gender, is shown in Figures 1 and 2. Before testing, it is necessary first to verify the assumption and thus choose the appropriate test. Here, QQ plots of residuals were used to test the normality of the two variables, mean test anxiety scores and mean self-efficacy scores, as shown in Figures 3 and 4. The visualization of the residual QQ plot shows that the residual data points for both variables are approximately distributed around a straight line. Therefore, both variables can be considered to be eligible for a normal distribution of residuals by the groups. Data for both variables were obtained from the mean scores of each participant on each subscale and can be considered interval data.

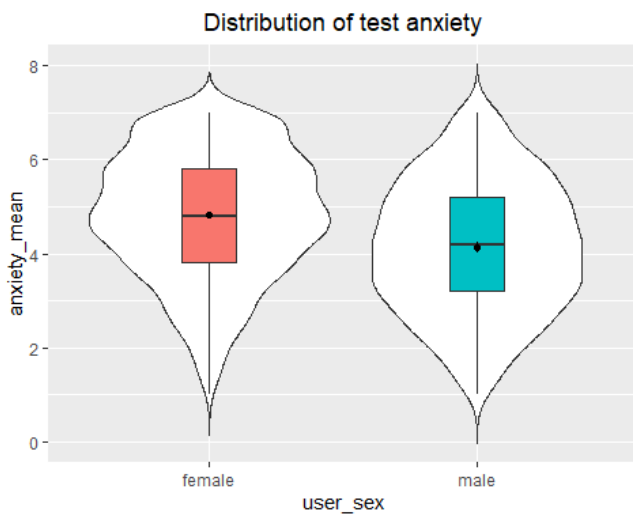


Figure 1. Distribution of test anxiety

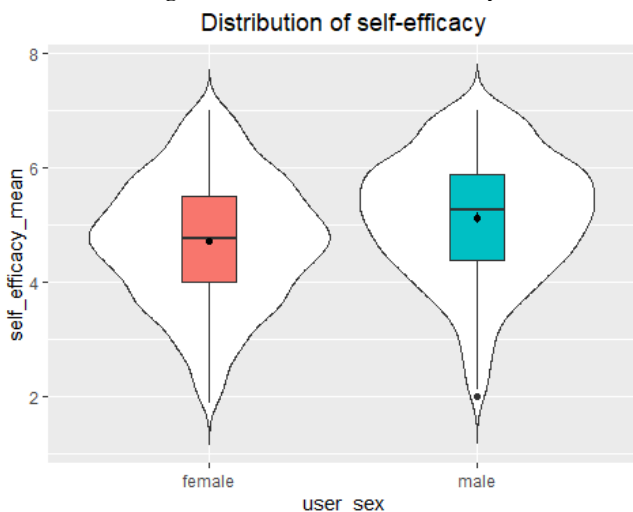


Figure 2. Distribution of self-efficacy

As the data collected met the hypotheses for running the Welch test, an independent samples t-test for both variables grouped by gender was conducted here using the Welch test approach. As the research hypothesis is directional, the test run will be a one-tailed test. The test results were corrected as the Welch test was run twice. The results of the test showed that female participants had greater mean scores on the test anxiety scale (M=4.83, SD=1.36) than male participants

(M=4.12, SD=1.4) (95% CI of difference= [0.58, ],  $t(1206.92) = 10.28, p < .001, d = 0.5$ ). In contrast, female participants had lower mean scores on the self-efficacy scale (M=4.71, SD=1.12) than males (M=5.12, SD=1.1) (95% CI of difference= [-, -0.32],  $t(1265.7930545) = -7.76, p < .001, d = 0.37$ ). Based on this result, the hypothesis that female participants in the study would exhibit higher test anxiety and lower self-efficacy than male participants were accepted.

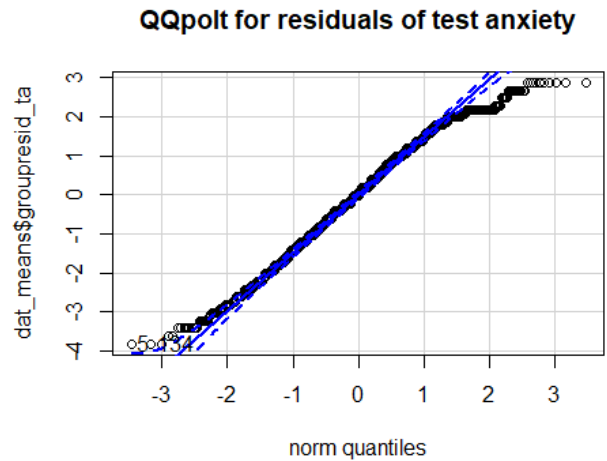


Figure 3. QQ plot for residuals of test anxiety

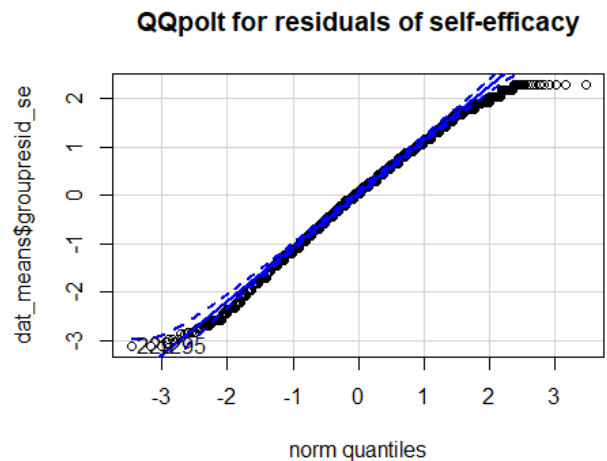


Figure 4. QQ plot for residuals of self-efficacy

The second main question in the study was whether there was a correlation between the mean scores on the test anxiety subscale and the mean scores on the self-efficacy subscale for university students. Visualizations of the QQ plots revealed that the data points for each of these two variables were approximately distributed around a straight line, so it can be assumed that both variables qualified as normally distributed, as shown in Figures 5 and 6. The data were manually checked to make sure that each participant had a corresponding data point on both variables. The scatter plot shows an approximately linear relationship between the two variables, as shown in Figure 7. As the data collected met the hypothesis of running the Pearson correlation test, the Pearson correlation test was used here to test the correlation between the two variables. The mean self-efficacy score was 4.84(SD=1.12), and the mean test anxiety score was 4.59(SD=1.41). Pearson's correlation found a significant, medium, negative correlation between the two variables ( $r(1940) = -0.24, p < .001$ ). Based on the results of the test, the

hypothesis that there is a correlation between self-efficacy and test anxiety can be accepted.

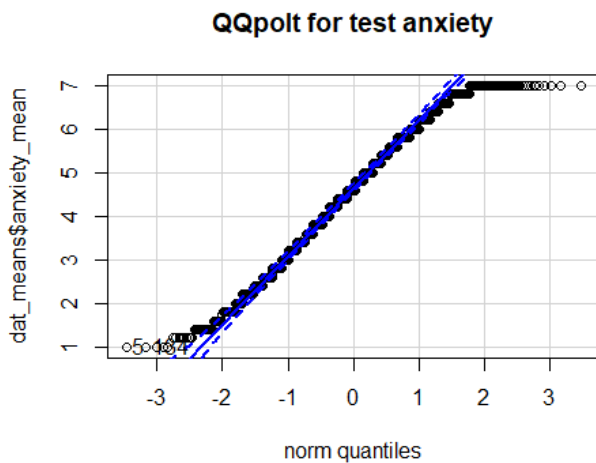


Figure 5. QQ plot for test anxiety

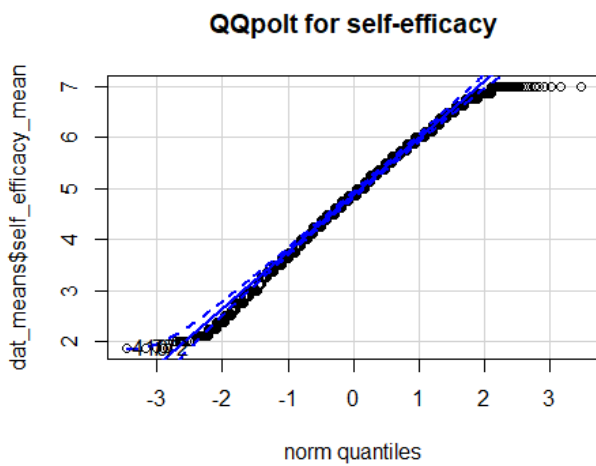


Figure 6. QQ plot for self-efficacy

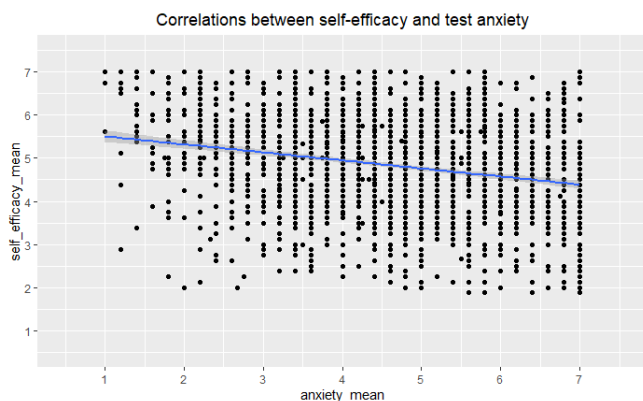


Figure 7. Correlations between self-efficacy and test anxiety

## 4. Discussion

As can be seen from the results, there was a significant moderate negative correlation between participants' self-efficacy and test anxiety ( $R(1940) = -0.24, p < .001$ ). In other words, university students with high self-efficacy had lower levels of anxiety about tests. This is consistent with previous research findings indicating that self-efficacy is negatively related to test anxiety (Jing, 2007; Onyeizugbo, 2010). Second, this study showed that female university students had lower self-efficacy than male university students. Also,

female university students showed higher test anxiety than male university students. A meta-analysis of 187 studies also supports the idea that female students have lower academic self-efficacy than male students (Huang, 2013). Furthermore, although many studies have shown that differences in test anxiety are not significant across genders (Mwamwenda, 1993; Onyeizugbo, 2010; Sideeg, 2015), the results of the present study confirm that female university students exhibit more anxiety than male university students. This result is in line with the findings of several other studies (Bandalos et al., 1995; Balogun and Olanrewaju, 2015). Further research may be needed to explain why gender differences in test anxiety differ in significance across studies with different backgrounds.

Linking self-efficacy to social cognitive theory, Bandura et al. (1999) argued that when faced with a task, people with low self-efficacy always fear that they will fail, leading to stress and low self-esteem, and even feelings of helplessness and bewilderment. In contrast, people with high self-efficacy tend to believe that they can perform well and focus on positive analysis and problem-solving to meet challenges. This may go some way to explaining the negative relationship between self-efficacy and test anxiety, whereby people with high self-efficacy are more confident that they can beat the test. Conversely, those with lower self-efficacy tend to worry more about failing the test. Specifically, for this study, the finding that male participants had a higher sense of self-efficacy and lower test anxiety was also supported. In contrast, female participants reported lower levels of self-efficacy and higher levels of test anxiety. However, there is still a lack of further research on the factors that influence the differential expression of self-efficacy and test anxiety in males and females. Although this study concludes that there are gender differences in self-efficacy and test anxiety levels between male and female university students, it still does not address the question of what accounts for this difference. Exactly what factors influence male and female students to have different levels of the two dimensions of self-efficacy and test anxiety is still a question that needs to be considered from a wider range of perspectives.

In conclusion, this study showed that there was a significant moderate negative correlation between test anxiety and self-efficacy. Furthermore, this study also found that there were differences in test anxiety and self-efficacy between male and female students, with female students showing higher test anxiety and lower self-efficacy than male students. These results have important implications for further research into the reasons for the differences between boys' and girls' attitudes towards examinations and for addressing girls' difficulties with examinations and self-efficacy.

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