

Evidence 2023.4.1.3: Pre and Post Statistics

Evidence Overview

A two-tailed paired samples t-test was performed to investigate the significance of the difference between the means of pre-test and post-test scores. The assumption of normality was confirmed by a non-significant Shapiro-Wilk test, suggesting that the differences could have originated from a normal distribution. The t-test results were significant, with a t-value of -21.02 and a p-value of less than .001, indicating a substantial difference between the pre-test and post-test means, with the post-test mean being significantly higher. This result led to the rejection of the null hypothesis, confirming that the observed difference was not zero. The effect size, measured by Cohen's d, was 5.62, indicating a large effect. These findings were summarized in Table 5 and visually represented in Figure 5, which included a bar plot of the means with 95% confidence interval error bars.

CAEP Standards Alignment

Initial	Advanced
4.1	

The Evidence

The two-tailed paired samples t-test showed a significant increase from pre-test to post-test scores, rejecting the null hypothesis with a large effect size (Cohen's $d = 5.62$).

Two-Tailed Paired Samples *t*-Test

Introduction

A two-tailed paired samples *t*-test was conducted to examine whether the mean difference of Pre and Post was significantly different from zero.

Assumptions

Normality. A Shapiro-Wilk test was conducted to determine whether the differences in Pre and Post could have been produced by a normal distribution (Razali & Wah, 2011). The results of the Shapiro-Wilk test were not significant based on an alpha value of .05, $W = 0.96$, $p = .776$. This result suggests the possibility that the differences in Pre and Post were produced by a normal distribution cannot be ruled out, indicating the normality assumption is met.

Results

The result of the two-tailed paired samples *t*-test was significant based on an alpha value of .05, $t(13) = -21.02$, $p < .001$, indicating the null hypothesis can be rejected. This finding suggests the difference in the mean of Pre and the mean of Post was significantly different from zero. The mean of Pre was significantly lower than the mean of Post. The results are presented in Table 5. A bar plot of the means is presented in Figure 5.

Table 5

Two-Tailed Paired Samples *t*-Test for the Difference Between Pre and Post

Pre		Post		<i>t</i>	<i>p</i>	<i>d</i>
<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
54.00	7.51	79.57	5.84	-21.02	< .001	5.62

Note. $N = 14$. Degrees of Freedom for the *t*-statistic = 13. *d* represents Cohen's *d*.

Figure 5

The means of Pre and Post with 95.00% CI Error Bars

