4.9 An experiment was conducted to evaluate the effectiveness of a work-site health program in reducing obesity as measured by a body mass index (BMI). A random sample of 12 workers received classes in exercise and diet education. The subjects were given a BMI before the program began and then after six months of the program. The data is given below. Test the claim that the program was effective in reducing body fat as measured by the BMI. Should the program be continued? Explain.

<table>
<thead>
<tr>
<th>Before:</th>
<th>26.5</th>
<th>26.1</th>
<th>25.4</th>
<th>27.4</th>
<th>25.4</th>
<th>25.4</th>
<th>25.8</th>
<th>26.3</th>
<th>26.5</th>
<th>26.1</th>
<th>26.5</th>
<th>25.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>After:</td>
<td>25.0</td>
<td>24.4</td>
<td>25.5</td>
<td>26.3</td>
<td>23.5</td>
<td>23.7</td>
<td>22.1</td>
<td>26.2</td>
<td>26.5</td>
<td>23.4</td>
<td>22.2</td>
<td>23.7</td>
</tr>
<tr>
<td>Diff:</td>
<td>1.5</td>
<td>1.7</td>
<td>-1</td>
<td>1.1</td>
<td>1.9</td>
<td>1.7</td>
<td>3.7</td>
<td>0.1</td>
<td>0</td>
<td>2.7</td>
<td>4.3</td>
<td>2.2</td>
</tr>
</tbody>
</table>

**Inference About Two Means: Dependent Case**

**Classic Before-After**

Enter Before into L1
Enter After into L2
L1 - L2 -> L3

H0: \( \mu_d \leq 0 \)

\[ \longrightarrow \]

H1: \( \mu_d > 0 \)

\[ \alpha = 0.05 \]

**Sample Data**

STAT > CALC 1-Var Stats L3

n = 12

\( \bar{d} = 1.73 \)

\( s_d = 1.386 \)

**Critical Value**

\[ t = 1.796 \quad df = 11 \]

**Test Statistic**

\[
t = \frac{\bar{d} - \mu_d}{s_d / \sqrt{n}} = \frac{1.73 - 0}{1.386 / \sqrt{12}} \approx 4.333
\]

\[
P-value = 0.0006
\]

Reject Ho

There is sufficient evidence to support the claim that the program was effective in reducing body fat as measured by the BMI. YES, the program should be continued.

**STUDY:** Chapter 8: Section 8.2

- Inference About Two Means: Dependent Case