

```

{
  "date": "2026-05-28 15:50:36",
  "test": "Two-way Independent Samples ANOVA",
  "group_column1": "treatment",
  "group_column2": "sex",
  "data_column": "score",
  "repeated_measures_column": "",
  "main_effects": {
    "treatment": {
      "F": 215.92446834596217,
      "p": 0.0
    },
    "sex": {
      "F": 0.05240746456787354,
      "p": 0.8195
    }
  },
  "interaction": {
    "F": 0.042950698425664194,
    "p": 0.8364
  },
  "summary_statistics_treatment": {
    "grouped": {
      "mean": {
        "A": 4.781363161582061,
        "B": 7.97095653515706
      },
      "std_dev": {
        "A": 0.9528089812659248,
        "B": 0.9647676158661982
      },
      "count": {
        "A": 40,
        "B": 40
      },
      "variance": {
        "A": 0.9078449547810096,
        "B": 0.9307765526241482
      },
      "n_missing": {
        "A": 0,
        "B": 0
      },
      "quartiles": {
        "A": {
          "0.25": 4.065774163275486,
          "0.5": 4.765854834163742,
          "0.75": 5.329610004032873
        },
        "B": {
          "0.25": 7.479339382964752,
          "0.5": 8.025610514564109,
          "0.75": 8.756981390595108
        }
      }
    },
    "min": {
      "A": 3.040329876120224,
      "B": 5.380254895910255
    },
    "max": {
      "A": 6.852278184508938,
      "B": 9.564643655814006
    }
  }
},
  "summary_statistics_sex": {
    "grouped": {

```

```

"mean": {
  "F": 6.351314163647831,
  "M": 6.401005533091291
},
"std_dev": {
  "F": 1.9343580439929962,
  "M": 1.8201089800273567
},
"count": {
  "F": 40,
  "M": 40
},
"variance": {
  "F": 3.74174104236041,
  "M": 3.312796699176225
},
"n_missing": {
  "F": 0,
  "M": 0
},
"quartiles": {
  "F": {
    "0.25": 4.757744337186779,
    "0.5": 6.239039927160331,
    "0.75": 7.994892237727079
  },
  "M": {
    "0.25": 4.7658589386072805,
    "0.5": 6.522253933020298,
    "0.75": 7.956105858506312
  }
},
"min": {
  "F": 3.040329876120224,
  "M": 3.086719755342202
},
"max": {
  "F": 9.564643655814006,
  "M": 9.057122226218915
}
},
"summary_statistics_interaction": {
  "grouped": {
    "mean": {
      "A_F": 4.73402488460595,
      "A_M": 4.828701438558171,
      "B_F": 7.968603442689712,
      "B_M": 7.973309627624408
    },
    "std_dev": {
      "A_F": 0.9680387092176913,
      "A_M": 0.9600284214390266,
      "B_F": 1.112087564224918,
      "B_M": 0.8208476944118859
    },
    "count": {
      "A_F": 20,
      "A_M": 20,
      "B_F": 20,
      "B_M": 20
    },
    "variance": {
      "A_F": 0.9370989425438538,
      "A_M": 0.9216545699707093,
      "B_F": 1.2367387505037108,
      "B_M": 0.6737909374213088
    }
  }
}

```

```

},
"n_missing": {
  "A_F": 0,
  "A_M": 0,
  "B_F": 0,
  "B_M": 0
},
"quartiles": {
  "A_F": {
    "0.25": 3.9189684089274994,
    "0.5": 4.741264974860094,
    "0.75": 5.199861825653032
  },
  "A_M": {
    "0.25": 4.351278334188968,
    "0.5": 4.765854834163742,
    "0.75": 5.508175625654916
  },
  "B_F": {
    "0.25": 7.479339382964752,
    "0.5": 8.025610514564109,
    "0.75": 8.814869992889454
  },
  "B_M": {
    "0.25": 7.485290421703669,
    "0.5": 8.027859999400865,
    "0.75": 8.643373861629504
  }
},
"min": {
  "A_F": 3.040329876120224,
  "A_M": 3.086719755342202,
  "B_F": 5.380254895910255,
  "B_M": 6.236959844637266
},
"max": {
  "A_F": 6.852278184508938,
  "A_M": 6.5792128155073915,
  "B_F": 9.564643655814006,
  "B_M": 9.057122226218915
}
},
"overall": {
  "mean": 6.376159848369561,
  "std_dev": 1.8663453645549768,
  "count": 80,
  "n_missing": 0,
  "variance": 3.4832450197958496,
  "quartiles": {
    "0.25": 4.7658589386072805,
    "0.5": 6.493563389277063,
    "0.75": 7.994892237727079
  },
  "min": 3.040329876120224,
  "max": 9.564643655814006
}
},
"normality_test": {
  "shapiro_wilk": {
    "test_statistic": 0.9922763074870584,
    "p_value": 0.9178032458778234
  }
},
"homogeneity_of_variance_test": {
  "levene": {
    "test_statistic": 0.22606536121480728,
    "p_value": 0.8779908288513949
  }
}

```

```

    }
  },
  "sphericity_test": "Not applicable",
  "post_hoc": {
    "treatment": {
      "correction_method": "holm",
      "significant_pairs": [],
      "posthoc_results": {
        "A - B": {
          "Contrast": "treatment",
          "Paired": false,
          "Parametric": true,
          "T": -14.877129659744169,
          "dof": 78.0,
          "alternative": "two-sided",
          "p_unc": 1.7380017280119486e-24,
          "BF10": "1.313e+21",
          "cohen": -3.326627322926628
        }
      }
    }
  },
  "sex": "Not applicable",
  "interaction": "Not applicable"
}

```