SEX DISCRIMINATION PROBLEM

8. Tests of Significance and Confidence Intervals

First we will apply the independent samples t-test for the male and female observations in the three-year period. SPSS produces the following output:

t-tests for Independent Samples of FSEX

Variable	Number of Cases	Mean	SD	SE of Mean
BSAL				
Females	61	5138.8525	539.871	69.123
Males	32	5956.8750	690.733	122.106

Mean Difference = -818.0225

Levene's Test for Equality of Variances: F= .344 P= .559

t-test for Equality of Means

Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	-6.29	91	.000	129.997	(-1076.25, -559.799)
Unequal	-5.83	51.33	.000	140.313	(-1099.67, -536.376)

The output starts with statistics of the two groups, followed by the value of the difference between means. The Levene test for equality of variances is also included. Provided the F value is not significant (P>0.05), the variances can be assumed to be equal and the Equal Variances line of values for the t-test can be used. If P<0.05, then the equality of variances assumption has been violated and the t-test based on unequal variances should be used.

In our case, the high P-value of 0.559 in the Levene's Test for equality of variances strongly indicates that the sample data are consistent with the equality variances assumption. The P-value of the two-sided t-test for the equality of means is obtained by SPSS as zero. Hence, one-sided p-value is zero as well. That means that there is a very strong evidence that the population mean starting salaries are higher for males. The mean starting salary for males is estimated to be $559.80 to $1076.25 larger than the mean starting salary for females.

Now we will carry tests of significance to compare the average starting salaries of males and females for each of the three one-year periods. This approach is reflecting changes in mean starting salary over the three-year period.

t-tests for Independent Samples of FSEX

Seniority between 65 and 76 (Year 1)

Variable	Number of Cases	Mean	SD	SE of Mean
BSAL				
Females	22	5341.3636	439.397	93.680
Males	6	6600.0000	827.043	337.639

Mean Difference = -1258.6364

Levene's Test for Equality of Variances: F= 3.138 P= .088

t-test for Equality of Means

Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	-5.10	26	.000	246.942	(-1766.23, -751.039)
Unequal	-3.59	5.79	.012	350.394	(-2123.57, -393.707)

t-tests for Independent Samples of FSEX

Seniority between 77 and 88 (Year 2)

Variable	Number of Cases	Mean	SD	SE of Mean
BSAL				
Females	23	5272.1739	468.721	97.735
Males	16	5790.0000	548.161	137.040

Mean Difference = -517.8261

Levene's Test for Equality of Variances: F= .784 P= .382

t-test for Equality of Means

Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	-3.17	37	.003	163.567	(-849.244, -186.409)
Unequal	-3.08	29.02	.005	168.322	(-862.072, -173.580)

t-tests for Independent Samples of FSEX

Seniority between 89 and 100 (Year 3)

Variable	Number of Cases	Mean	SD	SE of Mean
BSAL				
Females	16	4668.7500	500.185	125.046
Males	10	5838.0000	649.338	205.339

Mean Difference = -1169.2500

Levene's Test for Equality of Variances: F= .623 P= .438

t-test for Equality of Means

Variances	**t-value**	**df**	**2-Tail Sig**	**SE of Diff**	**95% CI for Diff**
Equal	-5.17	24	.000	226.060	(-1635.81, -702.685)
Unequal	-4.86	15.62	.000	240.417	(-1679.91, -658.589)

As you can see, the p-values of the t-test for equality of means are extremely small or reported as zero. That indicates strong evidence against the null hypothesis that the population means are equal in each of the three time periods. All the p-values reported above are obtained for two-sided alternatives. Remember that the p-value for one-sided alternative (the mean for males is higher) can be obtained by dividing the p-value for the two-sided alternative by two.