Unit 6 AS2: Choosing the Appropriate Hypothesis Test

SECTION I:

SCENARIO #1

In a classic study of problem-solving, Duncker (1945) asked subjects to mount a candle on a wall in an upright position so that it would burn normally. One group of subject was given a candle, a book of matches, and a box of tacks. A second group was given the same items, except the tacks and the box were presented separately as two distinct items. The solution to this problem involves using the tacks to mount the box on the wall, which creates a shelf for the candle. Duncker reasoned that the first group of subjects would have trouble seeing a "new" function for the box (a shelf) because it was already serving a function (holding tacks). For each subject, the amount of time to solve the problem was recorded.

What is the appropriate hypothesis test to analyze these data?

An independent measures T-test

Why did you choose this test?

I chose an independent measures t-test because we want to compare the population means between the two groups. Duncker concludes that the first group will have trouble seeing a "new" function for the box, which will take more time to solve the problem than the second group.

SCENARIO #2

A researcher for a cereal company wanted to demonstrate the health benefits of eating oatmeal. A sample of 9 volunteers was obtained and each subject ate a fixed diet without any oatmeal for 30 days. At the end of the 30-day period, cholesterol was measured for each individual. Then the subjects began a second 30-day period in which they repeated exactly the same diet except for 2 cups of oatmeal each day. After the second 30-day period, cholesterol levels were measured again.

What is the appropriate hypothesis test to analyze these data?

Dependent-measures t-test

Why did you choose this test?

I chose the dependent-measures test because we compared the before and after cholesterol levels on the same group of volunteers. In a dependent-measures t-test, we compare a before-treatment group mean to an after-treatment group mean.

SCENARIO #3

Suppose that scores on the Scholastic Achievement Test (SAT) form a normal distribution with a mean of 500 and a standard deviation of 100. A high school counselor has developed a special course designed to boost SAT scores. A random sample of n = 16 students is selected to take the course and then the SAT. The sample has a mean of 554. Was the course worth taking?

What is the appropriate hypothesis test to analyze these data?

Z-test

Why did you choose this test?

I chose the Z-test because of the standard deviation and the mean were given, this will provide me with the exact percentage of why the course was worth taking.

SCENARIO #4

Students often better remember information if they review their notes before going to bed. A researcher wished to empirically demonstrate this phenomenon. A sample of n=40 students participated in this study. After being given a list of words to memorize before going to bed, all participants were tested the next day at 8a.m. Half of his participants studied up to 1 hour prior to going to bed and the other half studied up to 3 hours prior to going to bed.

What hypothesis test did the researcher likely use to analyze the data?

Independent-measures t-test

Why did you choose this hypothesis test?

I chose the independent-measures t-test because we want to compare the means between the groups. Half the students studied one hour before bed, and the other half studied 3 hours before bed. Afterward, the amount of words that were remembered by each group will be compared to see if the test was true or not.

SCENARIO #5

A clinical psychologist has noted that autistic children seem to respond to treatment better if they are in a familiar environment. To evaluate the influence of the environment, the psychologist selects a group of n=50 autistic children who are currently in treatment and randomly assigns the sample to (a) standard clinical treatment, (b) at-home clinical treatment, and (c) half standard and half home clinical treatment.

What hypothesis test did the researchers most likely use to analyze the data?

ANOVA

Why did you choose this hypothesis test?

I chose the ANOVA hypothesis test because it is used to compare the means among three or more groups. In this test it will show the variability in the treatment in (a) a standard clinical treatment, (b) at-home clinical treatment and (c) half standard and half home-clinical treatment.

SCENARIO #6

Researchers wanted to investigate whether soccer players (who can sometimes get hit in the head with the ball) suffered any neurological deficits. These researchers measured neurological deficits in soccer players and compared the soccer player data to the data of non-soccer players believed to not engage in any other activity that could deliver blows to the head. The researchers did find significant differences between the soccer players and the non-soccer players.

What hypothesis test should the researcher use to analyze her data?

Independent-measures t-test

Why did you choose this hypothesis test?

I chose the independent-measures t-test in the two independent groups; soccer players and non-soccer players, to determine whether there is statistical evidence if the population means are significantly different or not

This section requires that you choose the appropriate hypothesis test for each data set, run the test on SPSS, and write up your conclusions in APA format.

1. Analyze the following data from a randomized two-group experiment, using the appropriate hypothesis test:

Control	Experimental
2, 3, 5, 7, 4, 3, 2, 1, 5,	4, 6, 5, 7, 8, 9, 7, 6, 8

Cut and paste your SPSS results here:

Group Statistics

	VAR00002	N	Mean	Std. Deviation	Std. Error Mean
VAR00001	1.00	9	3.5556	1.87824	.62608
	2.00	9	6.6667	1.58114	.52705

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means							
						Significance				95% Confidence Interval of the Difference	
		F	Sig.	t	df	One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference	Lower	Upper
VAR00001	Equal variances assumed	.324	.577	-3.802	16	<.001	.002	-3.11111	.81838	-4.84601	-1.37621
	Equal variances not assumed			-3.802	15.548	<.001	.002	-3.11111	.81838	-4.85012	-1.37211

Write up your results here:

The mean for the control group was M=3.5556 with an SD=1.87824. The mean for the experimental group was M= 6.6667, with an SD = 1.58114. Our data were significant. t (16)-3.802, p<.05

2. Analyze the following data measuring heart rate before and after watching a horror film:

Before	After
65	70
73	74
74	78
82	83
71	80
62	65
64	72

Cut and Paste your SPSS results here:

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	VAR00001	74.5714	7	6.21442	2.34883
	VAR00002	70.1429	7	7.01020	2.64961

Paired Samples Test

		Paired Differences					t	df	Significance	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			One-Sided p	Two-Sided p
Pair 1	VAR00001 - VAR00002	4.42857	3.15474	1.19238	1.51092	7.34622	3.714	6	.005	.010

Write up your research results here:

The mean heart rate after watching the horror film was M=74.5714, with an SD=6.21442. The heart rate means for before watching the horror film was M=70.1429 with an SD=7.01020. Our data did not support watching horror films affects heart rates. T (6) =3.714, p>.05

3. Analyze the following data from a randomized experiment that examined the effect of hours of sleep on happiness.

6 hours	8 hours	10 hours
10	10	9
15	11	9
11	10	9
9	11	8
8	13	9
12	13	7

Descriptives

VAR00001

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	Upper Bound	Minimum	Maximum
1.00	6	10.8333	2.48328	1.01379	8.2273	13.4394	8.00	15.00
2.00	6	11.3333	1.36626	.55777	9.8995	12.7671	10.00	13.00
3.00	6	8.5000	.83666	.34157	7.6220	9.3780	7.00	9.00
Total	18	10.2222	2.04524	.48207	9.2051	11.2393	7.00	15.00

ANOVA

VAR00001

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	27.444	2	13.722	4.714	.026
Within Groups	43.667	15	2.911		
Total	71.111	17			

Multiple Comparisons

Dependent Variable: VAR00001

Scheffe

(I) VAR00002	(J) VAR00002	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1.00	2.00	-.50000	.98507	.880	-3.1733	2.1733
	3.00	2.33333	.98507	.092	-.3399	5.0066
2.00	1.00	.50000	.98507	.880	-2.1733	3.1733
	3.00	2.83333*	.98507	.037	.1601	5.5066
3.00	1.00	-2.33333	.98507	.092	-5.0066	.3399
	2.00	-2.83333*	.98507	.037	-5.5066	-.1601

*. The mean difference is significant at the 0.05 level.

VAR00001

Scheffe[a]

VAR00002	N	Subset for alpha = 0.05	
		1	2
3.00	6	8.5000	
1.00	6	10.8333	10.8333
2.00	6		11.3333
Sig.		.092	.880

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 6.000.

Cut and paste your SPSS results, including the post-hoc test here:

Write the statistical statement for your results: F= (2,15) =4.714, p=0.26

Were the data significant? Yes _____ No _____

If yes, where was the significance found?

The data indicate a significant difference between the 8 hours of sleep group and the 10 hours of sleep group. However, there is no statistically significant difference between the 6 hours of sleep and the 8 hours of sleep groups, nor between the 6 hours of sleep and the 10 hours of sleep groups.

F= (2,15) =4.714, p=0.26