

Chapter 7: Answers

Task 1

Example: One of my pet hates is 'pop psychology' books. Along with banishing Freud from all bookshops, it is my vowed ambition to rid the world of these rancid putrefaction-ridden wastes of trees. Not only do they give psychology a very bad name by stating the bloody obvious and charging people for the privilege, but they are also considerably less enjoyable to look at than the trees killed to produce them (admittedly the same could be said for the turgid tripe that I produce in the name of education but let's not go there just for now!). Anyway, as part of my plan to rid the world of popular psychology I did a little experiment. I took two groups of people who were in relationships and randomly assigned them to one of two conditions. One group read the famous popular psychology book 'Women are from Bras and men are from Penis', whereas another group read Marie Claire. I tested only 10 people in each of these groups, and the dependent variable was an objective measure of their happiness with their relationship after reading the book. I didn't make any specific prediction about which reading material would improve relationship happiness.

SPSS Output for the Independent t-test

Book Read		N	Mean	Std. Deviation	Std. Error Mean
Relationship Happiness	Women are from Bras, Men are from Penis	10	20.0000	4.10961	1.29957
	Marie Claire	10	24.2000	4.70933	1.48922

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Relationship Happiness	Equal variances assumed	.491	.492	-2.125	18	.048	-4.2000	1.97653	-8.35253	-.04747
	Equal variances not assumed			-2.125	17.676	.048	-4.2000	1.97653	-8.35800	-.04200

Calculating the Effect Size

We know the value of t and the df from the SPSS output and so we can compute r as follows:

$$\begin{aligned}
 r &= \sqrt{\frac{-2.125^2}{-2.125^2 + 18}} \\
 &= \sqrt{\frac{4.52}{22.52}} \\
 &= 0.45
 \end{aligned}$$

If you think back to our benchmarks for effect sizes this represents a fairly large effect (it is just below 0.5—the threshold for a large effect). Therefore, as well as being statistically significant, this effect is large and so represents a substantive finding.

Interpreting and Writing the Result

When you report any statistical test you usually state the finding to which the test relates, and then in parenthesis, report the test statistic (usually with its degrees of freedom), the probability value of that test statistic, and more recently the American Psychological Association are, quite rightly, requesting an estimate of the effect size. To get you into good habits early, we'll start thinking about effect sizes now—before you get too fixated on Fisher's magic 0.05. In this example we know that the value of t was -2.12 , that the degrees of freedom on which this was based was 18, and that it was significant at $p = 0.048$. This can all be obtained from the SPSS output. We can also see the means for each group. Based on what we learnt about reporting means, we could now write something like:

- ☑ On average, the reported relationship happiness after reading Marie-Claire (M = 24.20, SE = 1.49), was significantly higher than after reading 'Women are from Bras and men are from Penis' (M = 20.00, SE = 1.30) (t(18) = -2.12, p < .05, r = .45).

Task 2

Imagine Twaddle and sons, the publishers of 'Women are from Bras men are from penis', were upset about my claims that their book was about as useful as a paper umbrella. They decided to take me to task and design their own experiment in which participants read their book, and this book (Field and Hole) at different times. Relationship happiness was measured after reading each book. To maximize their chances of finding a difference they used a sample of 500 participants, but got each participant to take part in both conditions (they read both books). The order in which books were read was counterbalanced and there was a delay of 6 months between reading the books. They predicted that reading their wonderful contribution to popular psychology would lead to greater relationship happiness than reading some dull and tedious book about experiments. The data are in **Field&Hole.sav**, analyse them using the appropriate t-test.

SPSS Output

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Women are from Bras, Men are from Penis	20.0180	500	9.98123	.44637
	Field & Hole	18.4900	500	8.99153	.40211

		N	Correlation	Sig.
Pair 1	Women are from Bras, Men are from Penis & Field & Hole	500	.117	.009

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	Women are from Bras, Men are from Penis - Field & Hole	1.5280	12.62807	.56474	.4184	2.6376	2.706	499	.007

Calculating the Effect Size

We know the value of *t* and the *df* from the SPSS output and so we can compute *r* as follows:

$$\begin{aligned}
 r &= \sqrt{\frac{2.706^2}{2.706^2 + 499}} \\
 &= \sqrt{\frac{7.32}{506.32}} \\
 &= 0.12
 \end{aligned}$$

If you think back to our benchmarks for effect sizes this represents a small effect (it is just above 0.1—the threshold for a small effect). Therefore, although this effect is highly statistically significant, the size of the effect is very small and so represents a trivial finding.

Interpreting and Writing the Result

In this example, it would be tempting for Twaddle and sons to conclude that their book produced significantly greater relationship happiness than our book. In fact, many researchers would write conclusions like this:

- ✓ 'The results show that reading 'Women are from Bras, men are from Penis' produces significantly greater relationship happiness than that book by smelly old Field and Hole. This result is highly significant.'

However, to reach such a conclusion is to confuse statistical significance with the importance of the effect. By calculating the effect size we've discovered that although the difference in happiness after reading the two books is statistically very different, the size of effect that this represents is very small indeed. So, the effect is actually not very significant in real terms. A more correct interpretation might be to say:

- ✓ 'The results show that reading 'Women are from Bras, men are from Penis' produces significantly greater relationship happiness than that book by smelly old Field and Hole. However, the effect size was small revealing that this finding was not substantial in real terms'

Of course, this latter interpretation would be unpopular with Twaddle & sons who would like to believe that their book had a huge effect on relationship happiness.