

ANSWERS Practice with 2x2 Mixed Factorial Designs

1. The purpose of the study was also to examine effect of participation in sports upon school performance and to consider whether that effect would differ across age groups. In this study a group of 1st graders who were participating in organized sports were identified and followed through 5th grade. The outcome measure was a composite score from their classroom grades with a score range from 0-20. Any student in the study that shifted into or out of sports participation was dropped from the study.

a. Draw and label the boxes depicting this 2x2 mixed group design.

b. What are the "effects" in the study?

-- Interaction of Grade & Sports participation

-- Main effect of Grade

-- Main effect of Sports Participation

c. Which effects are causally interpretable?

Nada !!!

Here are the output...

		1 st	Grade	5 th	
Sports Participation	Yes	14.1	<	19.52	16.81
	No	10.82	=	11.56	11.19
		12.38	<	15.35	

Descriptive Statistics

	SPORTS	Mean	Std. Deviation	N
G1SCORE	no	10.8182	4.49584	66
	yes	14.1000	4.91176	60
	Total	12.3810	4.96041	126
G5SCORE	no	11.5606	4.42068	66
	yes	19.5167	5.58597	60
	Total	15.3492	6.38789	126

b. Transpose the cell and marginal means into the table you drew above.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
GRADE	Sphericity Assumed	596.112	1	596.112	26.290	.000
GRADE * SPORTS	Sphericity Assumed	343.334	1	343.334	15.142	.000
Error(GRADE)	Sphericity Assumed	2811.602	124	22.674		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	49272.000	1	49272.000	2011.859	.000
SPORTS	1984.556	1	1984.556	81.033	.000
Error	3036.857	124	24.491		

- c. For the interaction... Do we need to compute the LSDmmd? Why or why not? **Yes, because the interaction is significant, so we have to determine the pattern of the interaction.**
- d. To compute the LSDmmd we'll need $k = 4$ $N = 126$ $n = 63$ $MSe = 22.674$ $df_{error} = 124$ $LSDmmd = 1.679$
- e. Put $<$, $>$ & $=$ in the table above to portray the simple effects of Sports Participation for each Grade.
- f. Describe the interaction using these simple effects

There was an interaction of Sports Participation and Grade as they relate to school performance. Those competing in sports had higher average grades than those who did not, however this effect was larger for 5th graders.

- g. Put $<$, $>$ & $=$ in the table above to portray the simple effects of Grade for each condition of Sports Participation.
- h. Describe the interaction using these simple effects.

There was an interaction of Sports Participation and Grade as they relate to school performance. Those competing in sports had higher average grades during 5th grade than during 1st grade, however there was no effect of grade for those who did not participate in sports.

- i. For the main effect of Sports... Do we need to use the LSDmmd? Why or why not?
No. With only 2 groups the F-test of the main effect provides the only significance test we need
- j.
- k. Put $<$, $>$ & $=$ in the table above to portray the Main effect of Sports Participation
- l. Is the main effect of Sport Presentation descriptive or potentially misleading?

Overall, those who participated in sports had higher school performance than those who did not participate in sports.

- m. For the main effect of Grade... Do we need to compute the LSDmmd? Why or why not?
No. With only 2 groups the F-test of the main effect provides the only significance test we need
- n. Put $<$, $>$ & $=$ in the table above to portray the Main effect of Sports Participation
- o. Is the main effect of Grade descriptive or potentially misleading?

Overall, 5th grader performed better than 1st graders, however this was not descriptive for those who did not participate in sports.

p. One RH: was that grades would improve for all students, but that those who participated in sports would show a larger improvement.

- Is this a main effect RH: or a RH: about an interaction?

Interaction

- Which set of simple effects would be used for the most direct test of the RH:?

Simple effects of Grade for each level of Sports participation

- Is this RH: support, partially supported or not supported by the results? Explain your answer.

Partial support – as hypothesized those who participated in sports showed a grade improvement from 1st to 5th grade, however, contrary to the research hypothesis those who did not participate in sports did not show an improvement.

p. A second RH: was that those who participated in sports would have higher grades.

- Is this a main effect RH: or a RH: about an interaction?

Main effect of Sports Participation

- Is this RH: support, partially supported or not supported by the results? Explain your answer.

Fully supported. There is a significant main effect in the hypothesized direction and that main effect is descriptive for both levels of the other IV. Specifically, the main effect of Sports, the simple effect of sports for 1st graders and the simple effect of Sports for 5th graders all show that those who participate in sports do better in school than those who do not participate in sports.

q. A third RH: was that 5th graders would have higher grades than 1st graders

- Is this a main effect RH: or a RH: about an interaction?

Main effect of Grade

- Is this RH: support, partially supported or not supported by the results? Explain your answer.

Partially supported. There is a significant main effect in the hypothesized direction, however that main effect is only descriptive for one level of the other IV. Specifically, both the main effect of Grade and the simple effect of Grade for those who participated in sports show an improvement from 1st to 5th grade, however there is no such improvement for those who did not participate in sports.