

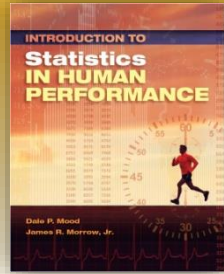


Chapter 9

One-Way Between Groups ANOVA

Multiple Comparison Procedures

SPSS One-way ANOVA



Independent Variable (X) Levels

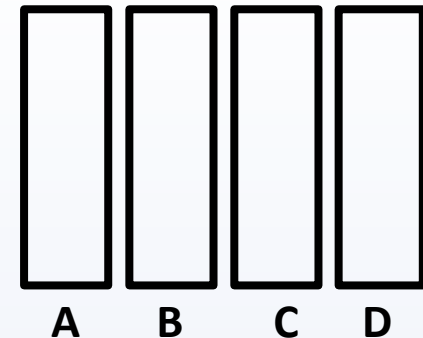
A = Pedometer Only

B = Pedometer and Written Support

C = Pedometer and Personal Support

D = Pedometer, Personal, and Computer Support

One-way ANOVA



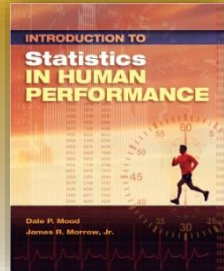
One Independent Variable (X)
Four Groups

Dependent Variable (Y) is Steps per Week

$$H_0: \mu_A = \mu_B = \mu_C = \mu_D$$

$$H_1: \mu_A \neq \mu_B \neq \mu_C \neq \mu_D$$

SPSS ANOVA Output



Steps Per Week (Nearest 1000)

	N	Mean	Std. Deviation
Pedometer Only	50	31420.00	9994.059
Pedometer and Written Support	50	36820.00	13745.040
Pedometer and Personal Support	50	42080.00	15891.006
Pedometer, Personal and Computer Support	50	50660.00	18736.857
Total	200	40245.00	16442.407

Now what?
Where are the differences?

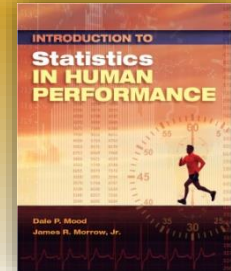
ANOVA

Steps Per Week (Nearest 1000)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	10072535000.0	3	3357511667	15.049	.000
Within Groups	43727660000.0	196	223100306.1		
Total	53800195000.0	199			

Reject H_0 at $\alpha < .001$

Multiple Comparison Procedures



3 Questions to answer

Simple (Two means only contrasted) or Complex (Multiple means involved)?

A vs. B or A vs. $(B+C+D)/3$

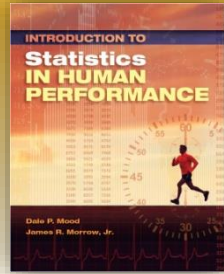
Contrast-based or Family-based Error rate?

EACH contrast at given alpha (e.g., .05) or FAMILY total alpha (e.g., .05)

Planned or Post hoc Comparison?

BEFORE the study or “Data snooping”

Common Multiple Comparison Procedures



Scheffé

Simple and complex contrasts; Family-based; Conservative

Tukey

Simple contrasts; Family-based

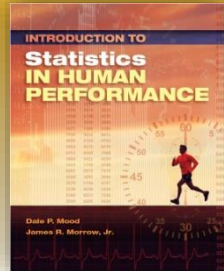
Student Newman Keuls (SNK)

Simple contrasts; Contrast-based

Trend Analysis

Planned; Complex; Contrast-based

SPSS ANOVA Output



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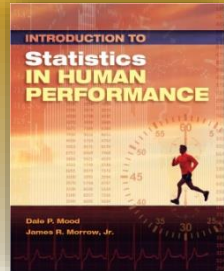
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SPSS Multiple Comparisons with One-way ANOVA



SNK – Contrast-based, Simple

Steps Per Week (Nearest 1000)

Student-Newman-Keuls^a

Group	N	Subset for alpha = 0.05		
		1	2	3
Pedometer Only	50	31420.00		
Pedometer and Written Support	50	36820.00	36820.00	
Pedometer and Personal Support	50		42080.00	
Pedometer, Personal and Computer Support	50			50660.00
Sig.		.072	.080	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 50.000.

Any means in the same subset are not different:
Any means not in the same Subset are different.

1 vs 2 no
2 vs 3 no
1 vs 3 and 4 yes
2 vs 4 yes
3 vs 4 yes