HSCC 470
Research Methods and Data Analysis in Health Sciences

Using SPSS: Pearson Correlation

Unit Objectives

Upon completion of this unit, the student will be able to:

- List the assumptions of the Pearson Correlation test.
- Describe when the Pearson Correlation Procedure is appropriate.
- Use SPSS to conduct Pearson Correlation and correctly interpret the output.

Statistical Methods to Test Hypotheses

Scale of Measurement	Two Treatment Groups Consisting of Different Individuals	Three or More Treatment Groups Consisting of Different Individuals	Before and After a Single Treatment in the Same Individuals	Association Between Two Variables
Interval	Unpaired *t* test	ANOVA	Paired *t* test	Linear Regression and Pearson Correlation
Nominal	Chi-square	Chi-square	McNemar's test	Contingency Coefficients
Ordinal	Mann-Whitney rank-sum test	Kruskal-Wallis statistic	Wilcoxon signed-rank test	Spearman Rank Correlation

Assumptions of the Pearson Correlation Procedure

- Continuous data
- Data measured on an interval or ratio level
- 2 or more variables are being compared
- Data drawn from a normally distributed population
- Measuring associations

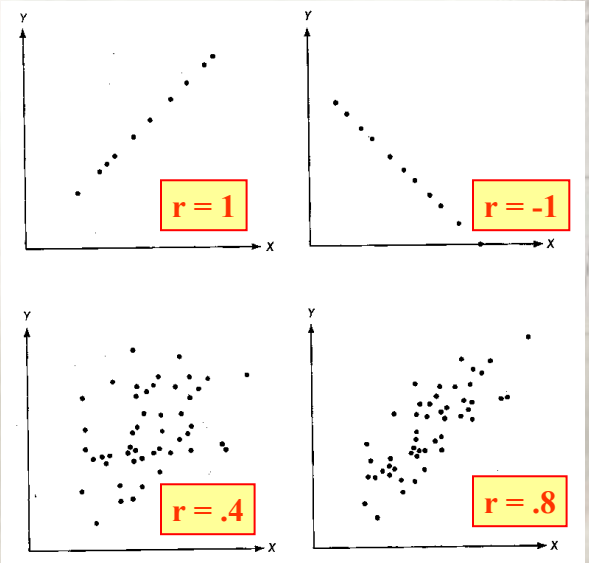
The Pearson Correlation

- **Does not determine causality, merely measures association.**
- **No independent and dependent variable.**
- **The more linear the relationship, the stronger the association.**
- **Association measured by the correlation coefficient *r*.**
- ***r* varies between –1 and +1**

The Pearson Correlation continued

- **The closer the magnitude of *r* is to 1, the less scatter there is in the relationship between the 2 variables.**
- **Positive correlations mean that as one variable increases, so does the other.**
- **Negative correlations mean that as one variable increases, the other decreases.**

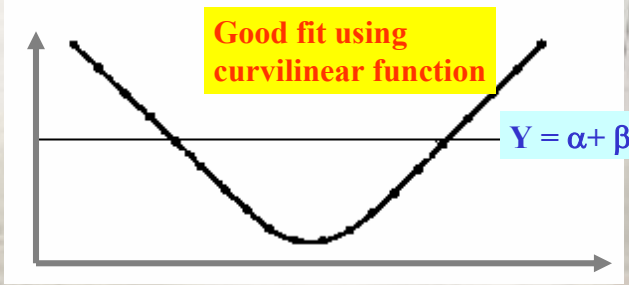
The Pearson Correlation continued



The Pearson Correlation continued

- **The association between X and Y is the same as between Y and X, thus the association is symmetrical.**
- **The value of *r* is not dependent on the magnitude of the units in which the variables are measured.**
- **The correlation is appropriate for use only when the relationship is expected to be reasonably approximated by a straight line.**

The Pearson Correlation continued



Assumptions of the Pearson Correlation Procedure

- **Assumptions**
  - Scale of measurement
    - Continuous data measured on an interval scale
  - Population distribution
    - **Normally distributed**
    - **Kolmogorov-Smirnov Test – $p > 0.05$**
  - Method of sampling
    - Randomized, 2 or more variables

Conducting the Pearson Correlation Procedure Using SPSS

- The Pearson Correlation Procedure is not a hypothesis test. Only associations are being measured. However, we must test the hypothesis of whether the Correlation Coefficient is significantly different from zero, or just the product of random sampling error.

Conducting the Pearson Correlation Procedure Using SPSS

- As an EMS educator, you are tasked with setting entrance criteria for transfer paramedic students to your over-subscribed BS degree program. You wish to make your criteria objective rather than subjective. You have developed a database over the years and now wish to see which variables are good predictors of student success in your program. Once identified, you hope to use these variables as entrance criteria to your program.

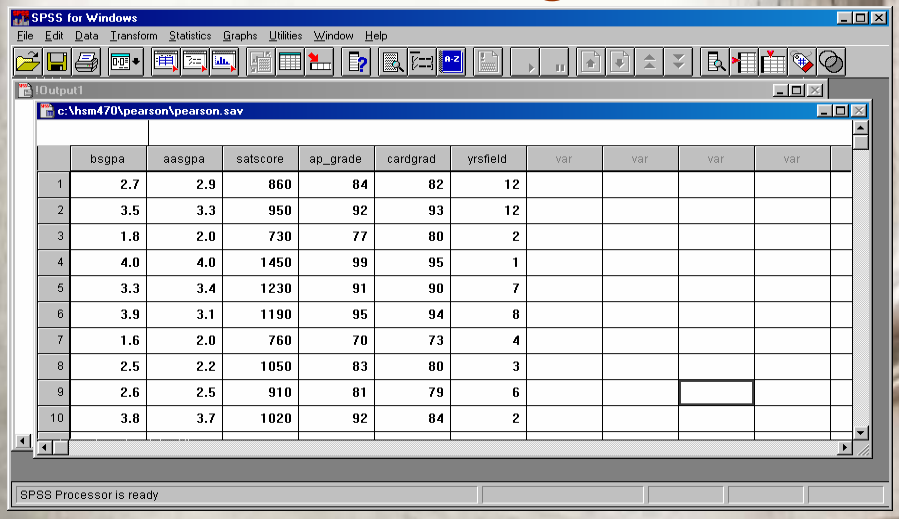
Conducting the Pearson Correlation Procedure Using SPSS

- **Variables**
  - GPA at graduation/dismissal from BS program
  - GPA at graduation from AAS program
  - SAT score
  - Years of field experience
  - Final grade average in Anatomy/Physiology
  - Final grade average in Cardiology

Conducting the Pearson Correlation Procedure Using SPSS

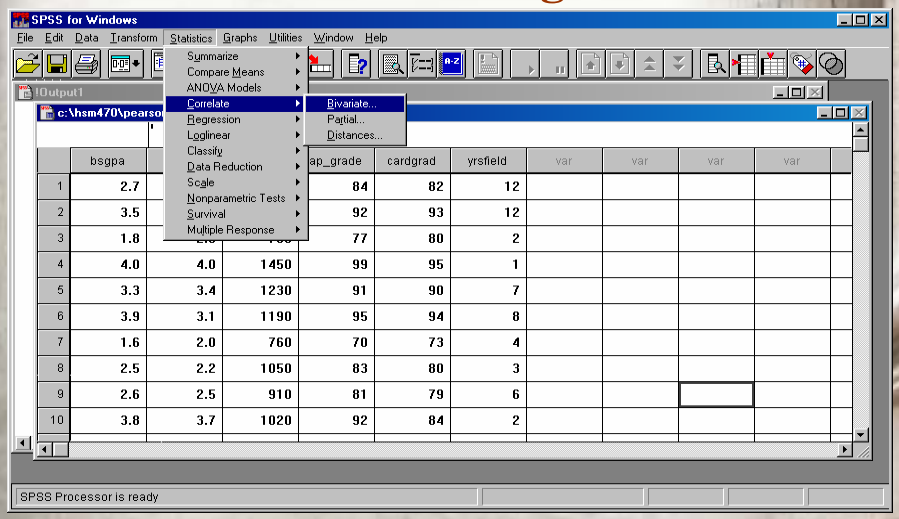
BS Program GPA	AAS Program GPA	SAT Score	A&P Grade	Cardiology Grade	Years Field Experience
2.7	2.9	860	84	82	12
3.5	3.3	950	92	93	12
1.8	2	730	77	80	2
4	4	1450	99	95	1
3.3	3.4	1230	91	90	7
3.9	3.1	1190	95	94	8
1.6	2	760	70	73	4
2.5	2.2	1050	83	80	3
2.6	2.5	910	81	79	6
3.8	3.7	1020	92	84	2

Conducting the Pearson Correlation Procedure Using SPSS



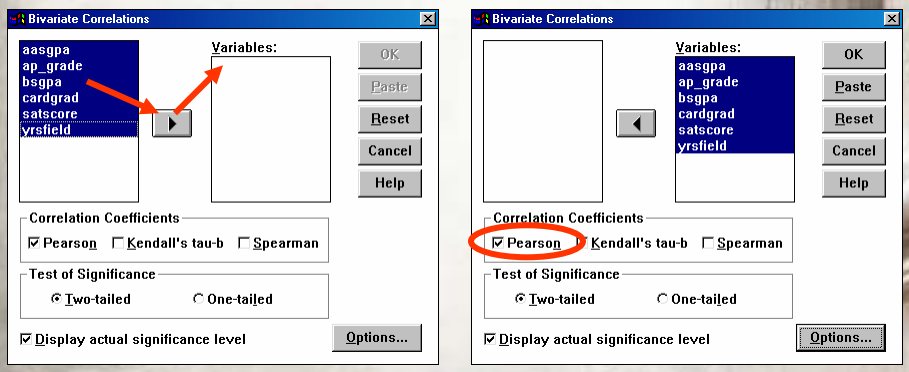
	bsgpa	aasgpa	satscore	ap_grade	cardgrad	yrsfield	var	var	var	var
1	2.7	2.9	860	84	82	12				
2	3.5	3.3	950	92	93	12				
3	1.8	2.0	730	77	80	2				
4	4.0	4.0	1450	99	95	1				
5	3.3	3.4	1230	91	90	7				
6	3.9	3.1	1190	95	94	8				
7	1.6	2.0	760	70	73	4				
8	2.5	2.2	1050	83	80	3				
9	2.6	2.5	910	81	79	6				
10	3.8	3.7	1020	92	84	2				

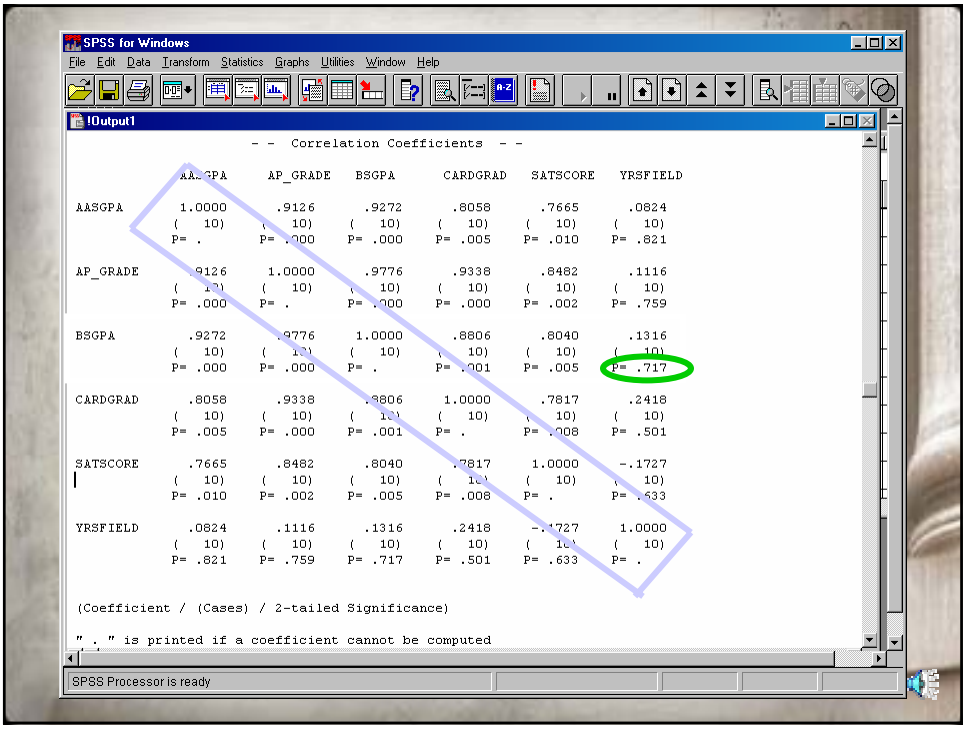
Conducting the Pearson Correlation Procedure Using SPSS



	bsgpa	ap_grade	cardgrad	yrsfield	var	var	var	var
1	2.7	84	82	12				
2	3.5	92	93	12				
3	1.8	77	80	2				
4	4.0	99	95	1				
5	3.3	91	90	7				
6	3.9	95	94	8				
7	1.6	70	73	4				
8	2.5	83	80	3				
9	2.6	81	79	6				
10	3.8	92	84	2				

Conducting the Pearson Correlation Procedure Using SPSS





Conducting the Pearson Correlation Procedure Using SPSS

Variable	*r*
AAS GPA	0.9272
SAT Score	0.8040
A&P Grade	0.9776
Cardiology Grade	0.8806
Field Experience	0.1316