

EXAMINE VARIABLES=D

/PLOT BOXPLOT NPLOT

/COMPARE GROUP

/STATISTICS DESCRIPTIVES

/CINTERVAL 95

/MISSING LISTWISE

/NOTOTAL.

Explore

[DataSet1] C:\BACKUP\APPLIED STATISTICS\Data_set_9 (Paired T-Test).sav

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
D	11	100,0%	0	,0%	11	100,0%

Descriptives

		Statistic	Std. Error
D	Mean	-1,5182	,47632
	95% Confidence Interval for Mean	Lower Bound Upper Bound	-2,5795 -,4569
	5% Trimmed Mean	-1,4480	
	Median	-1,4000	
	Variance	2,496	
	Std. Deviation	1,57976	
	Minimum	-4,70	
	Maximum	,40	
	Range	5,10	
	Interquartile Range	2,60	
	Skewness	-,699	,661
	Kurtosis	,076	1,279

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
D	,156	11	,200	,946	11	,591

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.

D
95% CI of the Difference

Equal variances: $\bar{X}_A - \bar{X}_B \pm t_{n_A+n_B-2; \alpha/2} \sqrt{\frac{S_A^2}{n_A} + \frac{S_B^2}{n_B}}$

Equal variances not equal:

$$\bar{X}_A - \bar{X}_B \pm t_{v; \alpha/2} \sqrt{\frac{S_A^2}{v} + \frac{S_B^2}{v}}$$

$$v = \frac{\left(\frac{S_A^2}{n_A} + \frac{S_B^2}{n_B}\right)^2}{\left(\frac{S_A^2/n_A}{n_A-1} + \frac{S_B^2/n_B}{n_B-1}\right)}$$

$$*** \sigma_A^2 = \sigma_B^2$$

$$|T| = \frac{|\bar{X}_A - \bar{X}_B|}{\sqrt{\frac{S^2}{n_A} + \frac{S^2}{n_B}}} \approx 0,289$$

$$S = \frac{(n_A-1)S_A^2 + (n_B-1)S_B^2}{n_A + n_B - 2}$$

$$df = n_A - 1 + n_B - 1 = 14$$

$$\alpha = 0,777$$

(ισχυρές

ενδείξεις

μη-απορρίψης

της $H_0: \mu_A = \mu_B$)

$$\bar{X}_A - \bar{X}_B =$$

= Mean difference

$$= 44,725 - 44,050$$

$$= 0,675$$

Std. Error

Difference

$$= 5,5826 - 3,5241$$

"

"

S_B

S_A

$$= 2,3341$$

$$\alpha = 0.05$$

$$\uparrow \sqrt{\frac{S^2}{n_A} + \frac{S^2}{n_B}}$$

βλεπούμε ότι ΟΕΔ.Ε.

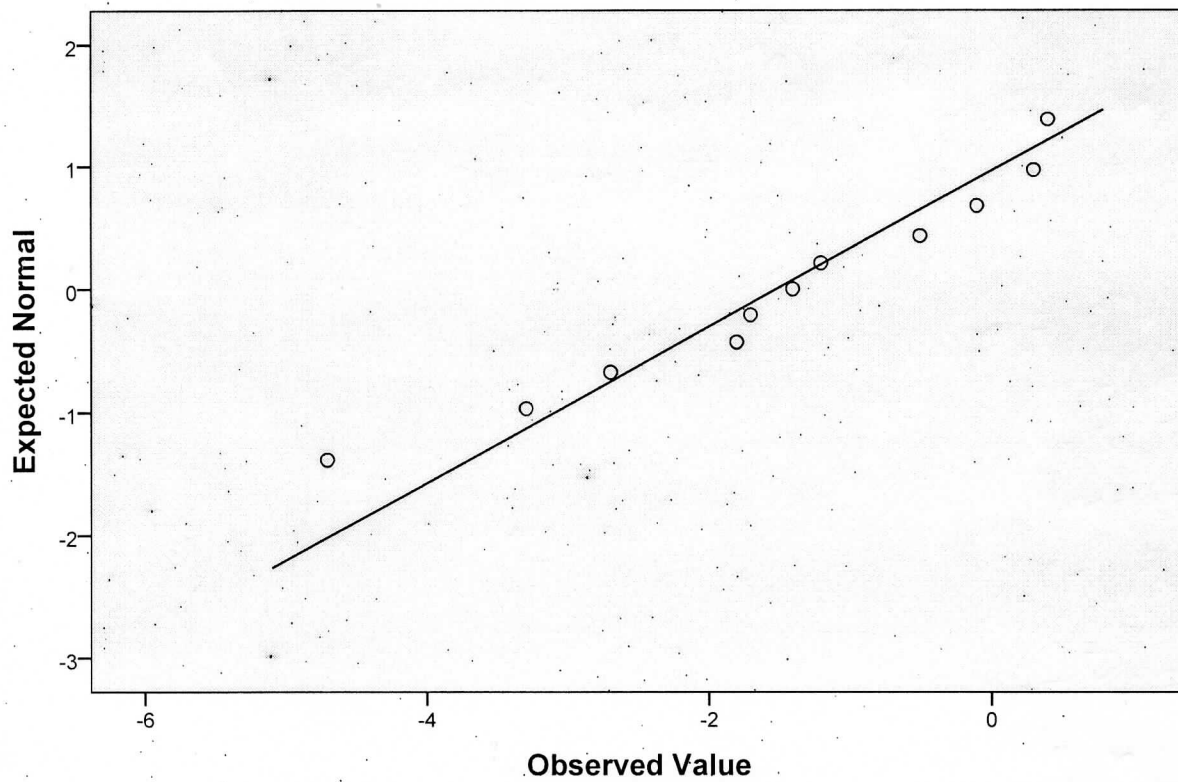
άρα δεν υπάρχει

ισχυρές

ενδείξεις

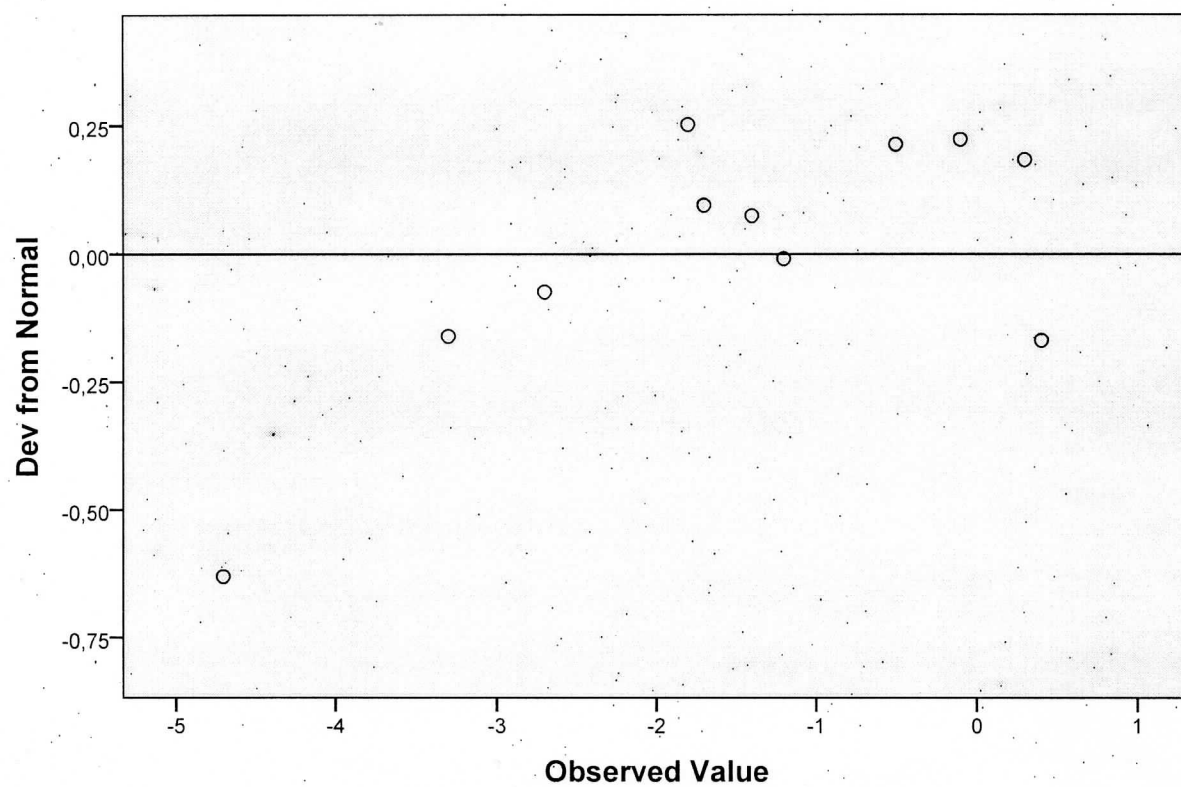
απορρίψης της H_0 .

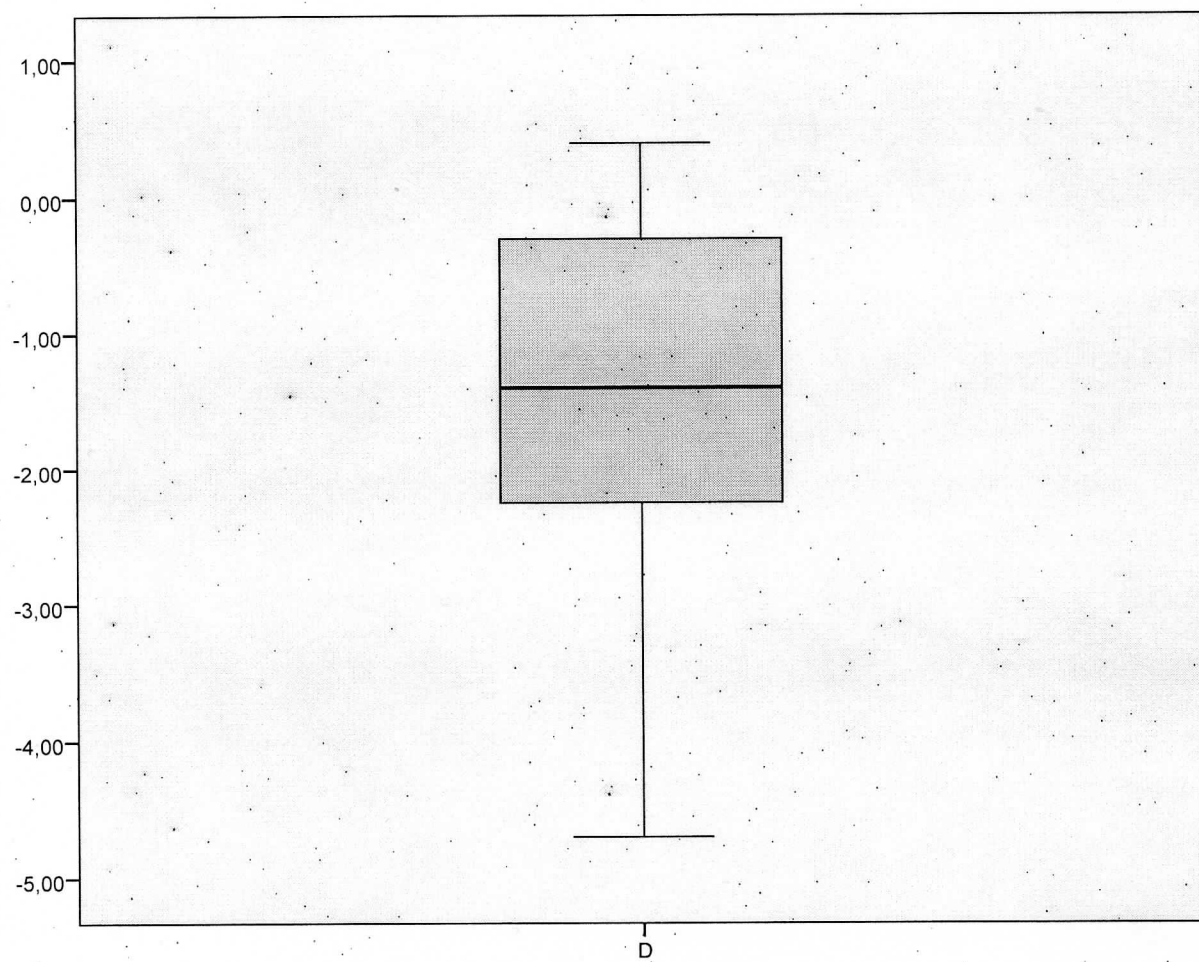
Normal Q-Q Plot of D



Ισχύει η υπόθεση του προηγούμενου Explore.

Detrended Normal Q-Q Plot of D





NPAR TESTS

/K-S (NORMAL)=D

/MISSING ANALYSIS

/METHOD=EXACT TIMER(5).

NPar Tests

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One-Sample Kolmogorov-Smirnov Test

	D
N	11
Normal Parameters ^a	
Mean	-1,5182
Std. Deviation	1,57976
Most Extreme Differences	
Absolute	,156
Positive	,112
Negative	-,156
Kolmogorov-Smirnov Z	,519
Asymp. Sig. (2-tailed)	,950
Exact Sig. (2-tailed)	,913
Point Probability	,000

a. Test distribution is Normal.

} Analyze
 → Non-parametric
 test → 1-Sample K-S
 H_0 : το δείγμα ακολουθεί
 κανονική $N(-1.51, 1.57^2)$
 H_1 : δεν ακολουθεί
 $N(-1.51, 1.57^2)$

$\hat{\alpha} = 0.913$ (ισχυρές ενδείξεις μη-απόρριψης
 της H_0 : $N(-1.51, 1.57^2)$.

Point Probability $1(T=0.156) = 0.$

$T = 0.156$

T-TEST PAIRS=ALCOOL WITH NONALCOOL (PAIRED)
 /CRITERIA=CI(.9500)
 /MISSING=ANALYSIS.

T-Test

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Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	ALCOOL	39,145	11	1,7224	,5193
	NONALCOOL	40,664	11	2,5625	,7726

* ΠΕΡΙΓΡΑΦΙΚΑ
 ΜΕΤΡΑ ΓΙΑ
 ΤΙΣ ΔΥΟ
 ΜΕΤΑΒΛΗΤΕΣ

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	ALCOOL & NONALCOOL	11	,797	,003

**

Paired Samples Test

		Paired Differences				
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference	
					Lower	Upper
Pair 1	ALCOOL - NONALCOOL	-1,5182	1,5798	,4763	-2,5795	-,4569

Paired Samples Test

		Paired Differences		
		t	df	Sig. (2-tailed)
Pair 1	ALCOOL - NONALCOOL	-3,187	10	,010

(δεν περιέχει το 0
 ενδείχνει για
 διαφορά στη
 μέση τιμή μεταξύ
 ALC-NON ALC)

(**) Συντελεστής συσχέτισης Pearson $r=0,797$ (δεδιχη
 δραστηριότητα
 συσχέτισης
 των
 δύο μεταβλητών)
 $\hat{\alpha}=0.003$ (ισχυρή ενδειξη απόρριψης
 της $H_0: \rho=0$ vs $H_1: \rho \neq 0$)

(*** $n=11$

$$\text{Mean} = \bar{d} = \frac{1}{n} \sum_{i=1}^n d_i = -1,5182$$

$$t = \frac{\bar{d}}{s_d / \sqrt{n}} = -3.187$$

$$\sqrt{s_d^2} = s_d = \frac{1}{n-1} \left(\sum_{i=1}^n d_i^2 - n \bar{d}^2 \right) = 1.5798$$

$\alpha=0.05$

$\hat{\alpha}=0.01$

$$\frac{s_d}{\sqrt{n}} = 0,4763$$

$$\bar{d} \pm t_{n-1, \alpha/2} \frac{s_d}{\sqrt{n}} = (-2.5795, -0.4569)$$

$$df = n-1 = 10$$

$$t = -3.187$$

Μεση τιμή μεταξύ
 αλκοολικών και μη-αλκοολικών
 της δραστηριότητας

NPART TEST

/WILCOXON=ALCOOL WITH NONALCOOL (PAIRED).

/MISSING ANALYSIS.

NPar Tests

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Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
NONALCOOL - ALCOOL	Negative Ranks	2 ^a	2,50	5,00
	Positive Ranks	9 ^b	6,78	61,00
	Ties	0 ^c		
	Total	11		

→ αρνητικές
βαθμολογίες
→ θετικές
βαθμολογίες

a. NONALCOOL < ALCOOL

b. NONALCOOL > ALCOOL

c. NONALCOOL = ALCOOL

Test Statistics^b

	NONALCOOL - ALCOOL
Z	-2,490 ^a
Asymp. Sig. (2-tailed)	,013

a. Based on negative ranks.

b. Wilcoxon Signed Ranks Test

→ το ποσοστό με βάση τον
αρνητικές βαθμολογίες

$$n = 11$$

$$T = \frac{5 - 61}{\sqrt{\frac{n(n+1)(2n+1)}{6}}} = \frac{-56}{\sqrt{\frac{11 \cdot 12 \cdot 23}{6}}}$$

$$\approx -2,49$$

$$\hat{\alpha} = 0,013$$

$$\text{Mean Rank} = \frac{\text{Sum of Ranks}}{\# \text{ ranks}} = \frac{5}{2} = 2,5$$

$$+ \frac{61}{9} = 6,78$$

Exact Point Probability

$$P(T = -2,49) = 0,001$$