Preparation for Story Problems for Quiz #3

1. Here's the code used to prepare the data for analysis and some results.

For variable "grp"	For variable "type"	For variable "gender"
If (grp = 1) g1 = -1.	If (type = 1) t1 = 0.	If (gender = 1) gc = 0.
If (grp = 2) g1 = 0.	If (type = 2) t1 = 0.	If (gender = 2) gc = 1.
If (grp = 3) g1 = 1	If (type = 3) t1 = 1	
If (grp = 1) g2 = -1.	If (type = 1) t2 = 1.	
If (grp = 2)g2 = 1.	If (type = 2)t2 = 0.	
If (grp = 3) g2 = 0.	If (type = 3) t2 = 0.	

	Age	g1	g2	t1	t2	gc	experience
Correlations (r-critical = .24)	-.32	.12	-.43	.47	.07	-.38	.35
Multiple Regression weights	.087	1.14	-6.41	4.43	.97	-.12	-2.32
(and p-values)	(.041)	(.211)	(.001)	(.003)	(.097)	(.062)	(.007)

Give a complete (and well-organized) description of these results including:
- the interpretation of each correlation and regression weight, in words
- why each variable probably did or did not contribute to the regression model

2. Here's another set of the code used to prepare the data for analysis and some results.

For variable "grp"	For variable "type"	For variable "gender"
If (grp = 1) g1 = 0.	If (type= 1) t1 = 0.	If (gender = 1) gc = -1.
If (grp = 2) g1 = 1.	If (type= 2) t1 = 0.	If (gender = 2) gc = 1.
If (grp = 3) g1 = -1	If (type= 3) t1 = 1	
If (grp = 1) g2 = 1.	If (type= 1) t2 = 1.	
If (grp = 2)g2 = 0.	If (type= 2)t2 = 0.	
If (grp = 3) g2 = -1.	If (type= 3) t2 = 0.	

	Age	g1	g2	t1	t2	gc	experience
Correlations (r-critical = .24)	.32	.12	-.53	.47	.37	-.38	-.15
Multiple Regression weights	.087	1.14	-6.41	4.43	.97	-.12	-5.46
(and p-values)	(.041)	(.211)	(.001)	(.003)	(.097)	(.062)	(.007)

Give a complete (and well-organized) description of these results including:
- the interpretation of each correlation and regression weight, in words
- why each variable probably did or did not contribute to the regression model

3. Here's another set of the code used to prepare the data for analysis and some results.

For variable "grp"	For variable "type"	For variable "gender"
If (grp = 1) g1 = 0.	If (type= 1) t1 = 0.	If (gender = 1) gc = 1.
If (grp = 2) g1 = 0.	If (type= 2) t1 = 0.	If (gender = 2) gc = -1.
If (grp = 3) g1 = 1	If (type= 3) t1 = 1	
If (grp = 1) g2 = 1.	If (type= 1) t2 = 0.	
If (grp = 2)g2 = 0.	If (type= 2)t2 = 1.	
If (grp = 3) g2 = 0.	If (type= 3) t2 = 0.	

	Age	g1	g2	t1	t2	gc	experience
Correlations (r-critical = .24)	.32	.12	.53	-.47	.37	.38	.15
Multiple Regression weights	.087	1.14	3.81	-4.43	.97	.12	.46
(and p-values)	(.041)	(.211)	(.01)	(.003)	(.097)	(.062)	(.327)

Give a complete (and well-organized) description of these results including:

- the interpretation of each correlation and regression weight, in words
- why each variable probably did or did not contribute to the regression model

4. Here's another set of the code used to prepare the data for analysis and some results.

For variable "grp"	For variable "type"	For variable "gender"
If (grp = 1) g1 = 0.	If (type = 1) t1 = 0.	If (gender = 1) gc = 1.
If (grp = 2) g1 = -1.	If (type = 2) t1 = 1.	If (gender = 2) gc = 0.
If (grp = 3) g1 = 1	If (type = 3) t1 = 0.	
If (grp = 1) g2 = 1.	If (type = 1) t2 = 1.	
If (grp = 2)g2 = -1.	If (type = 2)t2 = 0.	
If (grp = 3) g2 = 0.	If (type = 3) t2 = 0.	

	Age	g1	g2	t1	t2	gc
Correlations (r-critical = .24)	-.12	-.72	-.53	.47	.37	-.38
Multiple Regression weights	.087	-1.14	-6.41	4.43	.97	-.12
(and p-values)	(.061)	(.002)	(.001)	(.003)	(.097)	(.062)

Give a complete (and well-organized) description of these results including:

- the interpretation of each correlation and regression weight, in words
- why each variable probably did or did not contribute to the regression model

Answers to Exam Prep Questions

1. g1 - effect code comparing grp=3 to the grand mean g2 - effect code comparing grp=2 to the grand mean
   t1 - dummy code comparing type=3 to type=2 t2 - dummy code comparing type=1 to type=2
   gc = dummy code comparing gender=2 to gender=1

	Correlation	Regression weights
Age	Lower age is associated with better performance	Higher age is associated with better performance after correcting for the other variables (a suppressor variable)
G1	Not interpretable	Mean of grp=3 is 1.14 larger than grand mean after controlling for the other variables, not significant (not correlated with crit)
G2	Not interpretable	Mean of grp=2 is 6.41 less than grand mean after controlling for the other variables, significant (correlated and not too collinear with other preds)
T1	Usually not interpreted	Mean of type=3 is 4.43 larger than mean of type=2 after controlling for the other variables, significant (correlated and not too collinear with other preds)
T2	Usually not interpreted	Mean of type=1 is .97 larger than mean of type=2 after controlling for the other variables, not significant (not correlated with criterion)
Gc	Gender=2 tend to have poorer performance	Mean for gender=2 is .12 less than mean of gender=1 after controlling for the other variables, not significant (correlated but too collinear with other preds)
exp	More experience is associated with better performance	More experience is associated with poorer performance after controlling for the other variables (a suppressor variable)

2. g1 - effect code comparing grp=2 to the grand mean g2 - effect code comparing grp=1 to the grand mean
   t1 - dummy code comparing type=3 to type=2 t2 - dummy code comparing type=1 to type=2
   gc = effect code comparing gender=2 to grand mean

	Correlation	Regression weights
Age	Higher age is associated with better performance	Higher age is associated with better performance after correcting for the other variables (correlated and not too collinear with other preds)
G1	Not interpretable	Mean of grp=2 is 1.14 larger than grand mean after controlling for the other variables, not significant (not correlated with the criterion)
G2	Not interpretable	Mean of grp=1 is 6.41 less than grand mean after controlling for the other variables, significant (correlated and not too collinear with other preds)
T1	Usually not interpreted	Mean of type=3 is 4.43 larger than mean of type=2 after controlling for the other variables, significant (correlated and not too collinear with other preds)
T2	Usually not interpreted	Mean of type=1 is .97 larger than mean of type=2 after controlling for the other variables, not significant (correlated but too collinear with other preds)
Gc	Gender=2 tend to have poorer performance	Mean for gender=2 is .12 less than the grand mean after controlling for the other variables, not significant (correlated but too collinear with other preds)
exp	More experience is associated with poorer performance	More experience is associated with poorer performance after controlling for the other variables (a suppressor variable)

3. g1 - dummy code comparing grp=3 to the grp=2 g2 - dummy code comparing grp=1 to grp=2
   t1 - dummy code comparing type=3 to type=1 t2 - dummy code comparing type=2 to type=1
   gc = dummy code comparing gender=1 to grand mean

	Correlation	Regression weights
Age	Higher age is associated with better performance	Higher age is associated with better performance after correcting for the other variables (correlated and not too collinear with other preds)
G1	Usually not interpreted	Mean of grp=3 is 1.14 larger than mean of grp=2 after controlling for the other variables, not significant (not correlated with the criterion)
G2	Usually not interpreted	Mean of grp=1 is 3.81 more than mean of grp=2 after controlling for the other variables, significant (correlated and not too collinear with other preds)
T1	Usually not interpreted	Mean of type=3 is 4.43 less than mean of type=1 after controlling for the other variables, significant (correlated and not too collinear with other preds)
T2	Usually not interpreted	Mean of type=2 is .97 larger than mean of type=1 after controlling for the other variables, not significant (correlated but too collinear with other preds)
Gc	Gender=2 tend to have poorer performance	Mean for gender=1 is .12 more than the grand mean after controlling for the other variables, not significant (correlated but too collinear with other preds)
exp	Experience is not associated with performance	Experience is not associated with performance after controlling for the other variables

4. g1 - effect code comparing grp=3 to the grand mean g2 - effect code comparing grp=1 to the grand mean
   t1 - dummy code comparing type=2 to type=3 t2 - dummy code comparing type=1 to type=3
   gc = dummy code comparing gender=1 to gender=2

	Correlation	Regression weights
Age	Age is not associated with performance	Age is not associated with performance after correcting for the other variables (not correlated wit the criterion)
G1	Not interpretable	Mean of grp=3 is 1.14 less than grand mean after controlling for the other variables, significant (correlated and not too collinear with other preds)
G2	Not interpretable	Mean of grp=1 is 6.41 less than the grand mean after controlling for the other variables, significant (correlated and not too collinear with other preds)
T1	Usually not interpreted	Mean of type=2 is 4.43 less than mean of type=3 after controlling for the other variables, significant (correlated and not too collinear with other preds)
T2	Usually not interpreted	Mean of type=1 is .97 larger than mean of type=3 after controlling for the other variables, not significant (correlated but too collinear with other preds)
Gc	Gender=1 tend to have poorer performance	Mean for gender=1 is .12 less than the mean of gender=2 after controlling for the other variables, not significant (correlated but too collinear with other preds)

2xQ Graphs

On the following pages are several plots from multiple regression models including a 2-group variable (Treatment – coded following the SPSS GLM convention TX1 coded 1 and TX2 coded 0), a quantitative variable (Treatment Duration which has been mean centered and is shown on the X axis) and their interaction. Use them to prepare to answer the following questions for the quiz

$$\text{Wellness'} = b_1*\text{Treatment Duration} + b_2*\text{Treatment} + b_3*\text{Interaction} + a$$

1. What is the sign of the regression weight for Treatment?
2. Tell what the Treatment regression weight means in words?
3. Describe the main effect for Treatment and tell if it is descriptive or potentially misleading? Carefully explain your answer.

4. What is the sign of the regression weight for Treatment Duration?
5. Tell what the Treatment Duration regression weight means in words?
6. Describe the main effect for Treatment Duration and tell if it is descriptive or potentially misleading? Carefully explain your answer.

7. What is the sign of the regression weight for the Treatment X Treatment Duration interaction?
8. Tell what the interaction regression weight means in words?
9. Describe the pattern of the interaction.

10. Tell what the constant means in words?

QxQ Graphs

On the pages after that are several plots from multiple regression models including 2 quantitative variables (Treatment Duration which has been mean-centered and is shown on the X axis & Treatment Intensity, which has been mean-centered, with lines portraying those at the mean of this variable as well as -1 and +1 std) and their interaction. Use them to prepare to answer the following questions for the quiz.

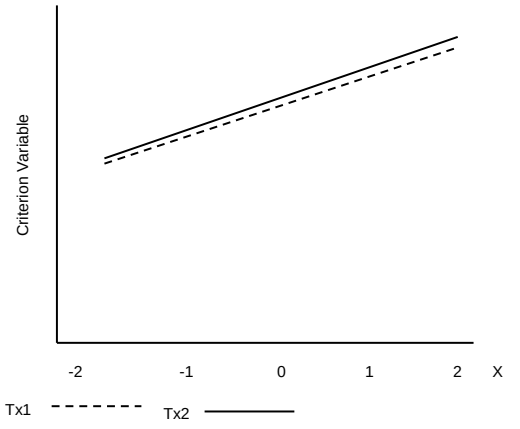
$$\text{Wellness'} = b_1*\text{Treatment Duration} + b_2*\text{Treatment Intensity} + b_3*\text{Interaction} + a$$

1. What is the sign of the regression weight for Treatment Intensity?
2. Tell what the Treatment Intensity regression weight means in words?
3. Describe the main effect for Treatment intensity and tell if it is descriptive or potentially misleading? Carefully explain your answer.

4. What is the sign of the regression weight for Treatment Duration?
5. Tell what the Treatment Duration regression weight means in words?
6. Describe the main effect for Treatment Duration and tell if it is descriptive or potentially misleading? Carefully explain your answer.

7. What is the sign of the regression weight for the Treatment Intensity X Treatment Duration interaction?
8. Tell what the interaction regression weight means in words?
9. Describe the pattern of the interaction.

10. Tell what the constant means in words?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2
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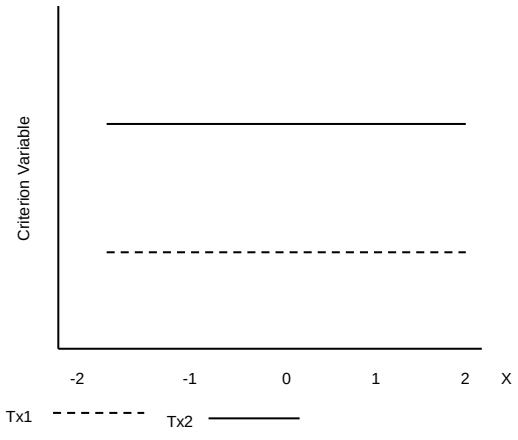
Tx1
Tx2

1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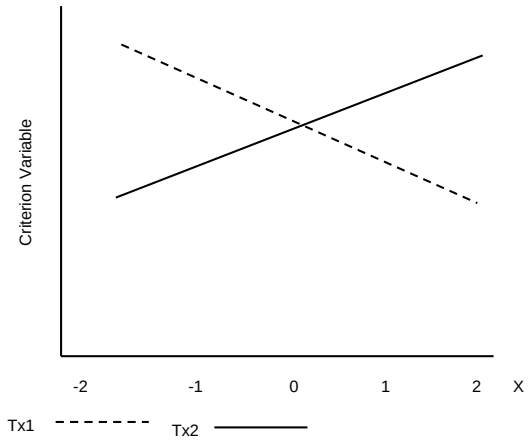
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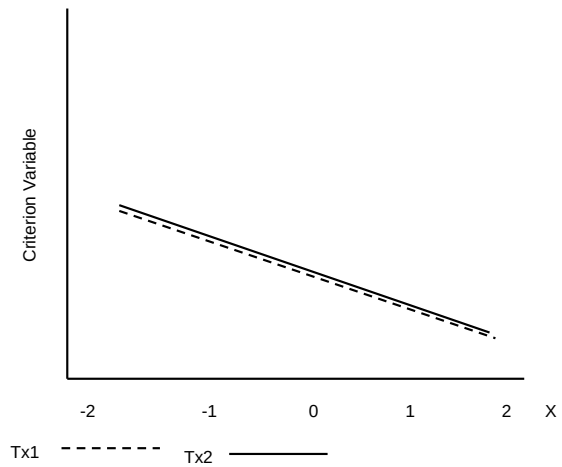
Tx2

3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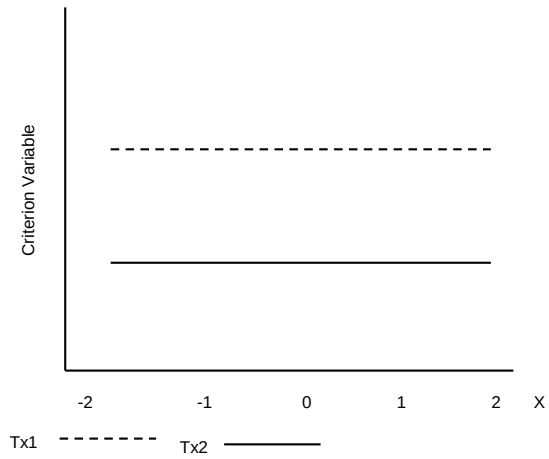
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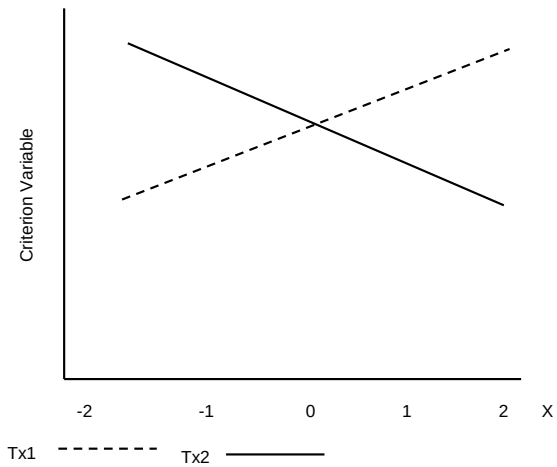
Tx2

5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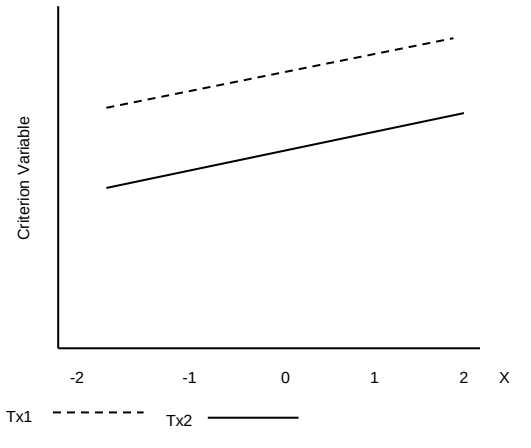
Tx1
Tx2

6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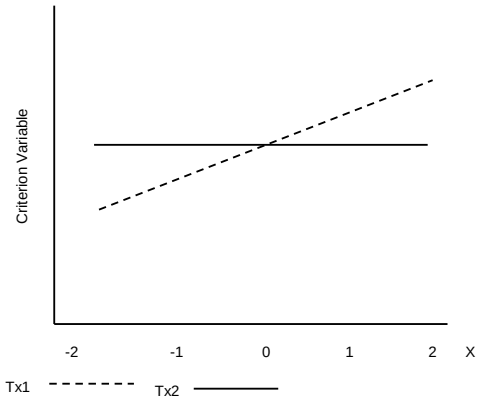
Tx1
Tx2

7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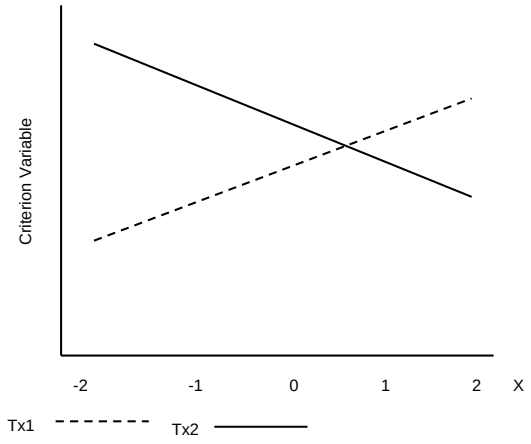
2
X
Tx1
Tx2

8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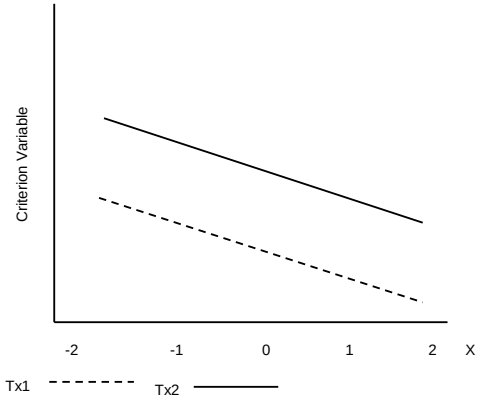
X
Tx1
Tx2

9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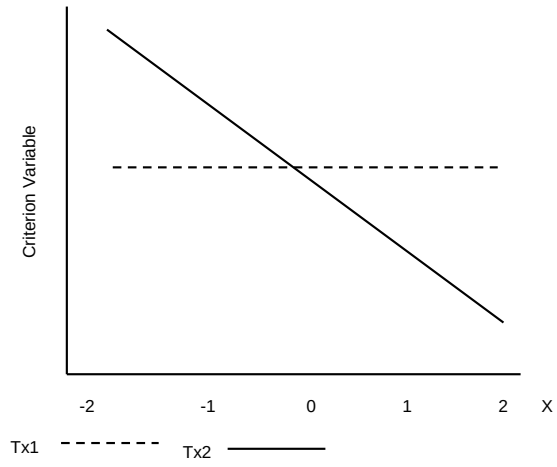
Tx1
Tx2

10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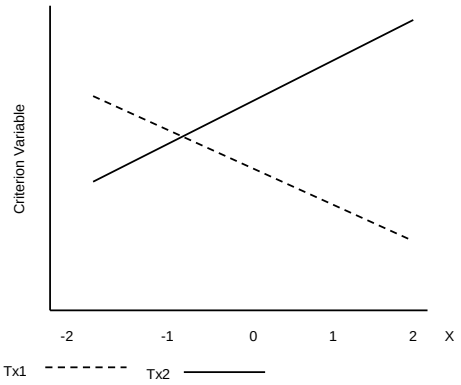
Tx1
Tx2

11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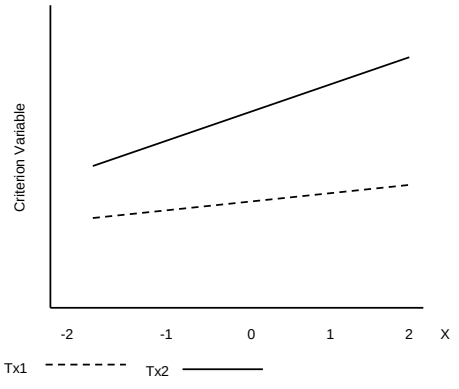
X
Tx1
Tx2

12



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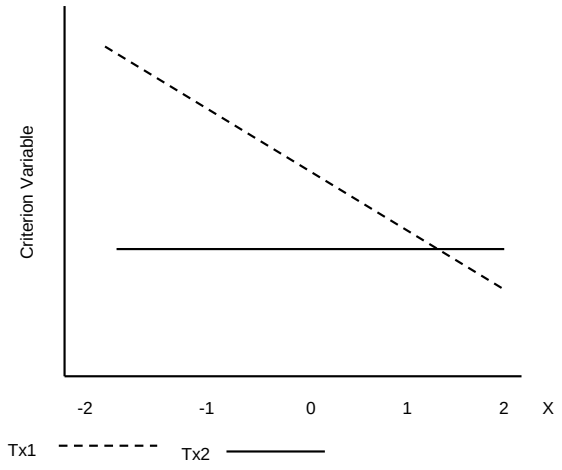

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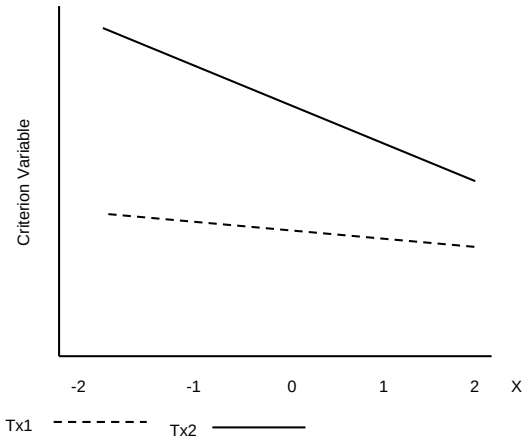

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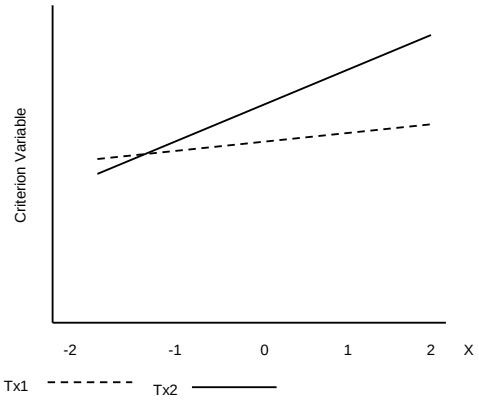

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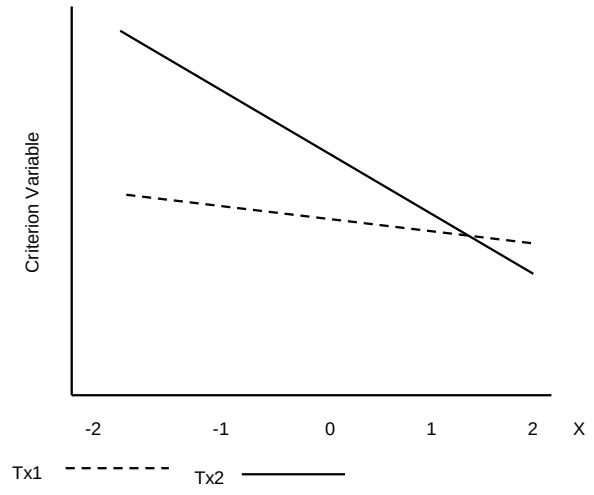

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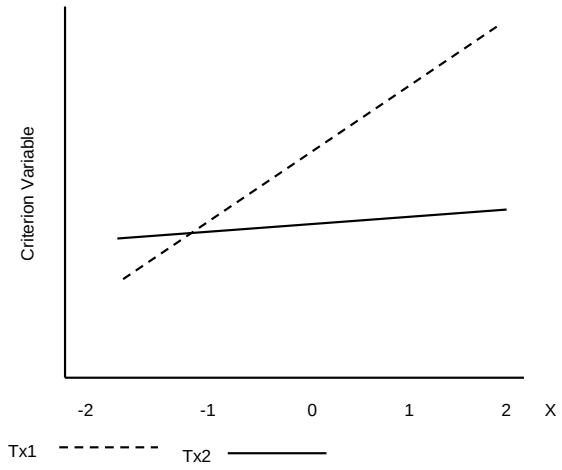

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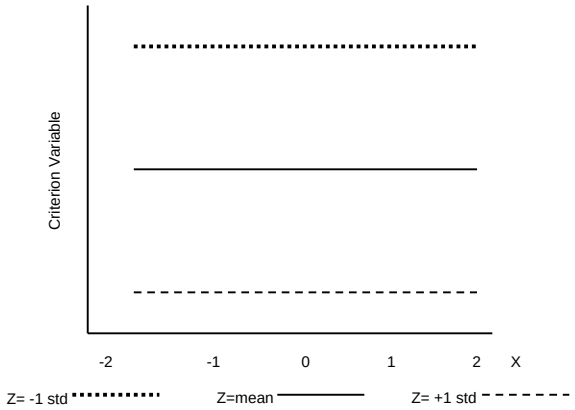
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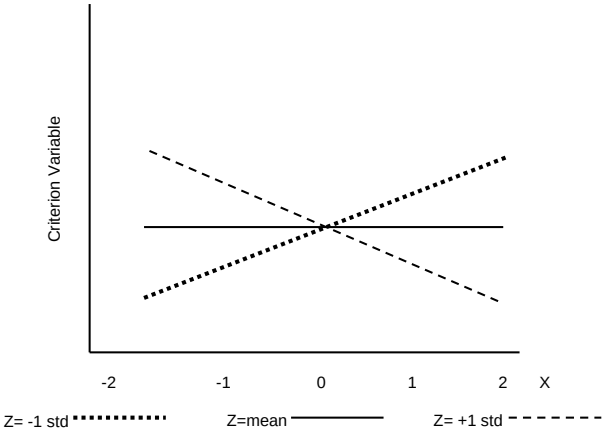
Z= -1 std
Z=mean
Z= +1 std

2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Z= -1 std
Z=mean
Z= +1 std

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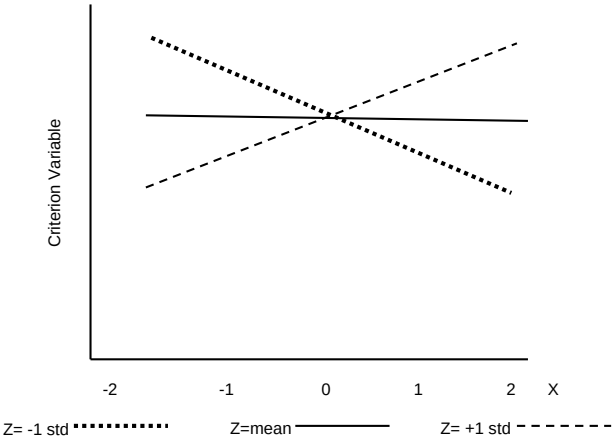
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0
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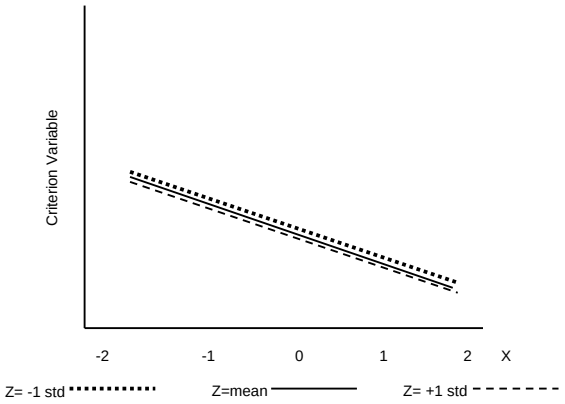
X
Z= -1 std
Z=mean
Z= +1 std

4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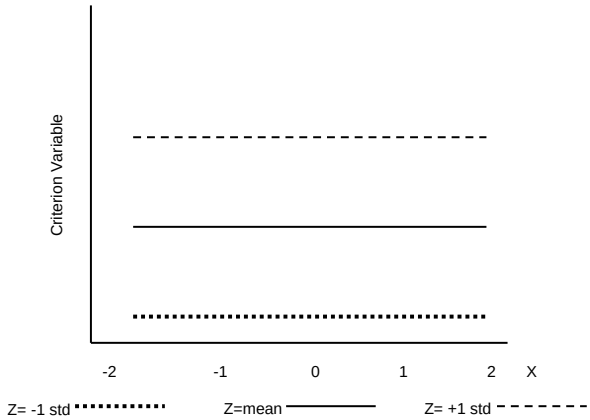
X
Z= -1 std
Z=mean
Z= +1 std

5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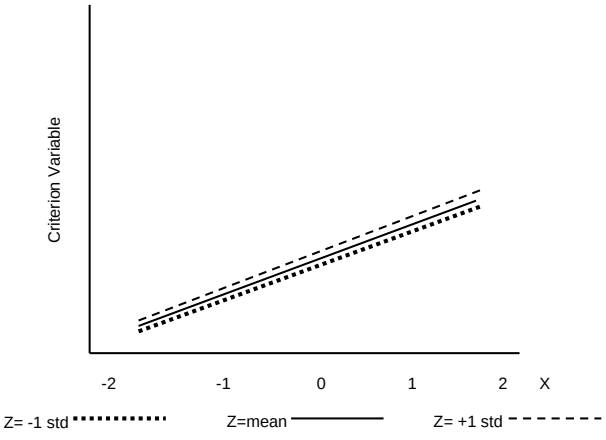
2
X
Z= -1 std
Z=mean
Z= +1 std

6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1
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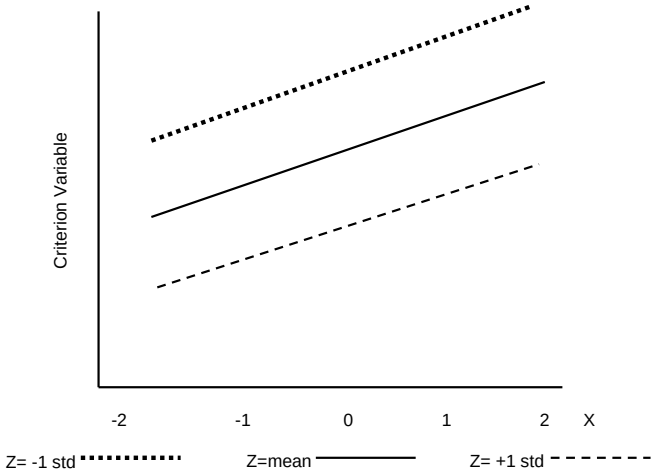
Z= -1 std
Z=mean
Z= +1 std

7


Criterion Variable
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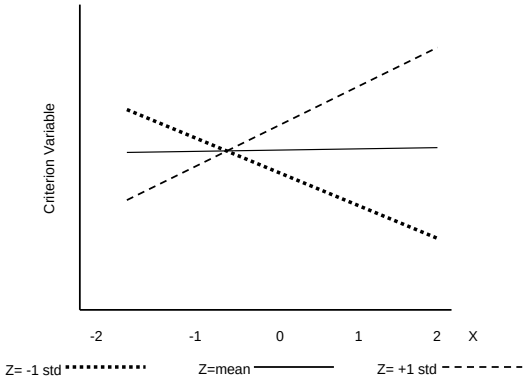
-1
0
1
2
X
Z= -1 std
Z=mean
Z= +1 std

8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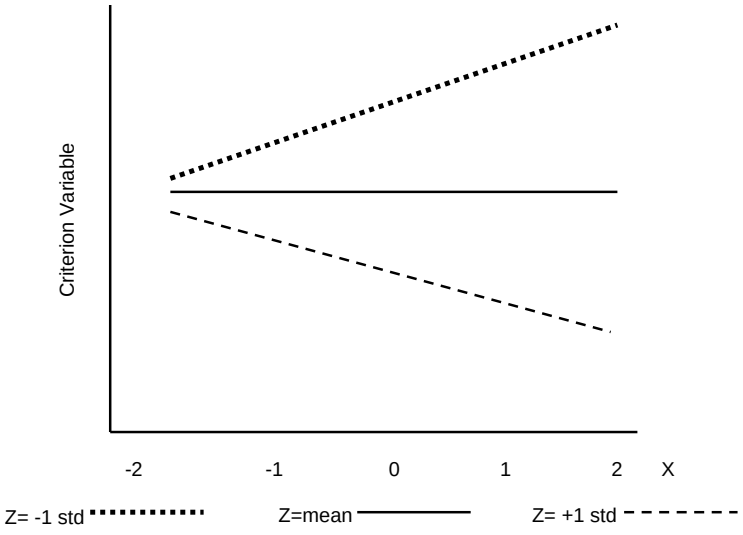
X
Z= -1 std
Z=mean
Z= +1 std

9


Criterion Variable
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-1
0
1
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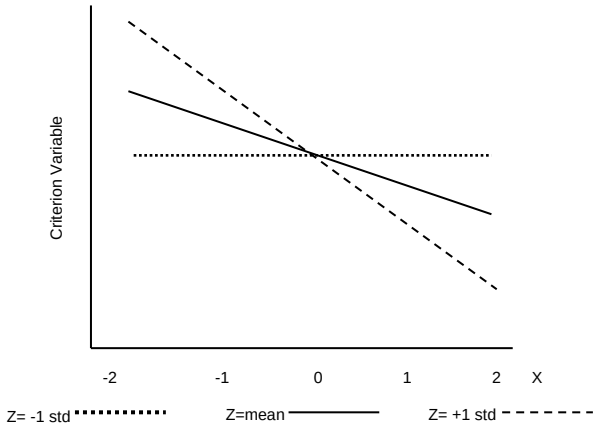
X
Z= -1 std
Z=mean
Z= +1 std

10


Criterion Variable
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-1
0
1
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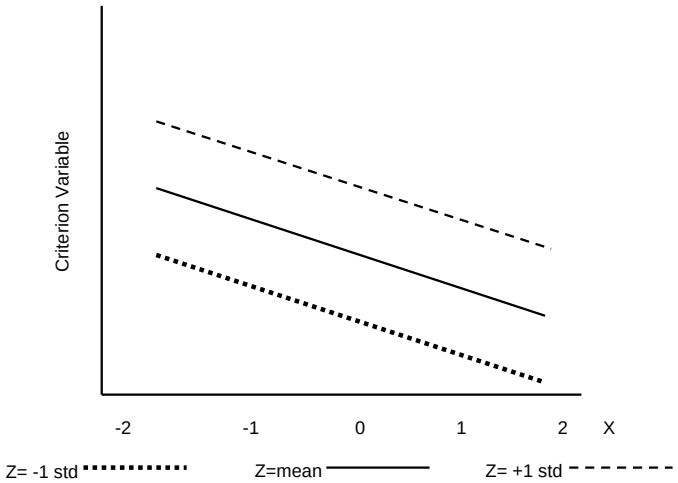
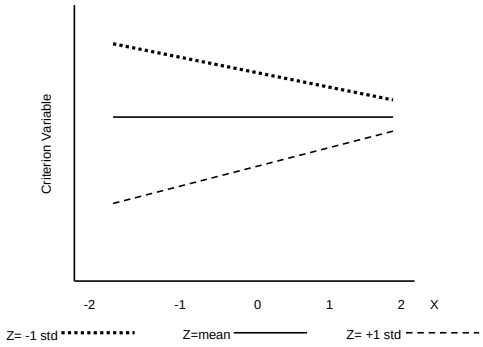
X
Z= -1 std
Z=mean
Z= +1 std

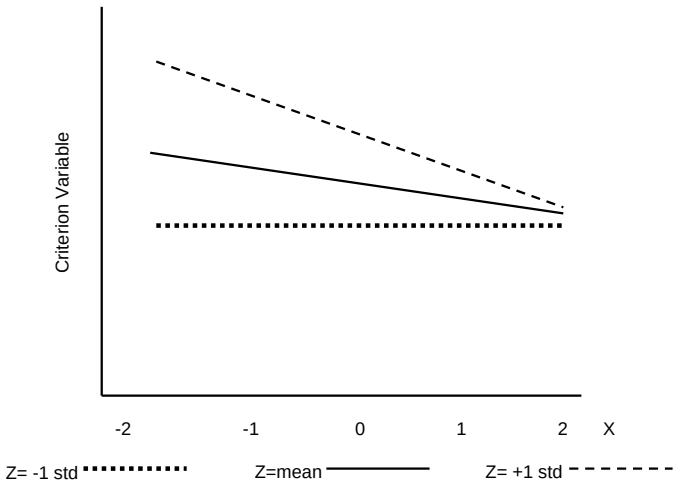
11


Criterion Variable
-2
-1
0
1
2
X
Z= -1 std
Z=mean
Z= +1 std

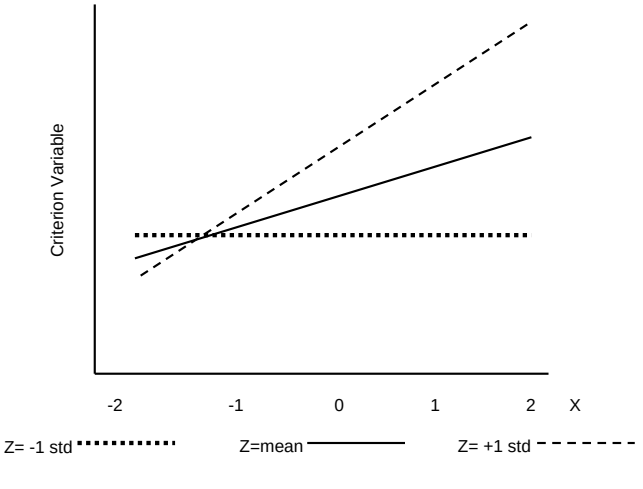
12


Criterion Variable
-2
-1
0
1
2
X
Z= -1 std
Z=mean
Z= +1 std

13



14



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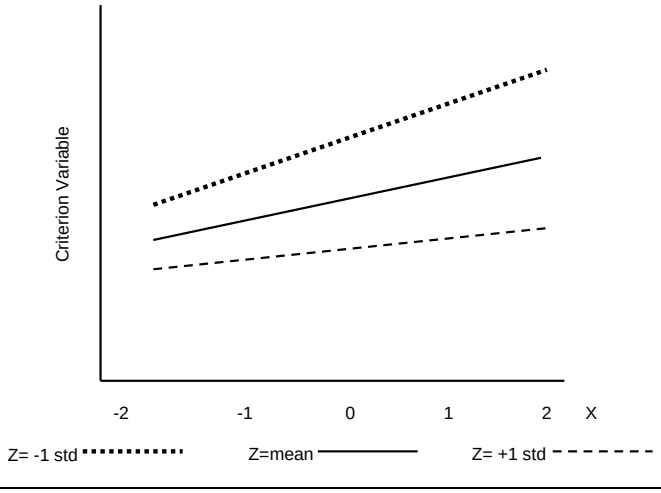
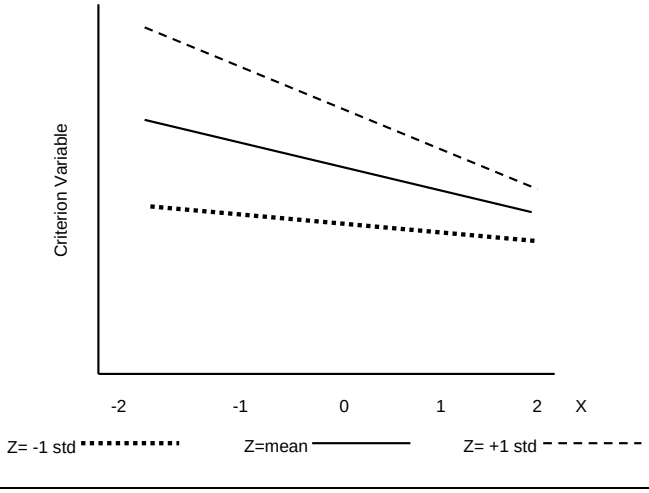
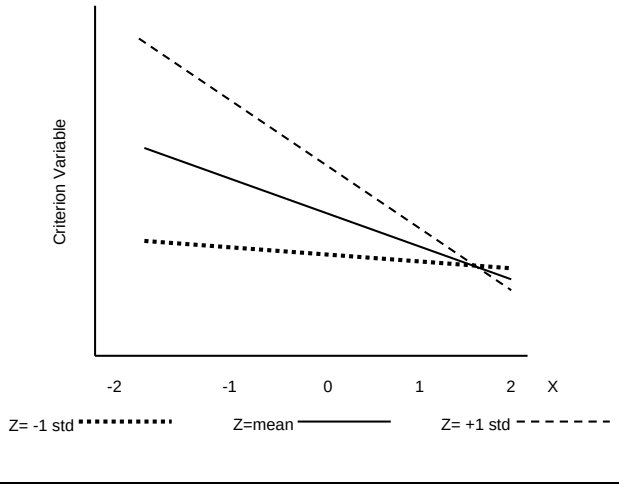


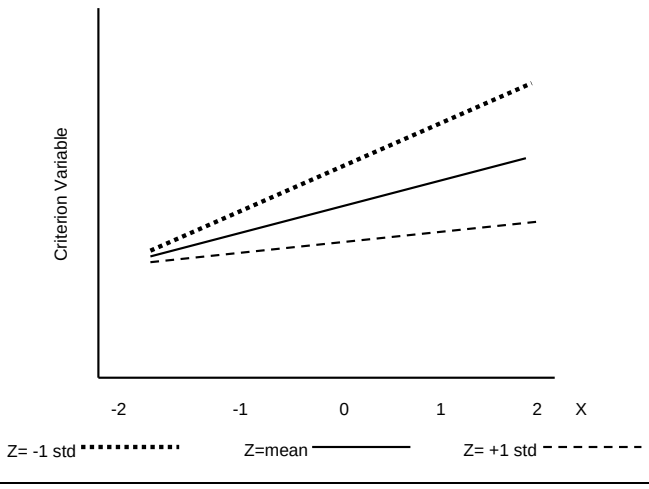
16



17



18



Answers to selected 2xQ graphs

#1

1. What is the sign of the regression weight for Treatment?
   0

2. Tell what the Treatment regression weight means in words?
   No mean difference between the treatment groups at the mean duration

3. Describe the main effect for Treatment and tell if it is descriptive or potentially misleading? Carefully explain your answer.
   There is no main effect of Treatment. Descriptive – no interaction

4. What is the sign of the regression weight for Treatment Duration?
   +

5. Tell what the Treatment Duration regression weight means in words?
   There is a positive relationship between duration and the criterion for those in the comparison group.

6. Describe the main effect for Treatment Duration and tell if it is descriptive or potentially misleading? Carefully explain your answer.
   Overall, as Duration increases Wellness tends to increase. Descriptive – no interaction

7. What is the sign of the regression weight for the Treatment X Treatment Duration interaction?
   0 -- no interaction

8. Tell what the interaction regression weight means in words?
   There is no interaction of treatment and duration

9. Describe the pattern of the interaction.
   There is no interaction, the regression lines for the two Tx groups are parallel.

10. Tell what the constant means in words?
    The average criterion variable score for those in the control group who ha ve the mean duration.

#7

1. What is the sign of the regression weight for Treatment?
   +

2. Tell what the Treatment regression weight means in words?
   The treatment group has a higher mean criterion score at the mean duration

3. Describe the main effect for Treatment and tell if it is descriptive or potentially misleading? Carefully explain your answer.
   Overall, those in Tx1 have higher wellness than those in Tx2. Descriptive – no interaction

4. What is the sign of the regression weight for Treatment Duration?
   +

5. Tell what the Treatment Duration regression weight means in words?
   There is a positive relationship between duration and the criterion for those in the comparison group.

6. Describe the main effect for Treatment Duration and tell if it is descriptive or potentially misleading? Carefully explain your answer.
   Overall, as Duration increases Wellness tends to increase. Descriptive – no interaction

7. What is the sign of the regression weight for the Treatment X Treatment Duration interaction?
   0 -- no interaction

8. Tell what the interaction regression weight means in words?
   There is no interaction of treatment and duration

9. Describe the pattern of the interaction.
   There is no interaction, the regression lines for the two Tx groups are parallel.

10. Tell what the constant means in words?
    The average criterion variable score for those in the control group who ha ve the mean duration.

#9

1. What is the sign of the regression weight for Treatment?
   -

2. Tell what the Treatment regression weight means in words?
   The comparison group has a higher mean criterion score at the mean duration

3. Describe the main effect for Treatment and tell if it is descriptive or potentially misleading? Carefully explain your answer.
   Oveerall, Tx2 has higher Wellness scores than Tx1 (the cross over is to the right of the graph). Misleading – the difference diminishes and then reverses as Duration increases above its mean

4. What is the sign of the regression weight for Treatment Duration?
   -

5. Tell what the Treatment Duration regression weight means in words?
   There is a negative relationship between duration and the criterion for those in the comparison group.

6. Describe the main effect for Treatment Duration and tell if it is descriptive or potentially misleading? Carefully explain your answer.
   Overall, there is not main effect for Treatment Duration (imagine a line that is "the average" of the two Tx group lines). Misleading – the relationship is positive for the treatment group

7. What is the sign of the regression weight for the Treatment X Treatment Duration interaction?
   +

8. Tell what the interaction regression weight means in words?
   The relationship between duration and the criterion is more positive for the Tx1 group

9. Describe the pattern of the interaction.
   Treatment duration is positively related to the criterion for those in the Tx1 group, whereas duration is negatively related to the criterion for those inTx2.

10. Tell what the constant means in words?
    The average criterion variable score for those in the control group who ha ve the mean duration.

#18

1. What is the sign of the regression weight for Treatment?
   +

2. Tell what the Treatment regression weight means in words?
   The treatment group has a higher mean criterion score at the mean duration

3. Describe the main effect for Treatment and tell if it is descriptive or potentially misleading? Carefully explain your answer.
   Overall, Tx1 has a higher mean than Tx2. Misleading – the difference diminishes and then reverses as during decreases below its mean

4. What is the sign of the regression weight for Treatment Duration?
   +

5. Tell what the Treatment Duration regression weight means in words?
   There is a positive relationship between duration and the criterion for those in the comparison group.

6. Describe the main effect for Treatment Duration and tell if it is descriptive or potentially misleading? Carefully explain your answer.
   Overall, as Duration increases, wellness tends to increase. Descriptive – the relationship is positive for both groups

7. What is the sign of the regression weight for the Treatment X Treatment Duration interaction?
   +

8. Tell what the interaction regression weight means in words?
   The relationship between duration and the criterion is more positive for the treatment group

9. Describe the pattern of the interaction.
   For those in the Tx2 group there is a slight positive relationship between the criterion and Treatment Duration, whereas there is a much stronger positive relationship for those in the Tx1 group.

10. Tell what the constant means in words?
    The average criterion variable score for those in the control group who ha ve the mean duration.

Answers to selected QxQ graphs

#2

1. What is the sign of the regression weight for Treatment Intensity?
   0
2. Tell what the Treatment Intensity regression weight means in words?
   There is no relationship between intensity and the criterion at the mean of duration

3. Describe the main effect for Treatment Intensity and tell if it is descriptive or potentially misleading? Carefully explain your answer.
   There is no main effect for Treatment Intensity. No – there are treatment intensity effects both above and below the mean duration

4. What is the sign of the regression weight for Treatment Duration?
   0

5. Tell what the Treatment Duration regression weight means in words?
   There is no relationship between duration and the criterion at the mean intensity

6. Describe the main effect for Treatment Duration and tell if it is descriptive or potentially misleading? Carefully explain your answer.
   There is no main effect for Treatment Duration. No – there are relationships between duration and the criterion for both +1 (negative) and -1 (positive) standard deviations from the mean of intensity

7. What is the sign of the regression weight for the Treatment Intensity X Treatment Duration interaction?
   -
8. Tell what the interaction regression weight means in words?
   The relationship between duration and the criterion is more positive for lower values of intensity

9. The Describe the pattern of the interaction.
   The relationship between Treatment Duration and the criterion is positive for those with Treatment Intensity 1 std below the mean, unrelated for those at the mean, and negative for those 1 std above the mean.

10. Tell what the constant means in words?
    The average criterion variable score for those who ha ve the mean duration and mean intensity values

#8

1. What is the sign of the regression weight for Treatment Intensity?
   +

2. Tell what the Treatment Intensity regression weight means in words?
   Higher intensity is related to higher criterion scores at the mean of duration

3. Describe the main effect for Treatment Intensity and tell if it is descriptive or potentially misleading? Carefully explain your answer.
   Overall, those with higher Treatment Intensity tend to have higher wellness (notice the cross over is to the left of center). No – there are treatment intensity effects diminishes and reverses as duration increases

4. What is the sign of the regression weight for Treatment Duration?
   0

5. Tell what the Treatment Duration regression weight means in words?
   There is no relationship between duration and the criterion at the mean intensity

6. Describe the main effect for Treatment Duration and tell if it is descriptive or potentially misleading? Carefully explain your answer.
   There is no main effect for Treatment Duration. No – there are relationships between duration and the criterion for both +1 (positive) and -1 (negative) standard deviations from the mean of intensity

7. What is the sign of the regression weight for the Treatment Intensity X Treatment Duration interaction?
   +

8. Tell what the interaction regression weight means in words?
   The relationship between duration and the criterion is more positive for higher values of intensity

9. Describe the pattern of the interaction.
   The relationship between Treatment Duration and the criterion is positive for those 1 std above the mean on Treatment Intensity, not related for those at the mean and negative for those 1 std below the mean.

10. Tell what the constant means in words?
    The average criterion variable score for those who ha ve the mean duration and mean intensity values

#11

1. What is the sign of the regression weight for Treatment Intensity?
   +

2. Tell what the Treatment Intensity regression weight means in words?
   Higher intensity is related to higher criterion scores at the mean of duration

3. Describe the main effect for Treatment Intensity and tell if it is descriptive or potentially misleading? Carefully explain your answer.
   Those with higher Treatment Intensity tend to have higher wellness. Yes – there is no interaction

4. What is the sign of the regression weight for Treatment Duration?
   -

5. Tell what the Treatment Duration regression weight means in words?
   Higher duration is associated with lower criterion scores at the mean intensity

6. Describe the main effect for Treatment Duration and tell if it is descriptive or potentially misleading? Carefully explain your answer.
   Those with higher duration tend to have lower wellmess. Yes – there is no interaction

7. What is the sign of the regression weight for the Treatment Intensity X Treatment Duration interaction?
   0

8. Tell what the interaction regression weight means in words?
   There is no interaction

9. Describe the pattern of the interaction.
   There is no interaction, the slope of the Treatment Duration - criterion relationship is the same for all levels of Intensity.

10. Tell what the constant means in words?
    The average criterion variable score for those who ha ve the mean duration and mean intensity values

#15

1. What is the sign of the regression weight for Treatment Intensity?
   -

2. Tell what the Treatment Intensity regression weight means in words?
   Lower intensity is related to higher criterion scores at the mean of duration

3. Describe the main effect for Treatment Intensity and tell if it is descriptive or potentially misleading? Carefully explain your answer.
   Those with lower Treatment Intensity tend to have higher wellness scores. Yes – the intensity effect diminishes as duration decreases, but never disappears

4. What is the sign of the regression weight for Treatment Duration?
   +

5. Tell what the Treatment Duration regression weight means in words?
   Higher duration is associated with higher criterion scores at the mean intensity

6. Describe the main effect for Treatment Duration and tell if it is descriptive or potentially misleading? Carefully explain your answer.
   Those with higher Treatment Duration tend to have higher wellness scores. Yes – There is a positive relationship, even for the -1 intensity line

7. What is the sign of the regression weight for the Treatment Intensity X Treatment Duration interaction?
   -

8. Tell what the interaction regression weight means in words?
   The relationship between duration and the criterion is less positive for higher values of intensity

9. Describe the pattern of the interaction.
   While the relationship between Treatment Duration and the criterion is consistently positive, it is more positive for those with lower values of Treatment Intensity.

10. Tell what the constant means in words?
    The average criterion variable score for those who ha ve the mean duration and mean intensity values