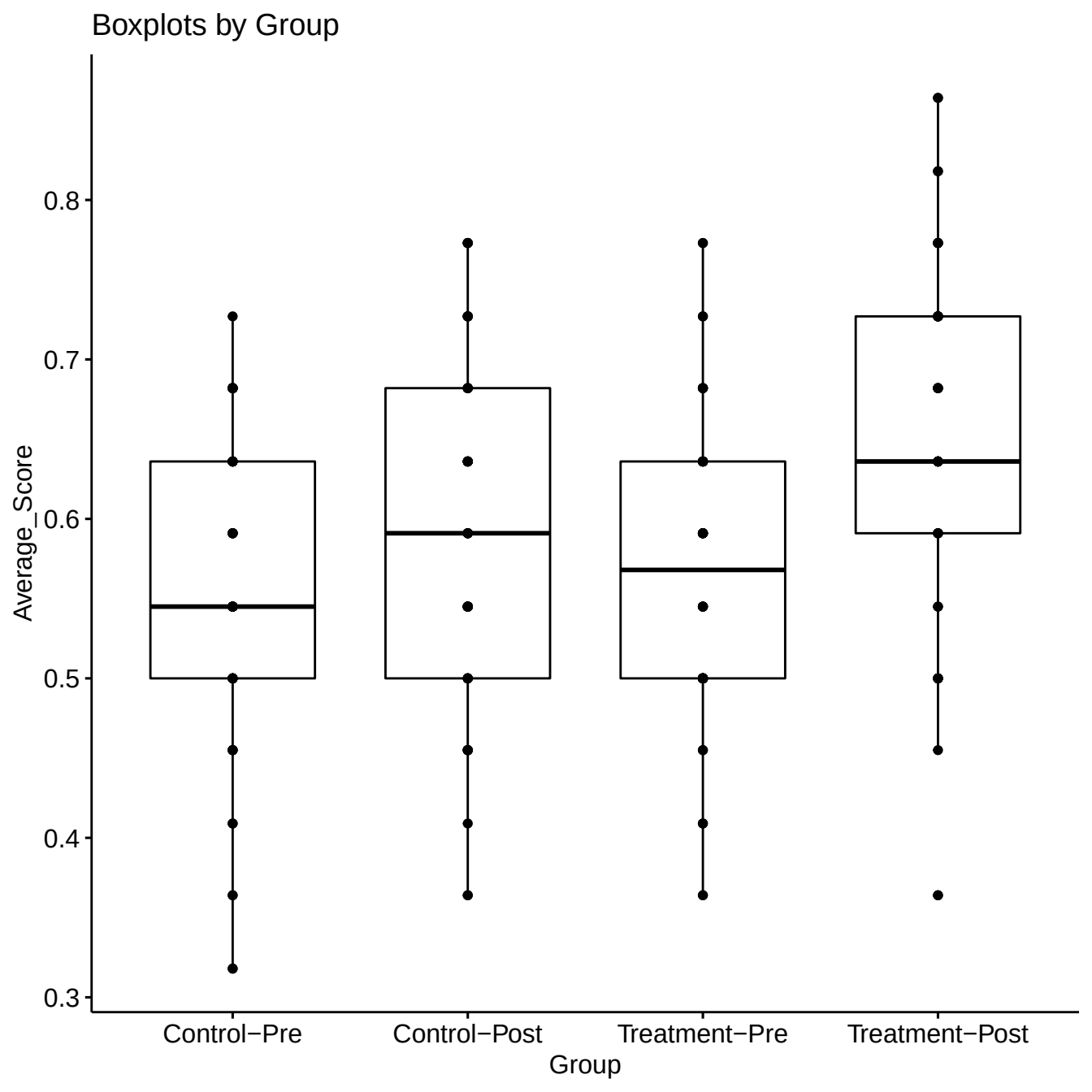
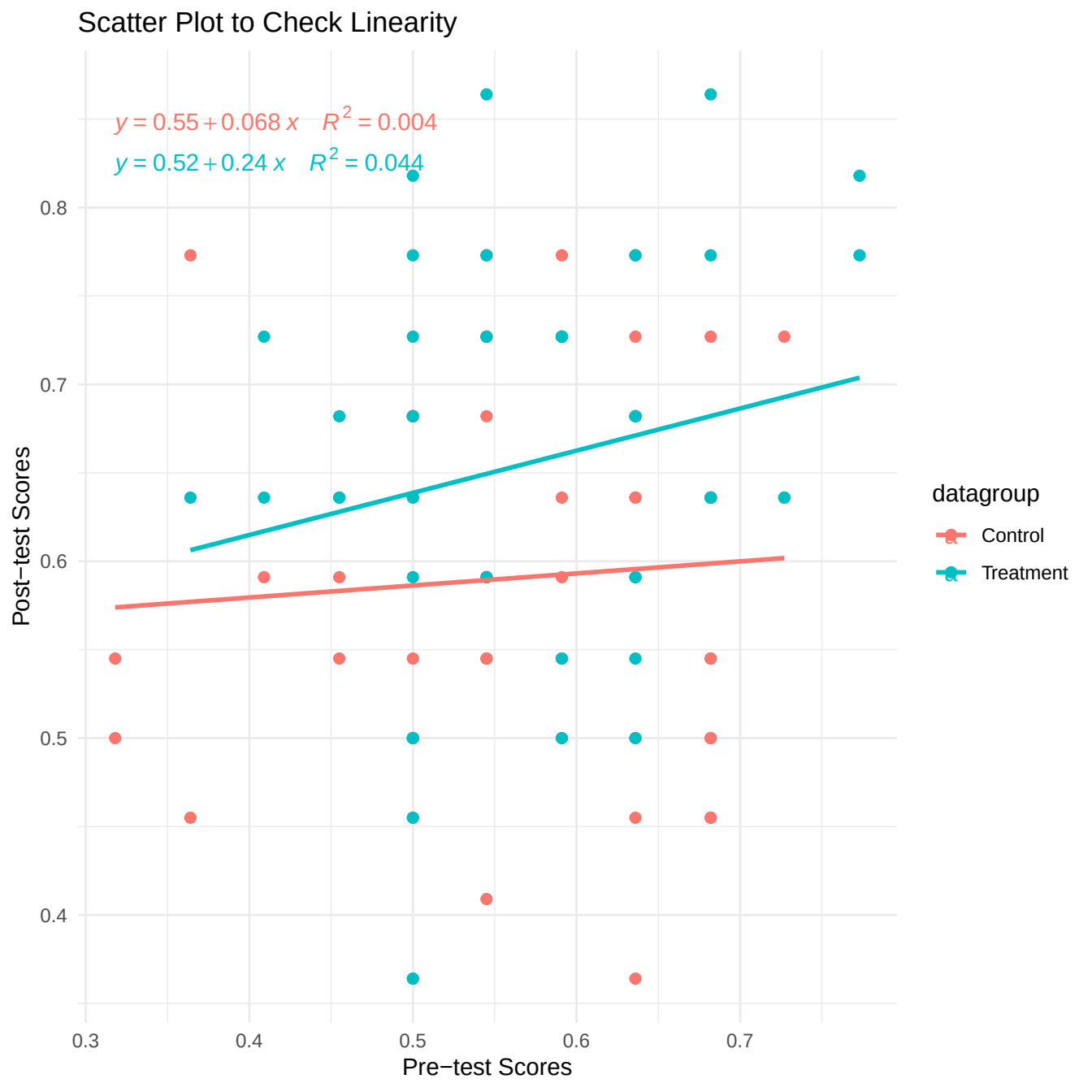
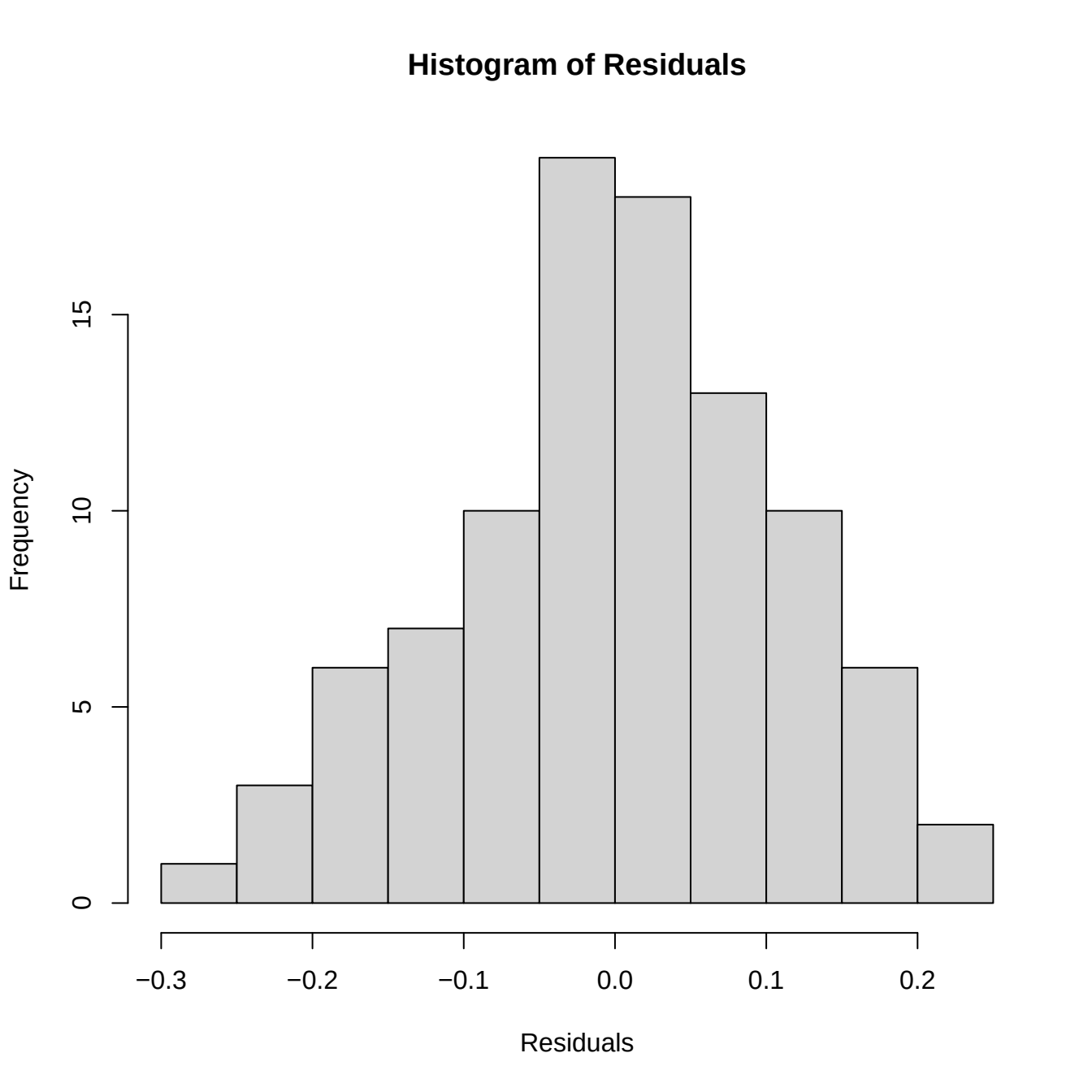
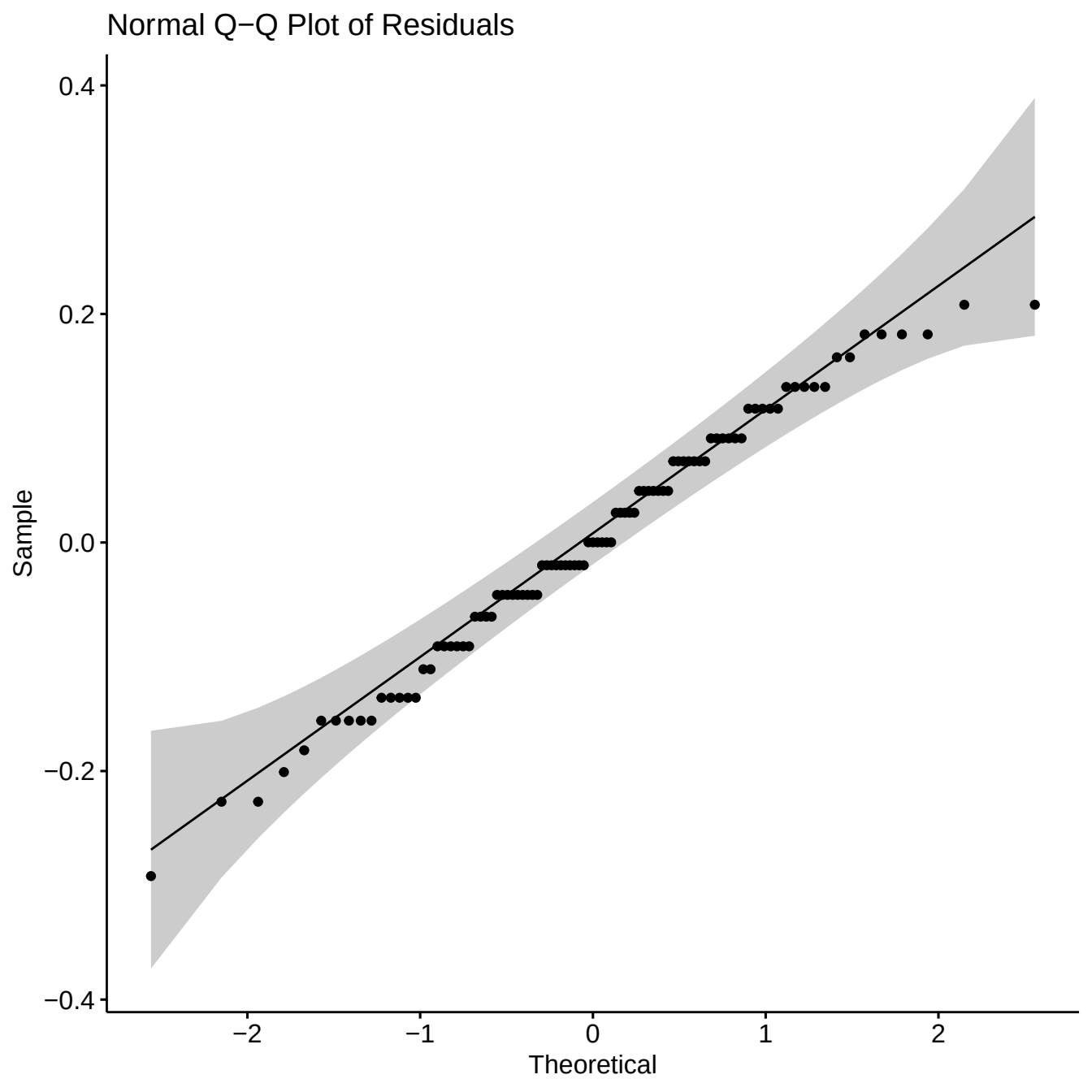
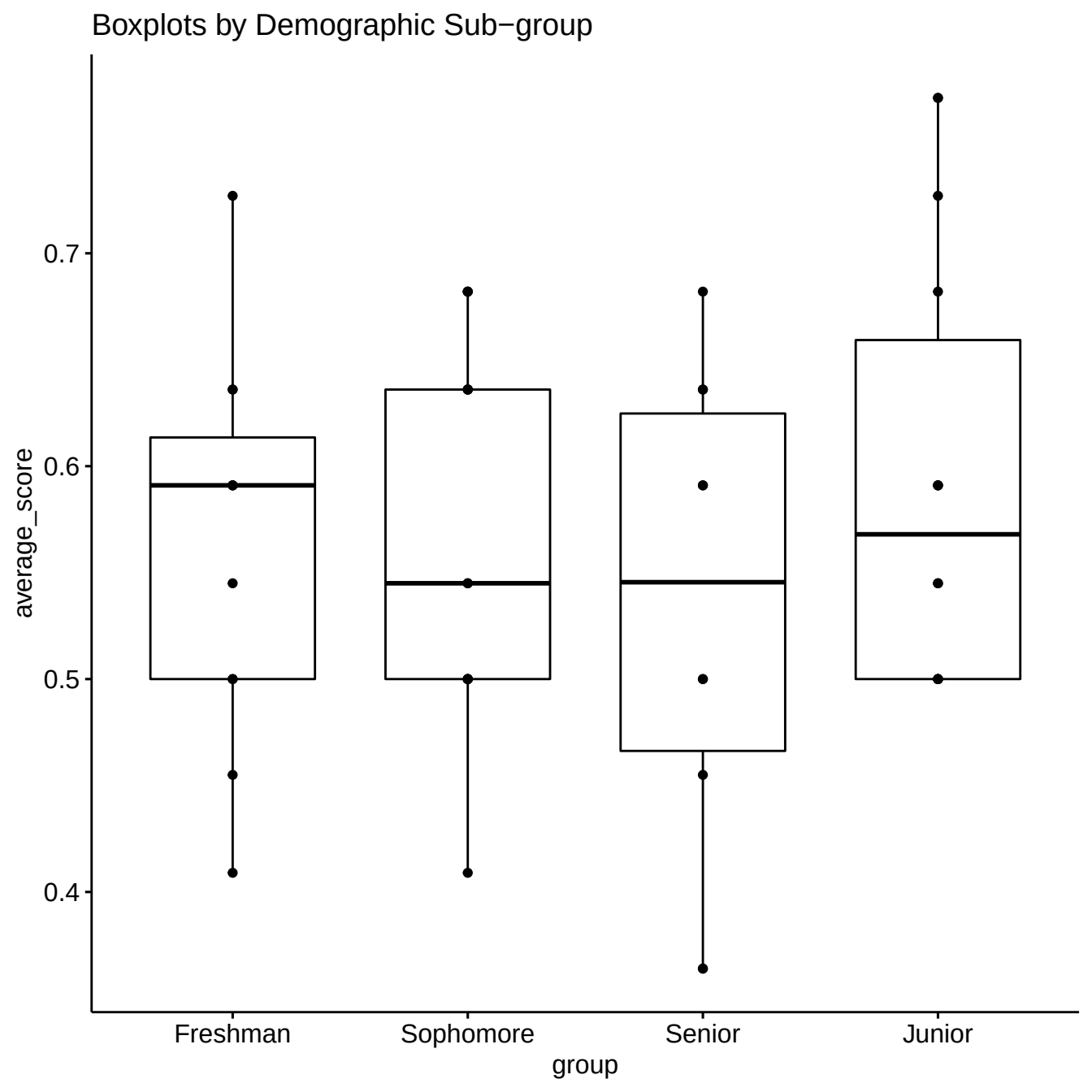
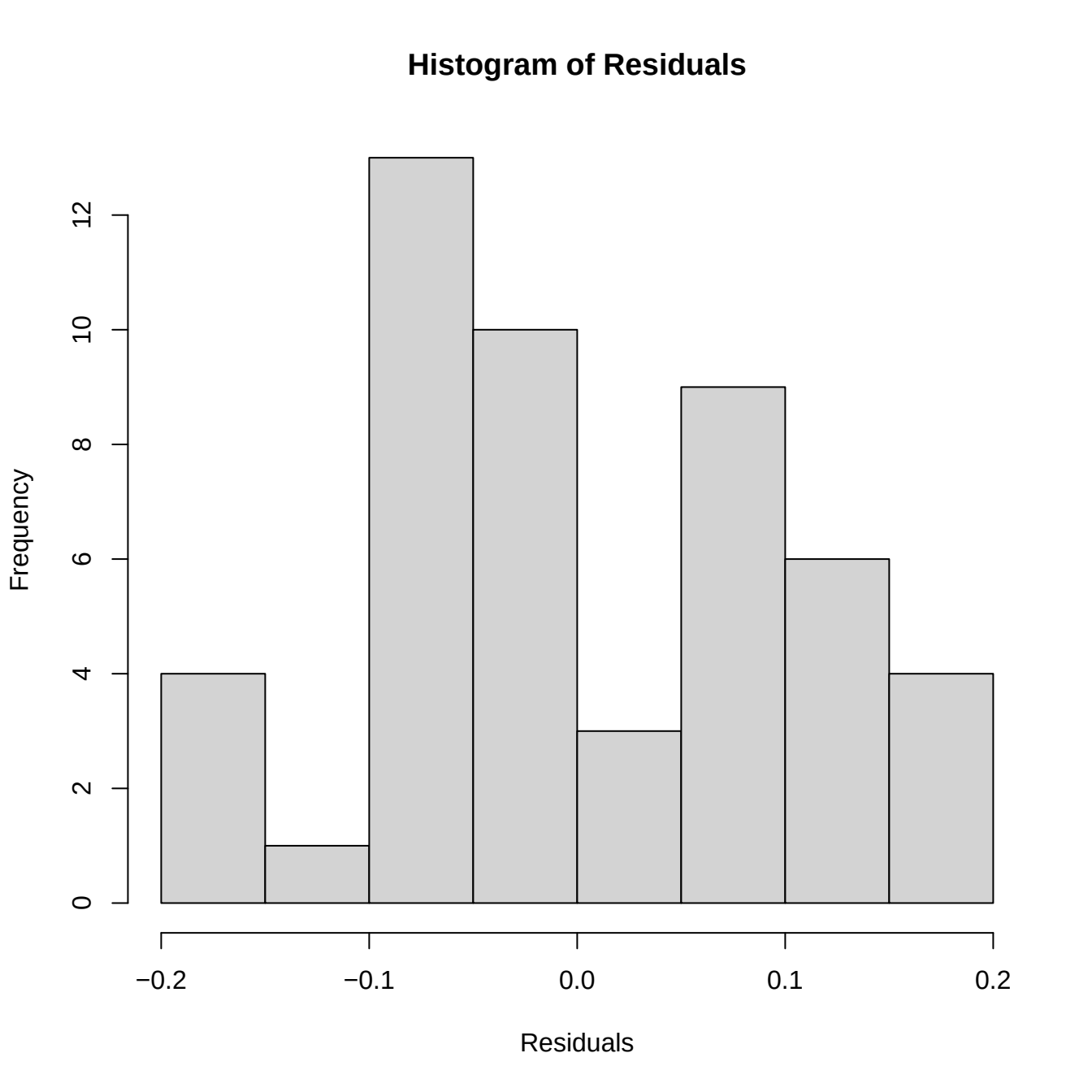

Boxplots by Group
Average_Score
0.8
0.7
0.6
0.5
0.4
0.3
Control−Pre
Control−Post
Treatment−Pre
Treatment−Post
Group

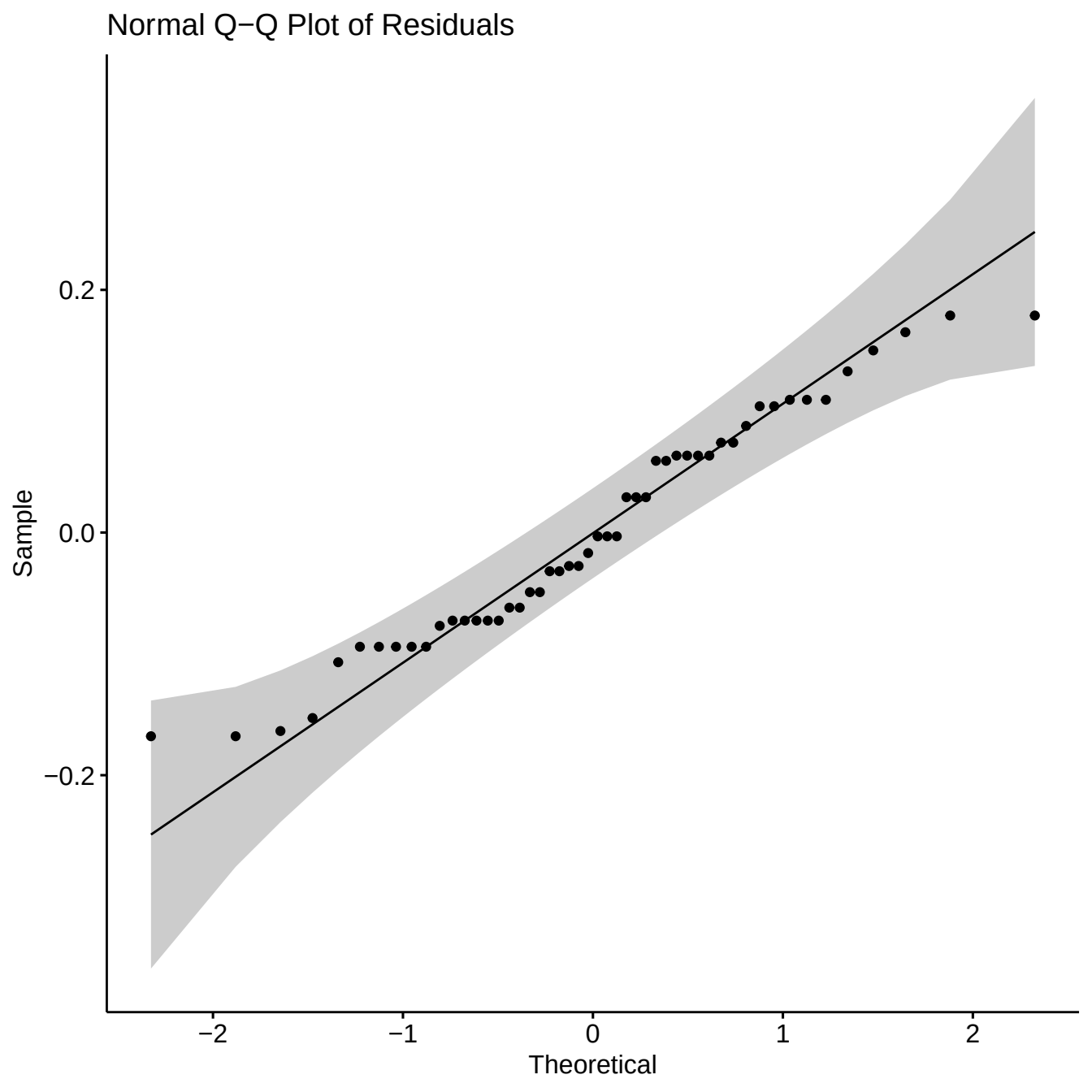

Scatter Plot to Check Linearity
y = 0.55 + 0.068 x R^2 = 0.004
y = 0.52 + 0.24 x R^2 = 0.044
Post−test Scores
Pre−test Scores
0.8
0.7
0.6
0.5
0.4
0.3
0.4
0.5
0.6
0.7
datagroup
Control
Treatment

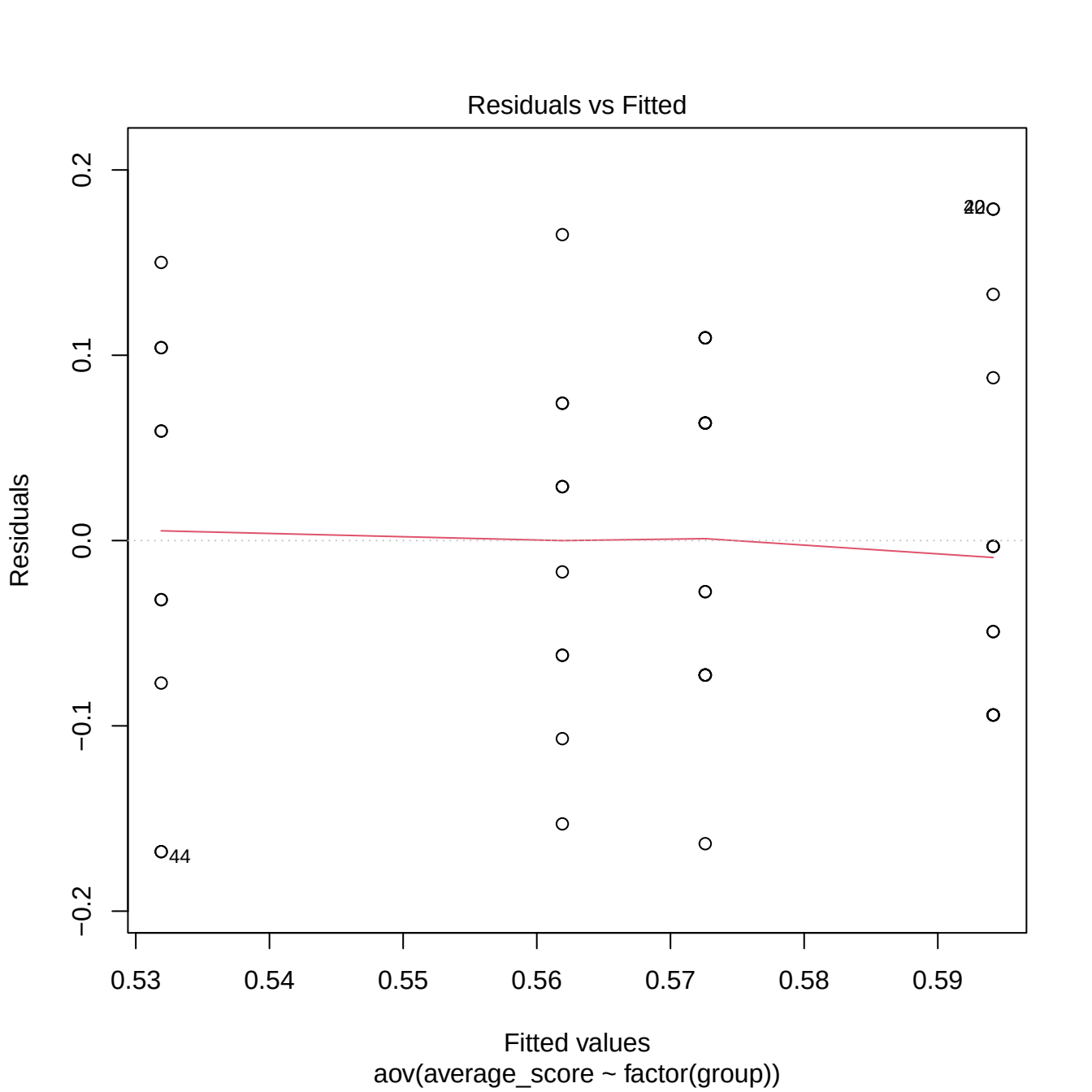

Histogram of Residuals
Frequency
0
5
10
15
−0.3
−0.2
−0.1
0.0
0.1
0.2
Residuals

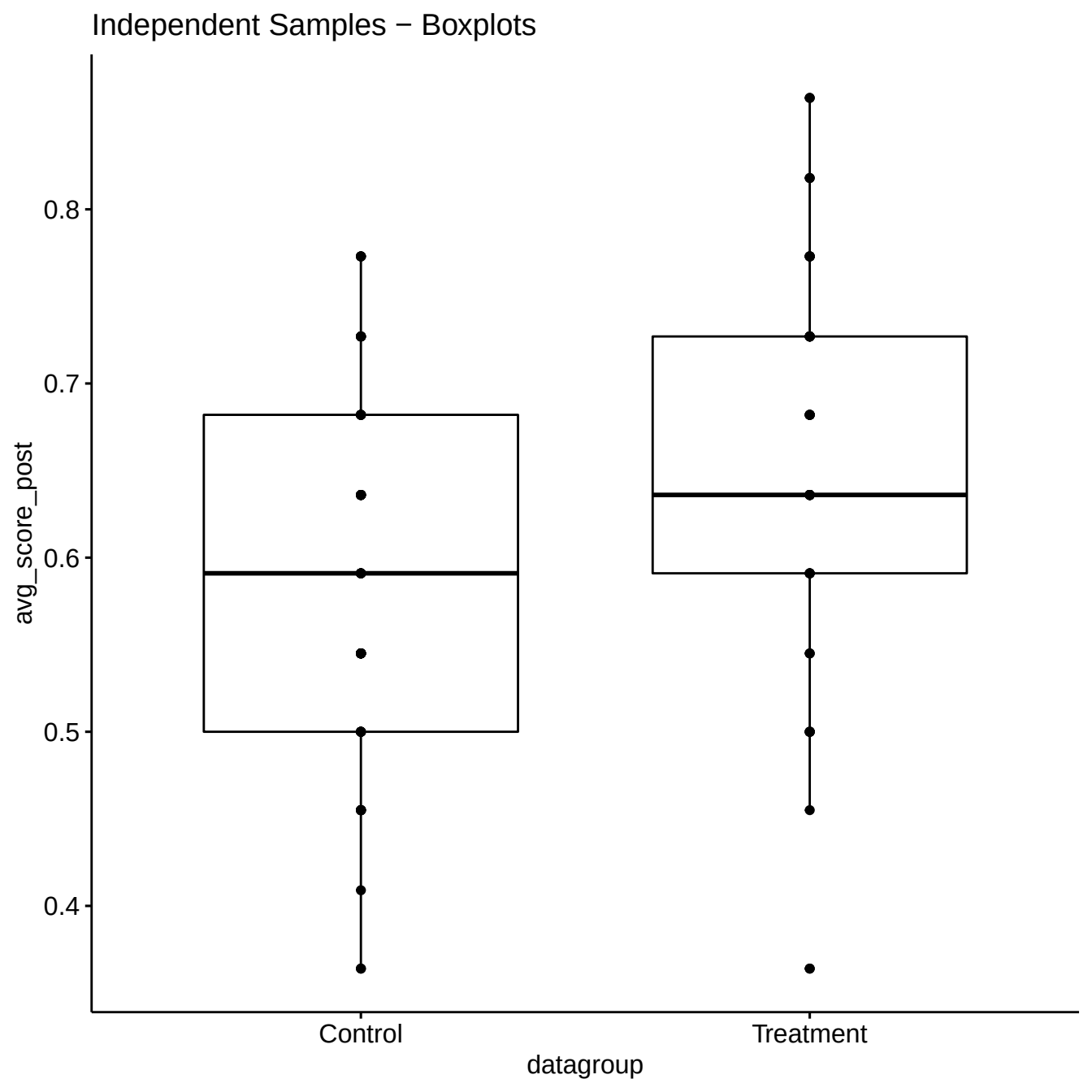

Normal Q−Q Plot of Residuals
Sample
Theoretical
0.4
0.2
0.0
−0.2
−0.4
−2
−1
0
1
2

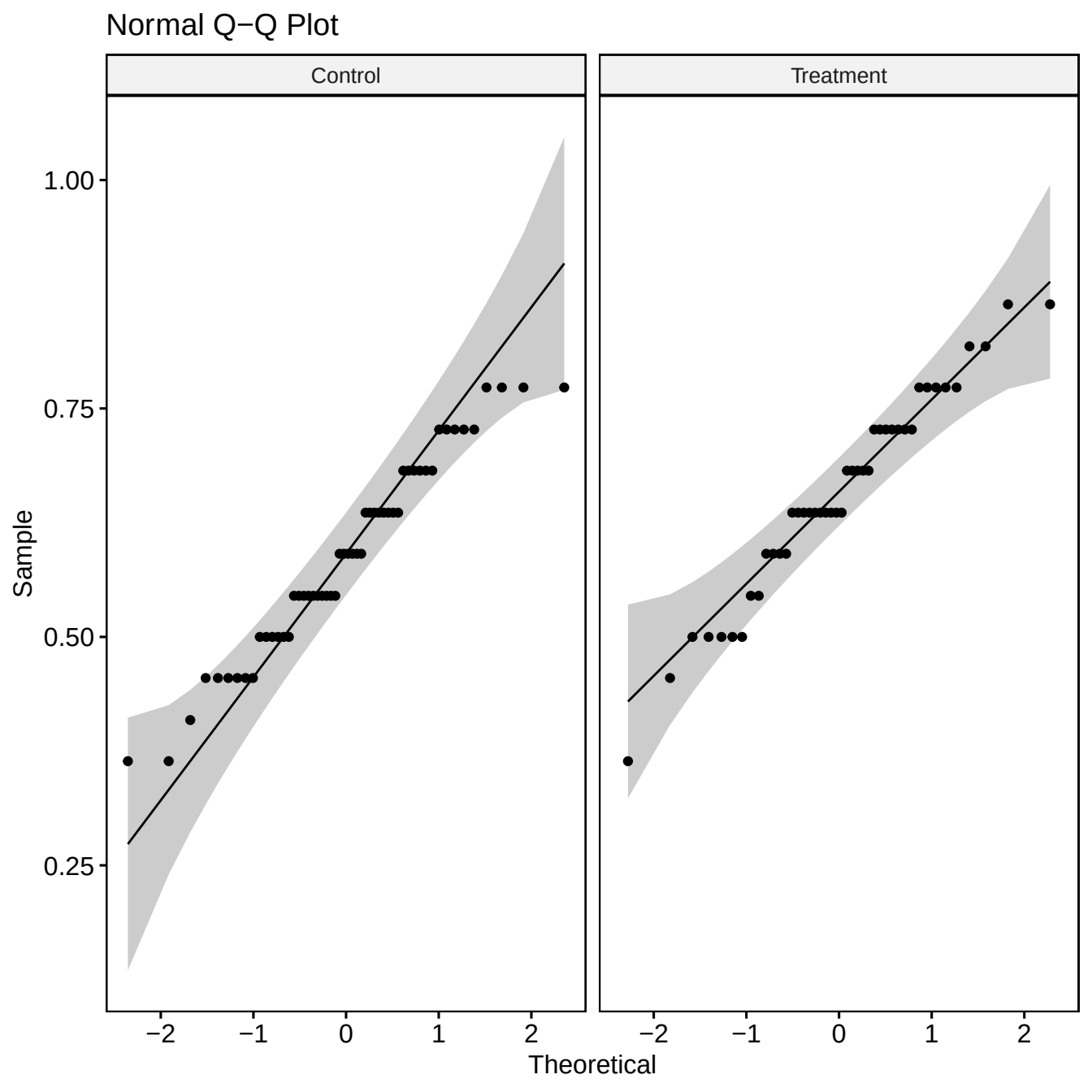

Boxplots by Demographic Sub−group
average_score
0.7
0.6
0.5
0.4
Freshman
Sophomore
Senior
Junior
group

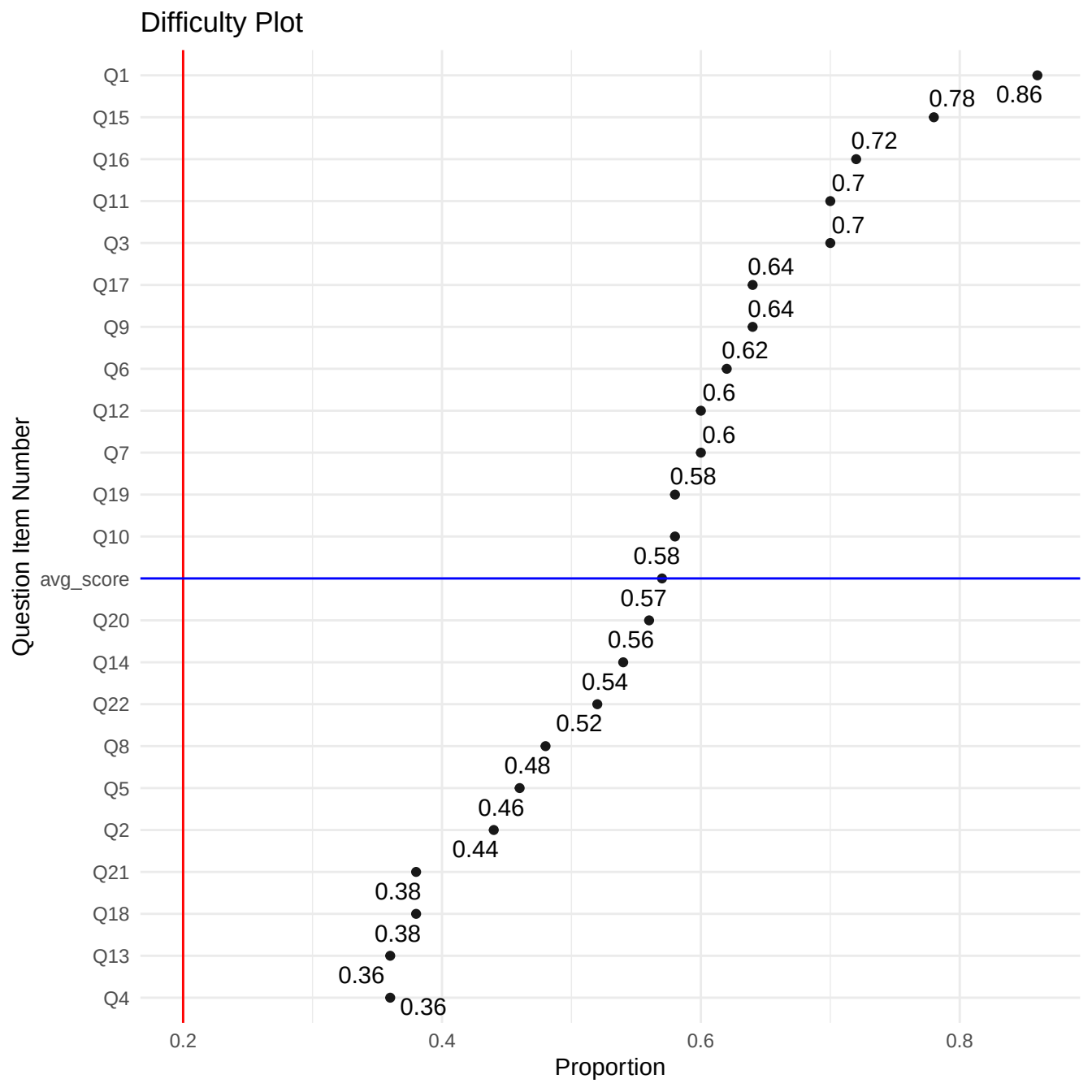

Histogram of Residuals
Frequency
0
2
4
6
8
10
12
−0.2
−0.1
0.0
0.1
0.2
Residuals

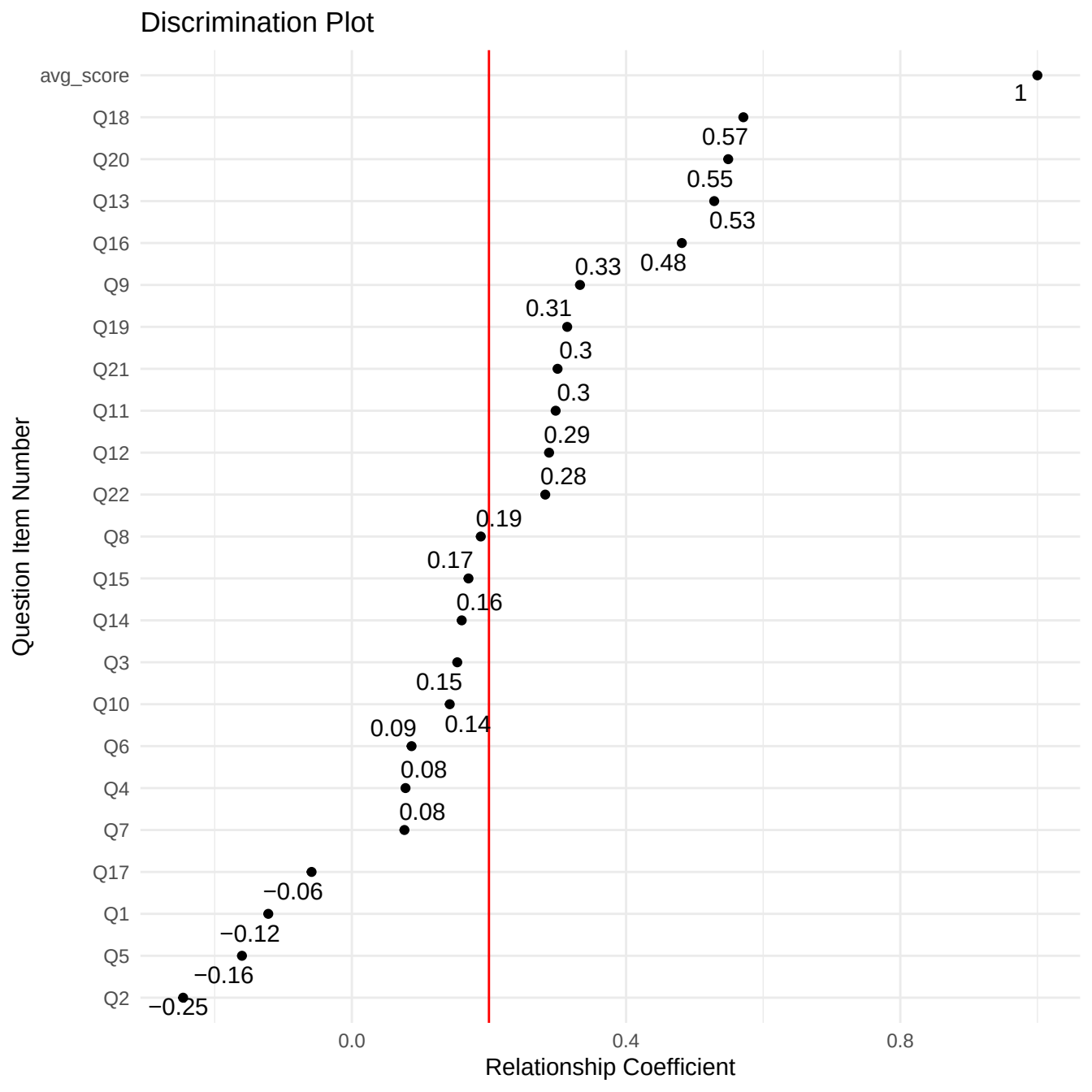

Normal Q−Q Plot of Residuals
Sample
0.2
0.0
−0.2
−2
−1
0
1
2
Theoretical

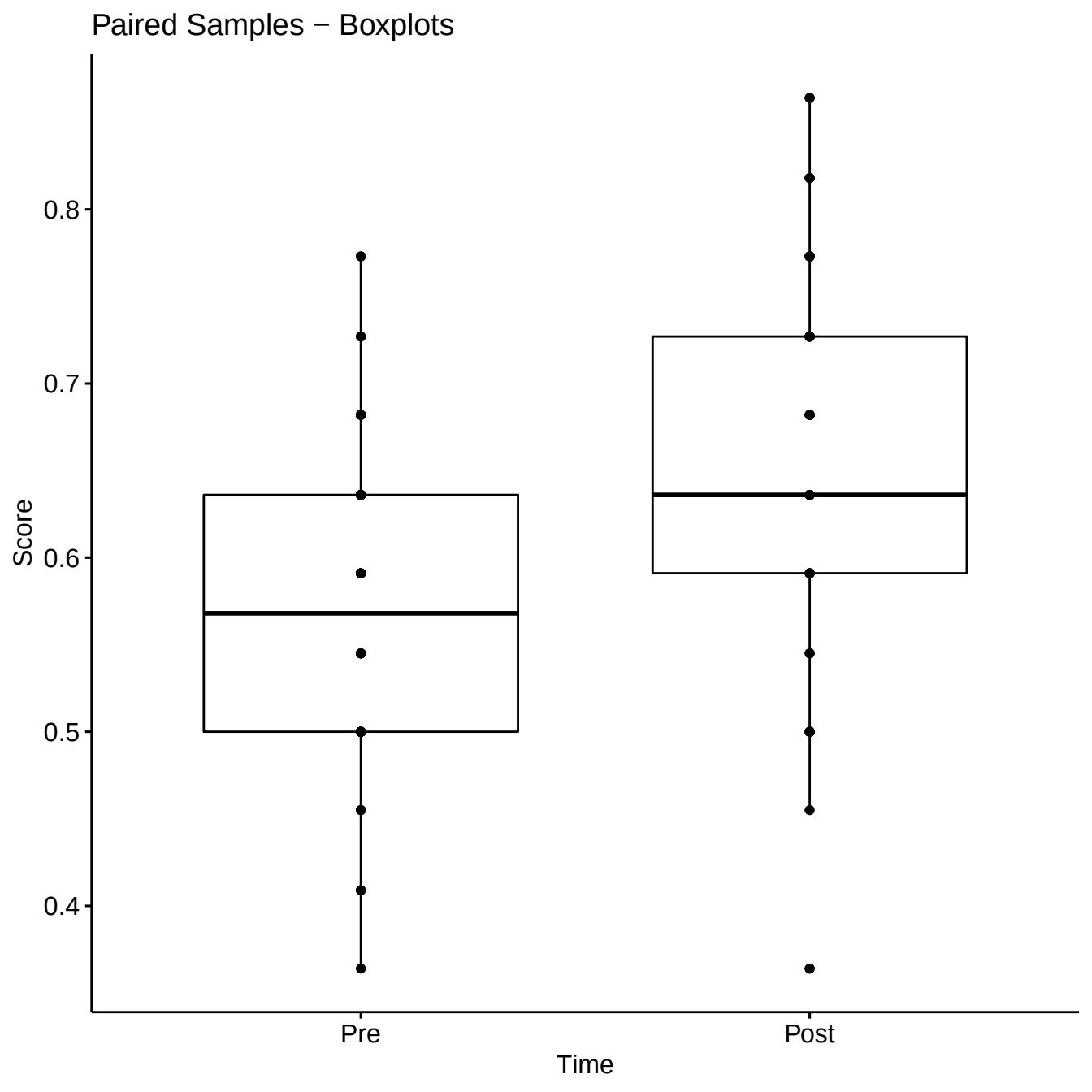

Residuals vs Fitted
Residuals
0.2
0.1
0.0
−0.1
−0.2
0.53
0.54
0.55
0.56
0.57
0.58
0.59
Fitted values
aov(average_score ~ factor(group))
44

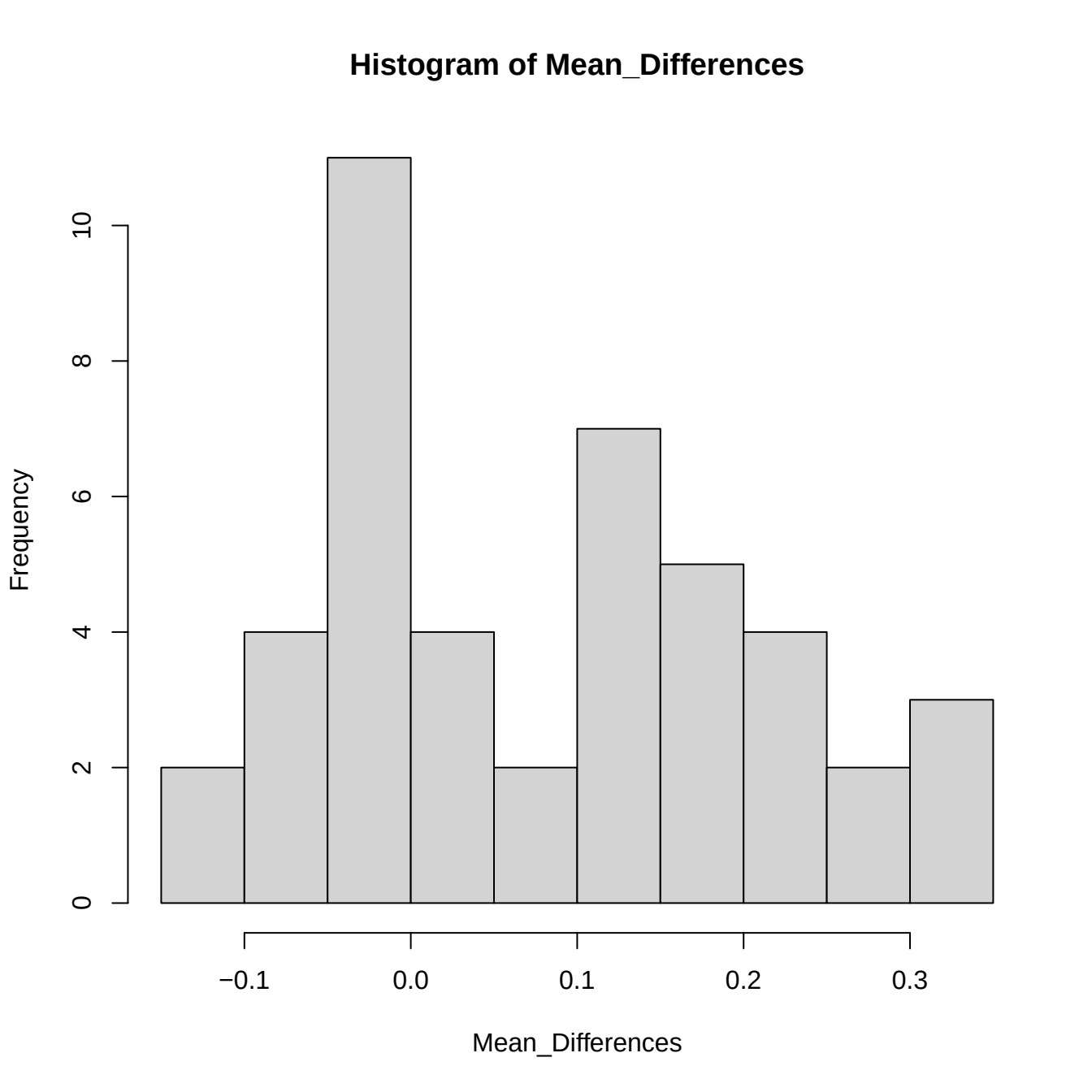

Independent Samples − Boxplots
avg_score_post
0.8
0.7
0.6
0.5
0.4
Control
Treatment
datagroup

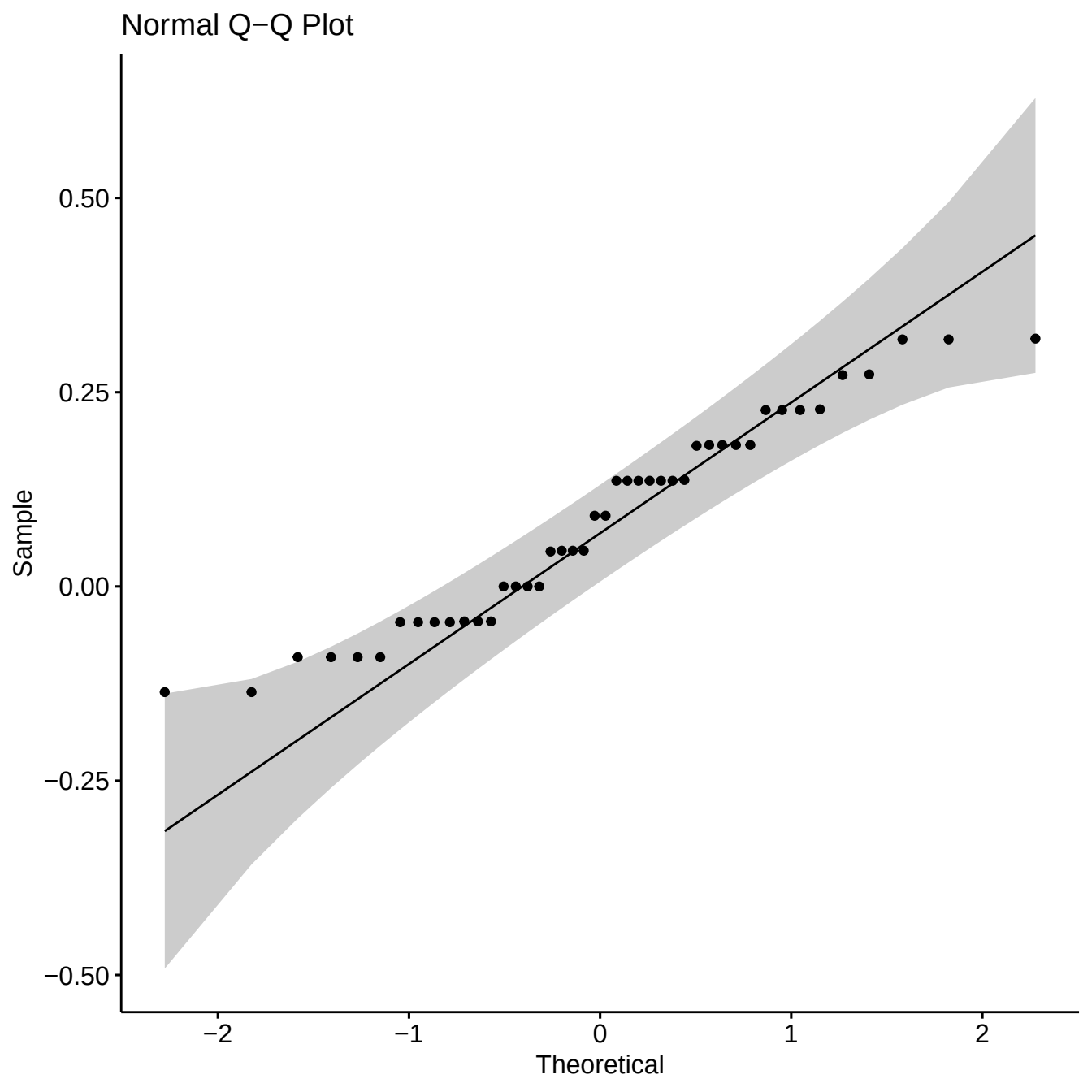

Normal Q−Q Plot
Control
Treatment
1.00
0.75
0.50
0.25
Sample
−2
−1
0
1
2
Theoretical

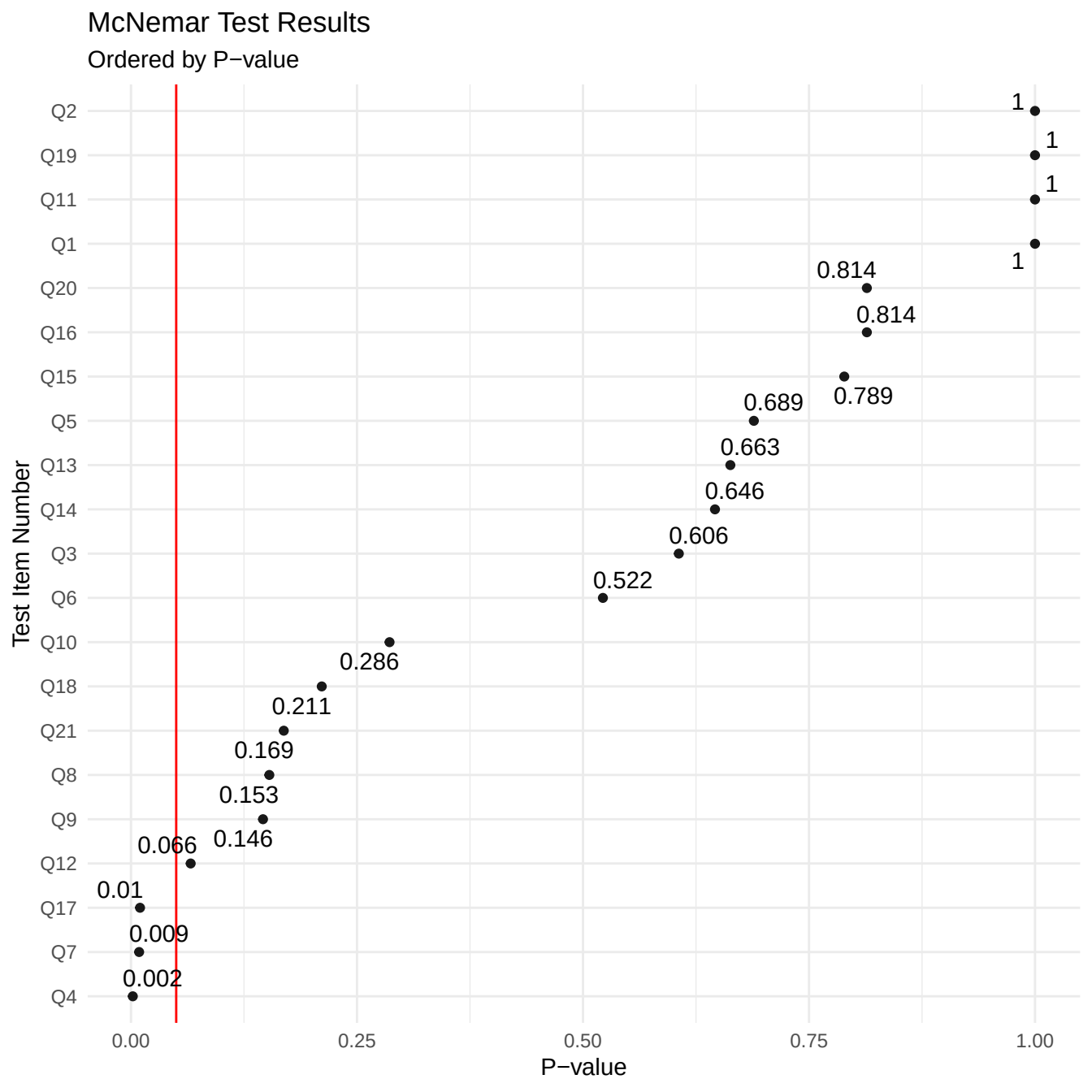

Difficulty Plot
Question Item Number
Proportion
Q1
Q15
Q16
Q11
Q3
Q17
Q9
Q6
Q12
Q7
Q19
Q10
avg_score
Q20
Q14
Q22
Q8
Q5
Q2
Q21
Q18
Q13
Q4
0.86
0.78
0.72
0.7
0.7
0.64
0.64
0.62
0.6
0.6
0.58
0.58
0.57
0.56
0.54
0.52
0.48
0.46
0.44
0.38
0.38
0.36
0.36
0.2
0.4
0.6
0.8

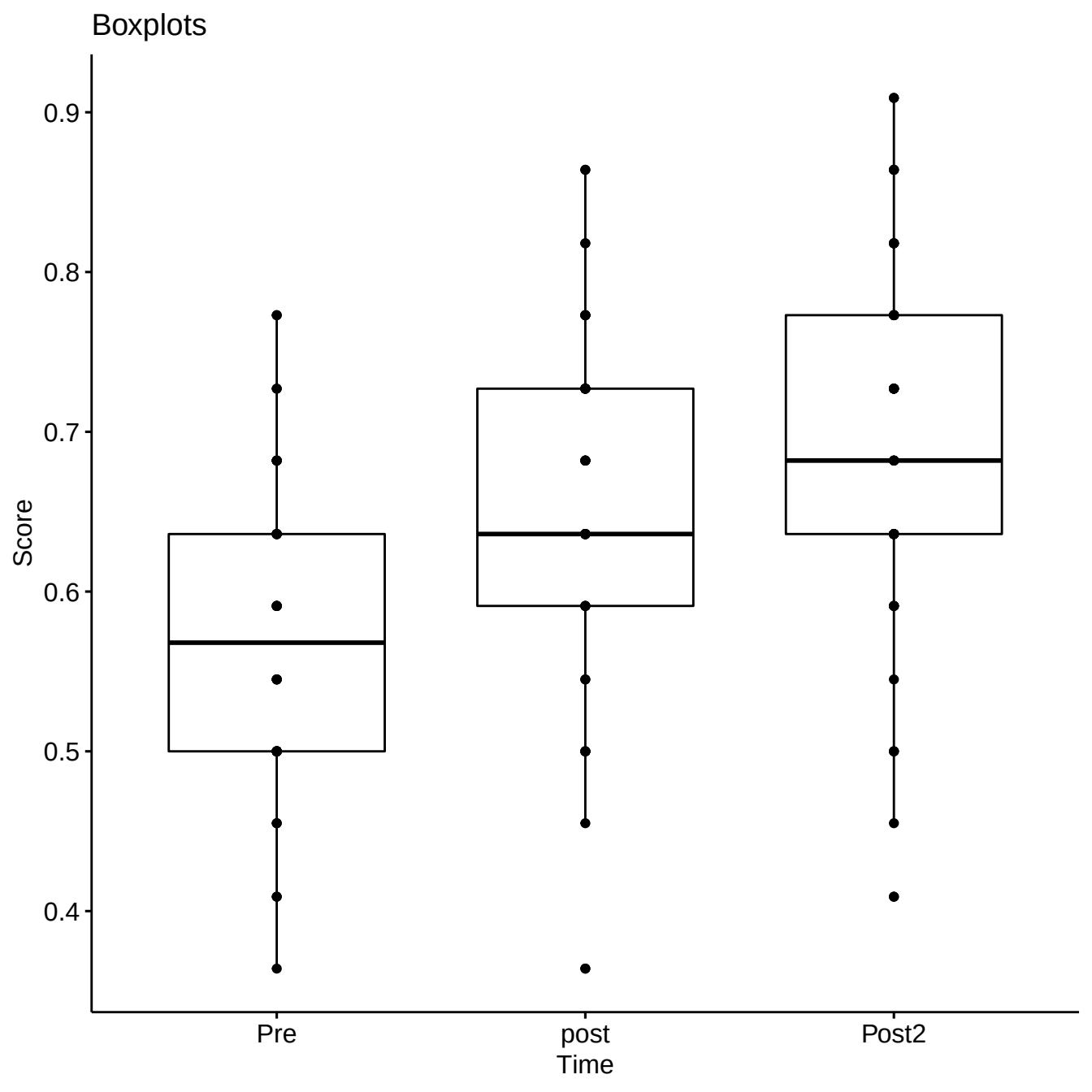

Discrimination Plot
avg_score
Q18
Q20
Q13
Q16
Q9
Q19
Q21
Q11
Q12
Q22
Q8
Q15
Q14
Q3
Q10
Q6
Q4
Q7
Q17
Q1
Q5
Q2
Question Item Number
1
0.57
0.55
0.53
0.48
0.33
0.31
0.3
0.3
0.29
0.28
0.19
0.17
0.16
0.15
0.14
0.09
0.08
0.08
−0.06
−0.12
−0.16
−0.25
0.0
0.4
0.8
Relationship Coefficient

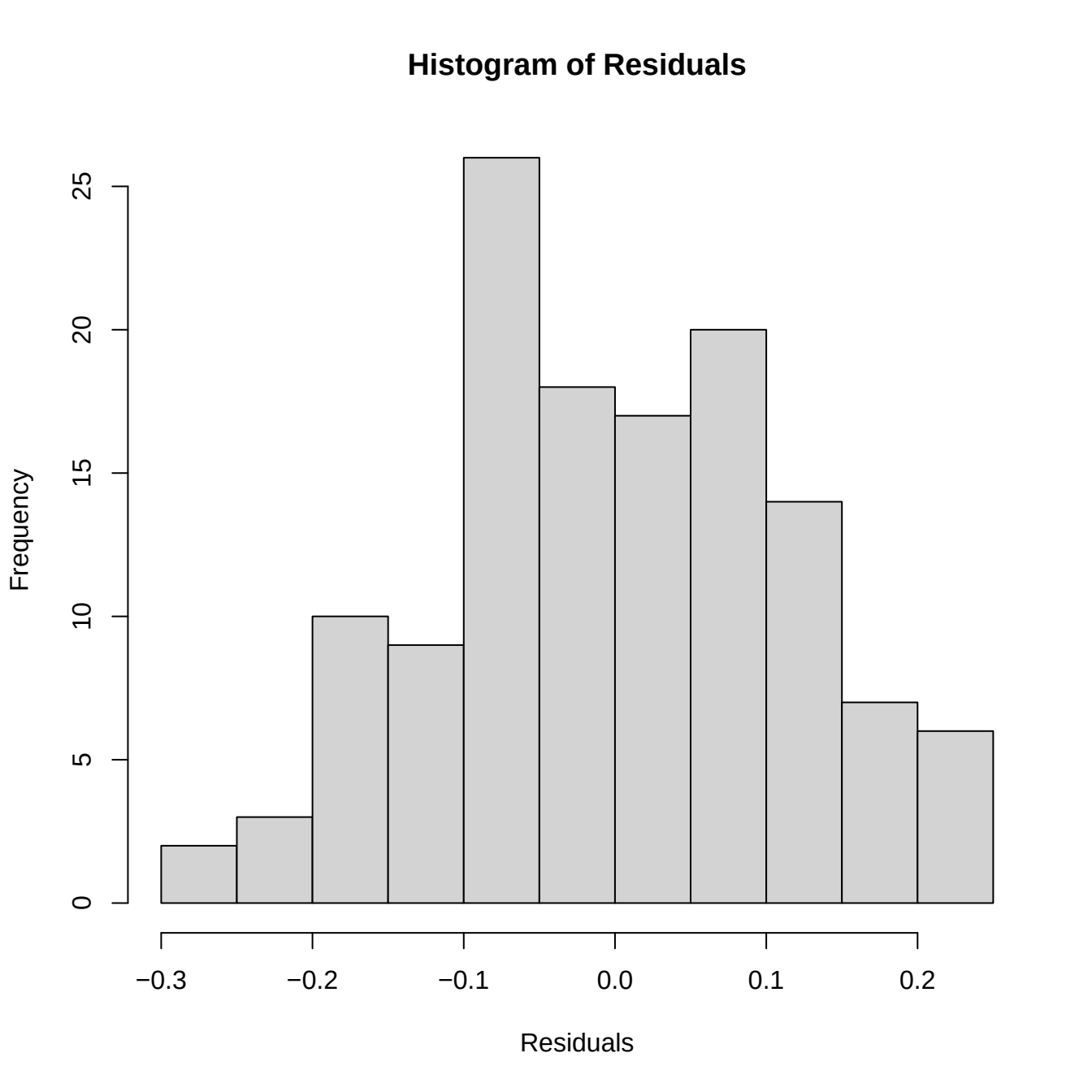

Paired Samples − Boxplots
0.8
0.7
0.6
0.5
0.4
Score
Pre
Post
Time

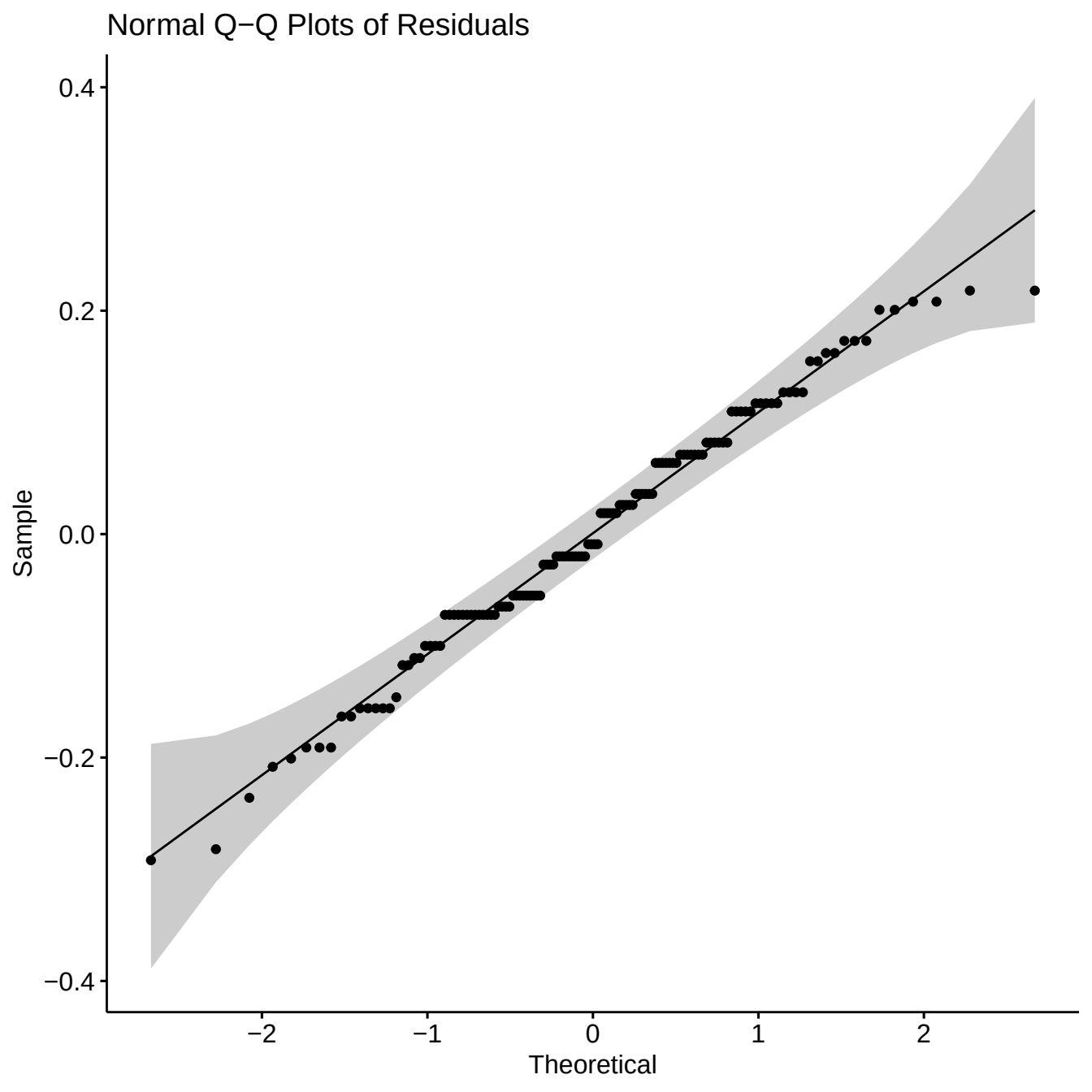

Histogram of Mean_Differences
Frequency
0
2
4
6
8
10
−0.1
0.0
0.1
0.2
0.3
Mean_Differences


Normal Q−Q Plot
0.50
0.25
0.00
−0.25
−0.50
Sample
−2
−1
0
1
2
Theoretical


McNemar Test Results
Ordered by P−value
Test Item Number
P−value
Q2
Q19
Q11
Q1
Q20
Q16
Q15
Q5
Q13
Q14
Q3
Q6
Q10
Q18
Q21
Q8
Q9
Q12
Q17
Q7
Q4
1
1
1
1
0.814
0.814
0.789
0.689
0.663
0.646
0.606
0.522
0.286
0.211
0.169
0.153
0.146
0.066
0.01
0.009
0.002
0.00
0.25
0.50
0.75
1.00


Boxplots
0.9
0.8
0.7
0.6
0.5
0.4
Score
Pre
post
Post2
Time


Histogram of Residuals
Frequency
0
5
10
15
20
25
−0.3
−0.2
−0.1
0.0
0.1
0.2
Residuals


Normal Q−Q Plots of Residuals
Sample
Theoretical
0.4
0.2
0.0
−0.2
−0.4
−2
−1
0
1
2