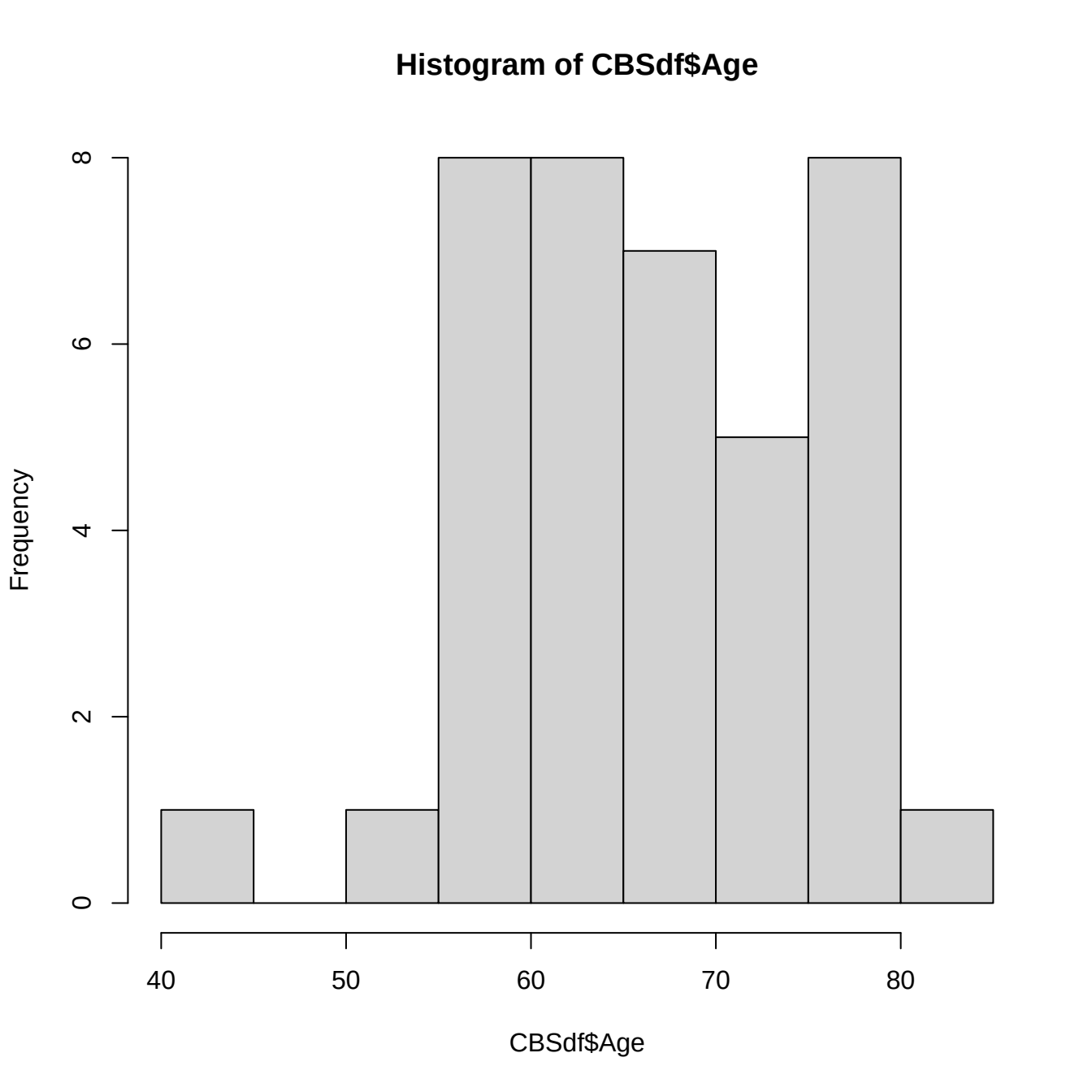
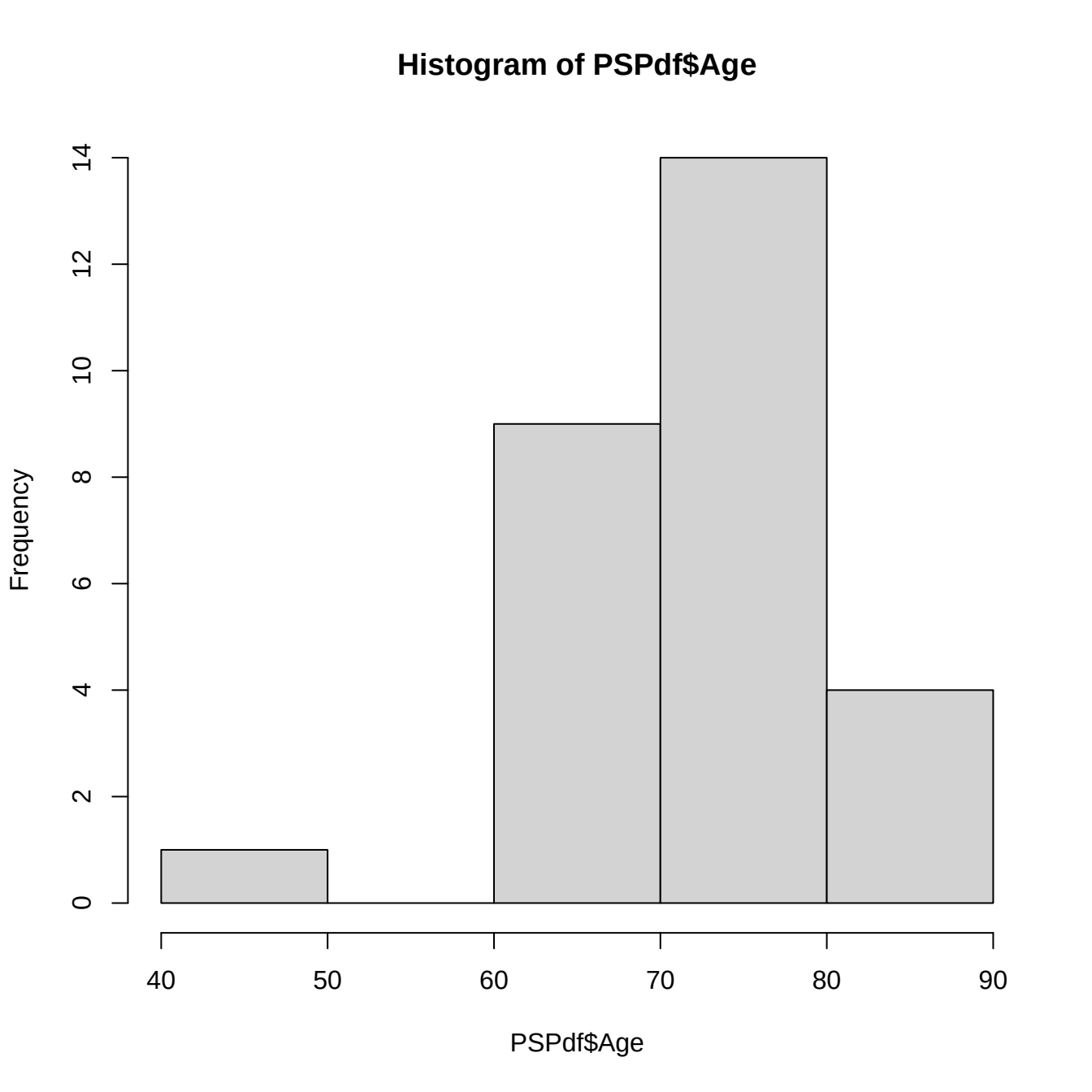
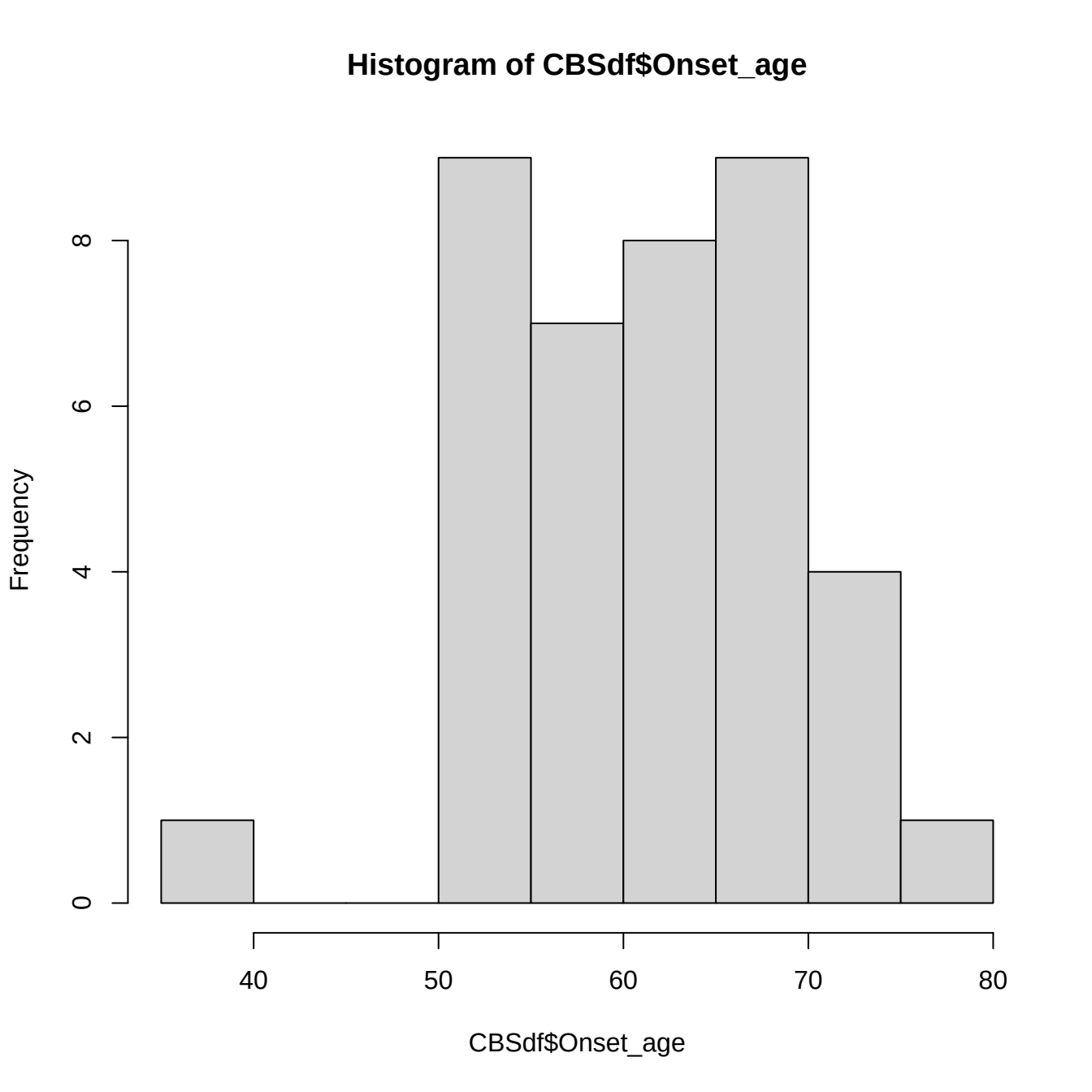
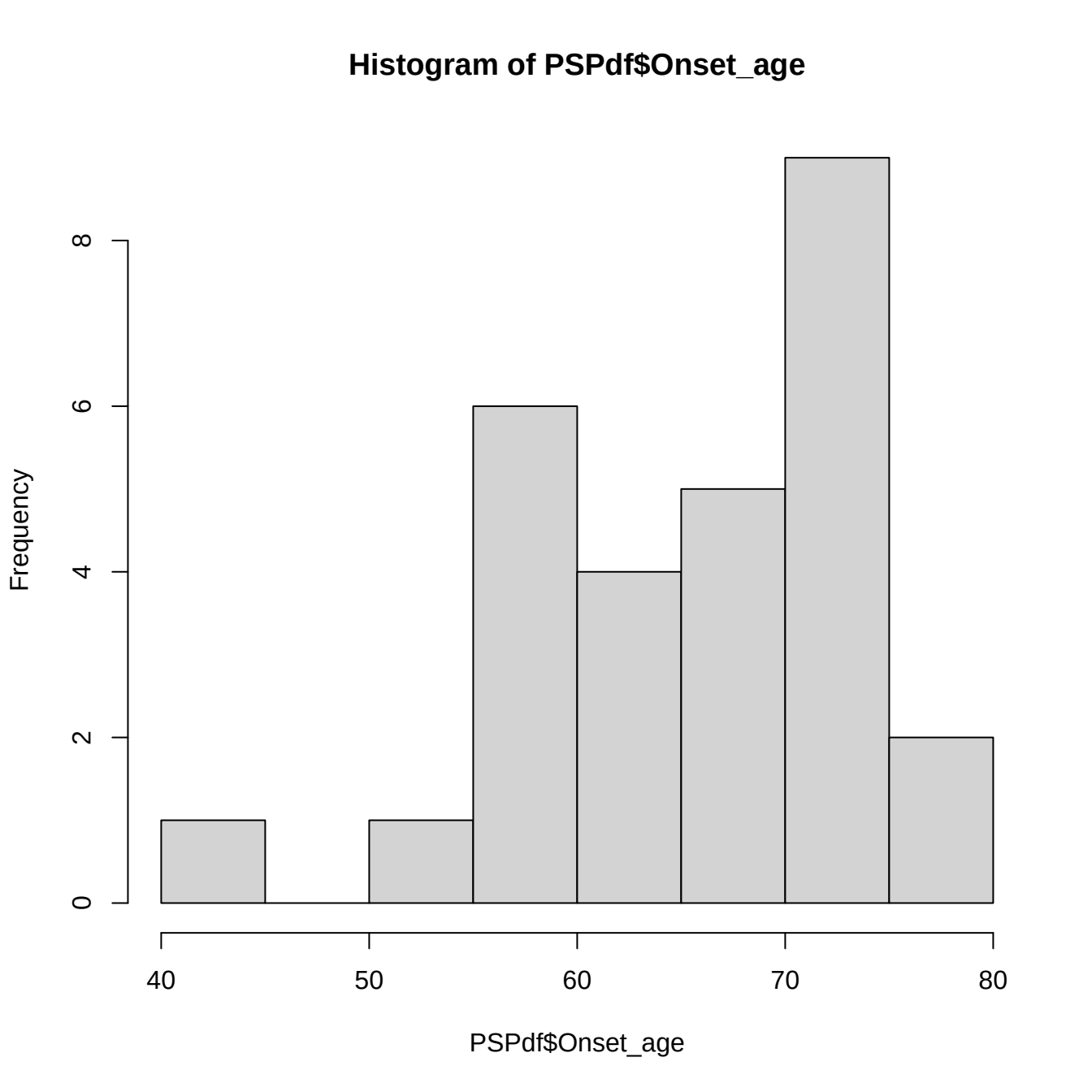
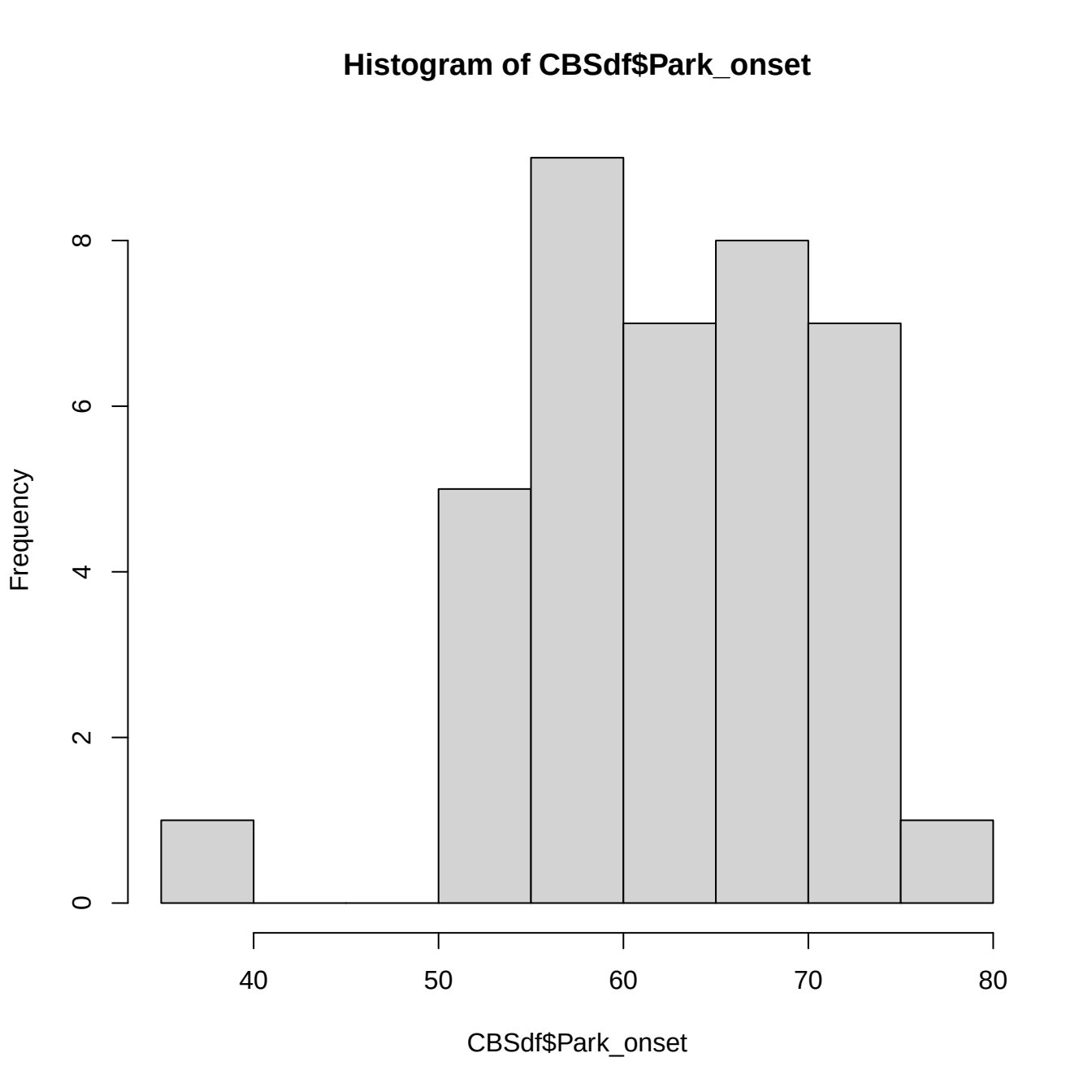
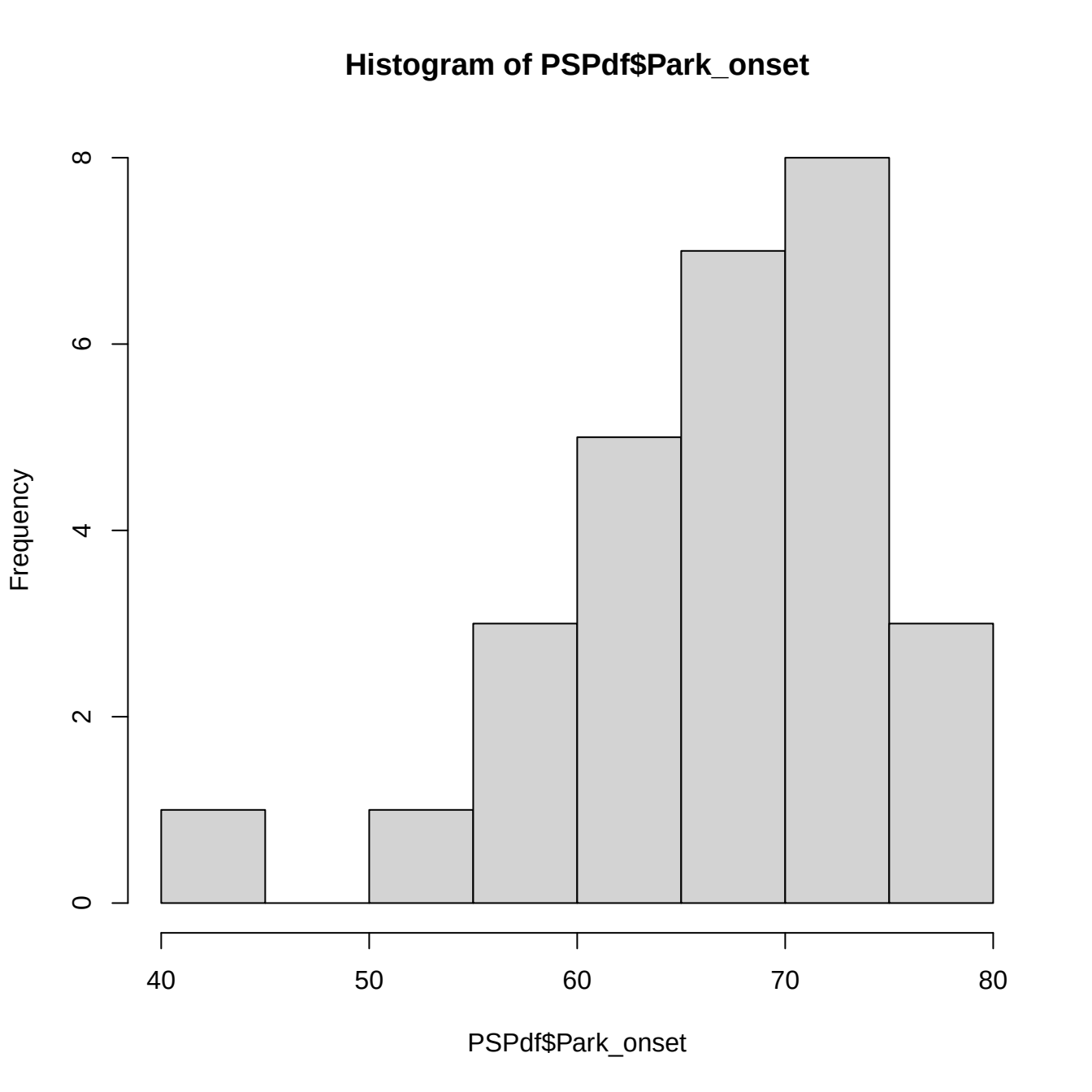

Histogram of CBSdf$Age
Frequency
0
2
4
6
8
40
50
60
70
80
CBSdf$Age

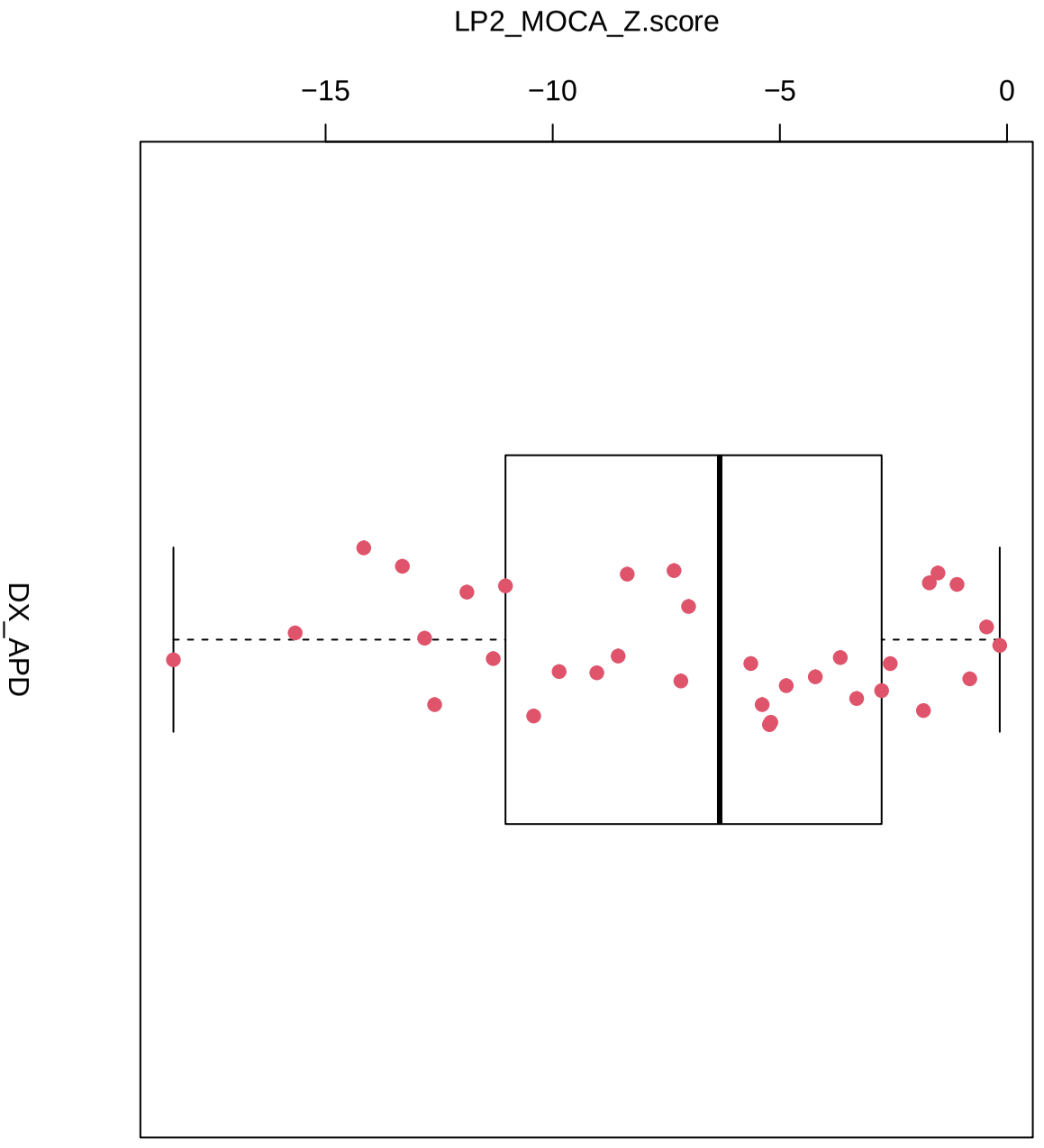

Histogram of PSPdf$Age
Frequency
0
2
4
6
8
10
12
14
40
50
60
70
80
90
PSPdf$Age

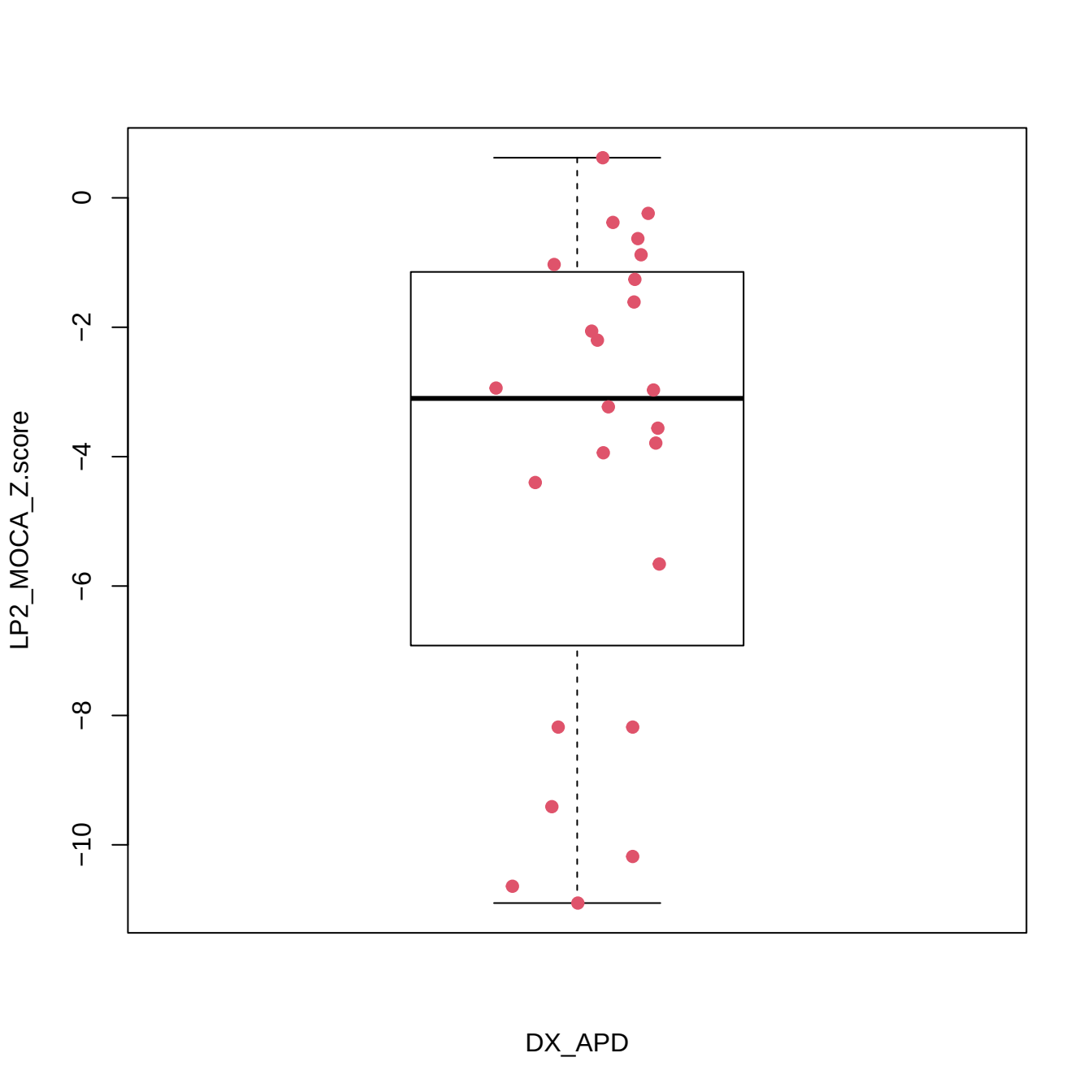

Histogram of CBSdf$Onset_age
Frequency
0
2
4
6
8
40
50
60
70
80
CBSdf$Onset_age

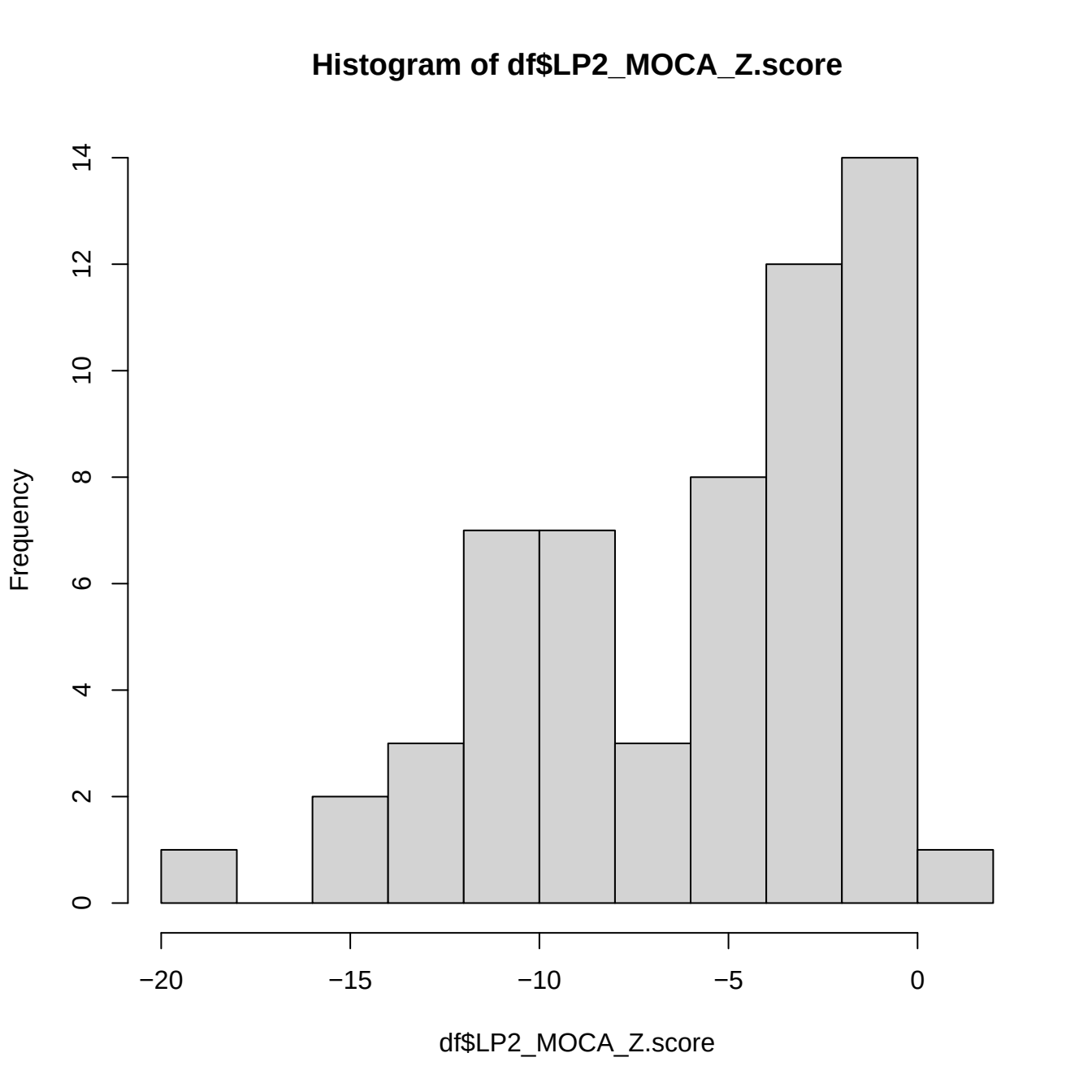

Histogram of PSPdf$Onset_age
Frequency
0
2
4
6
8
40
50
60
70
80
PSPdf$Onset_age

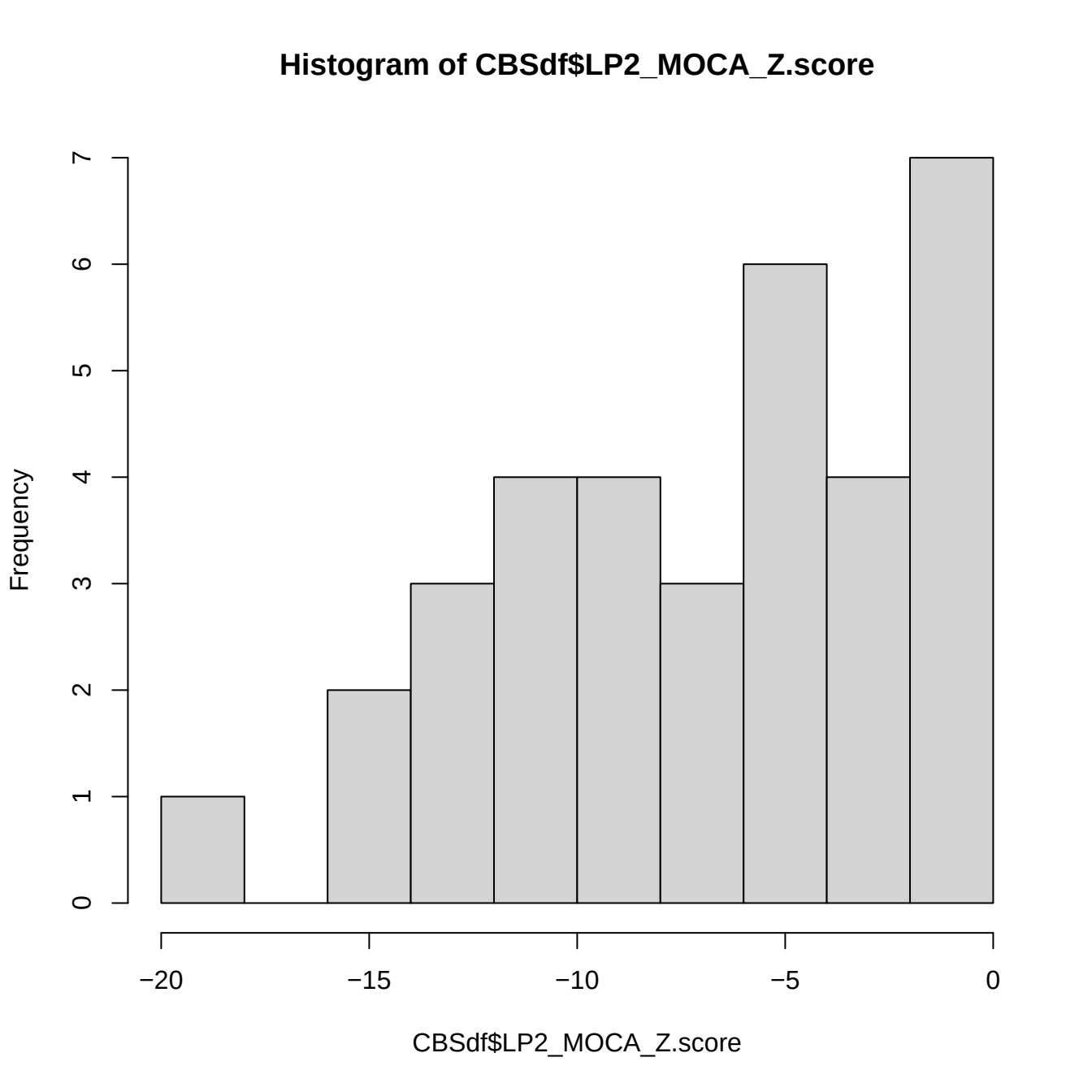

Histogram of CBSdf$Park_onset
Frequency
0
2
4
6
8
40
50
60
70
80
CBSdf$Park_onset

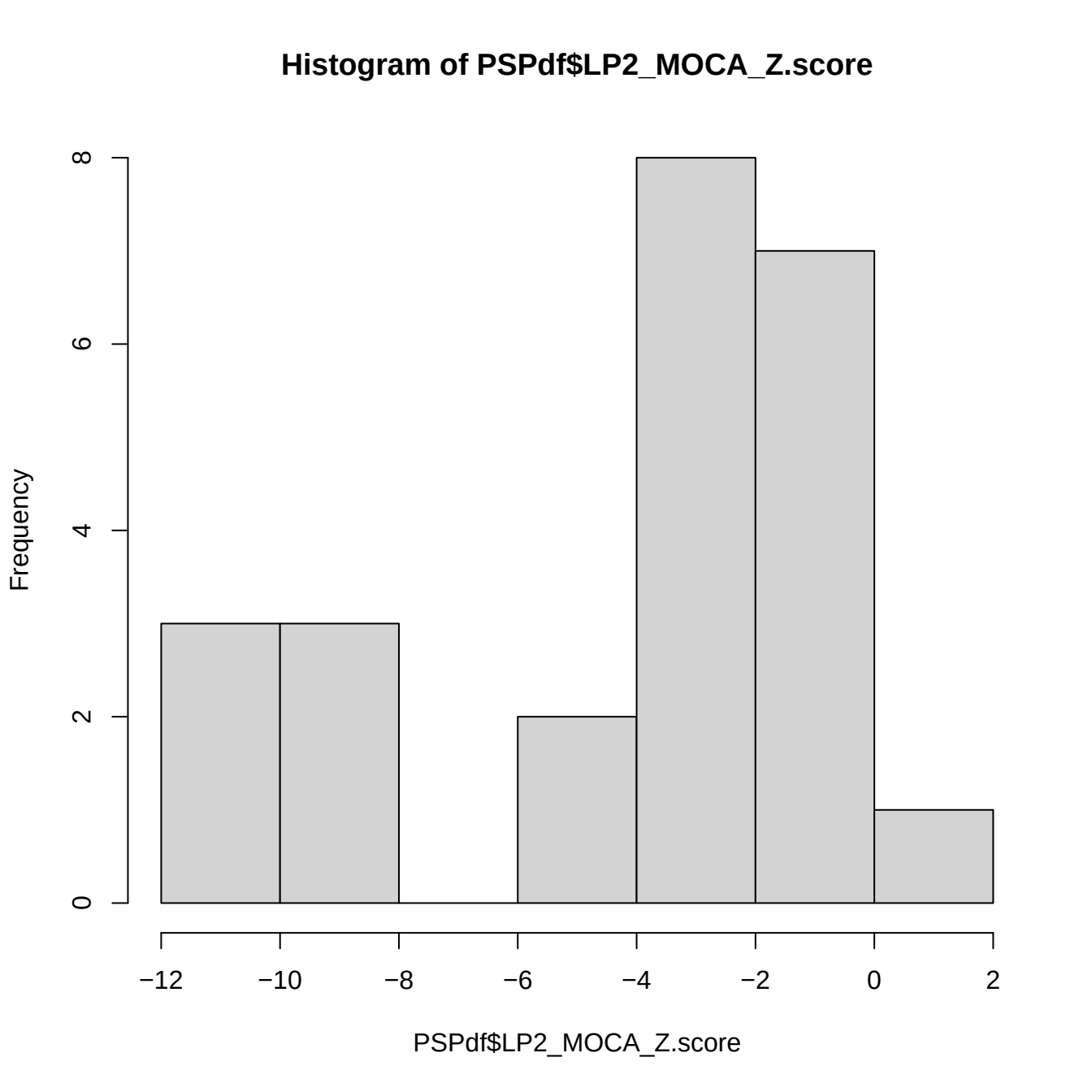

Histogram of PSPdf$Park_onset
Frequency
0
2
4
6
8
40
50
60
70
80
PSPdf$Park_onset

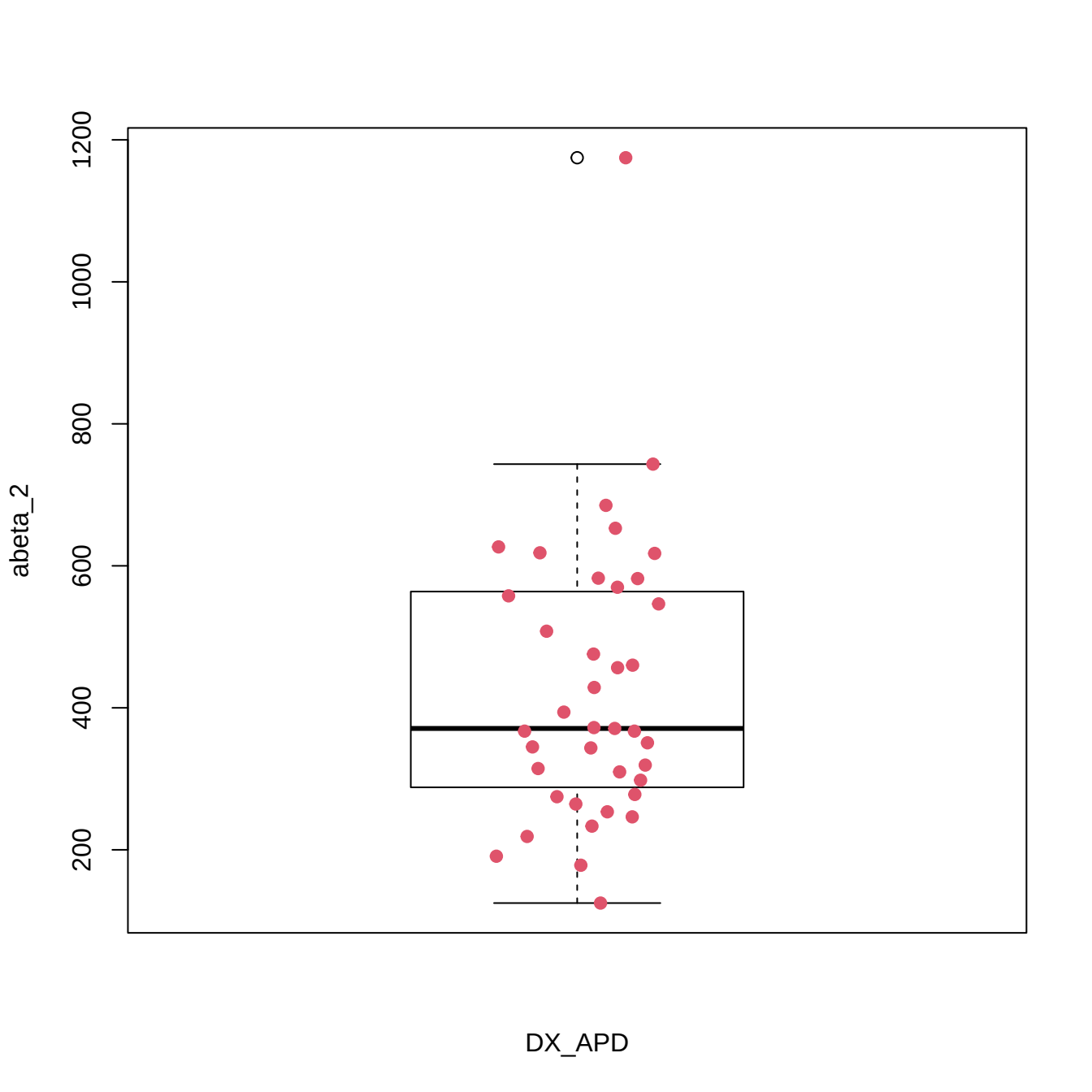

LP2_MOCA_Z.score
−15
−10
−5
0
DX_APD

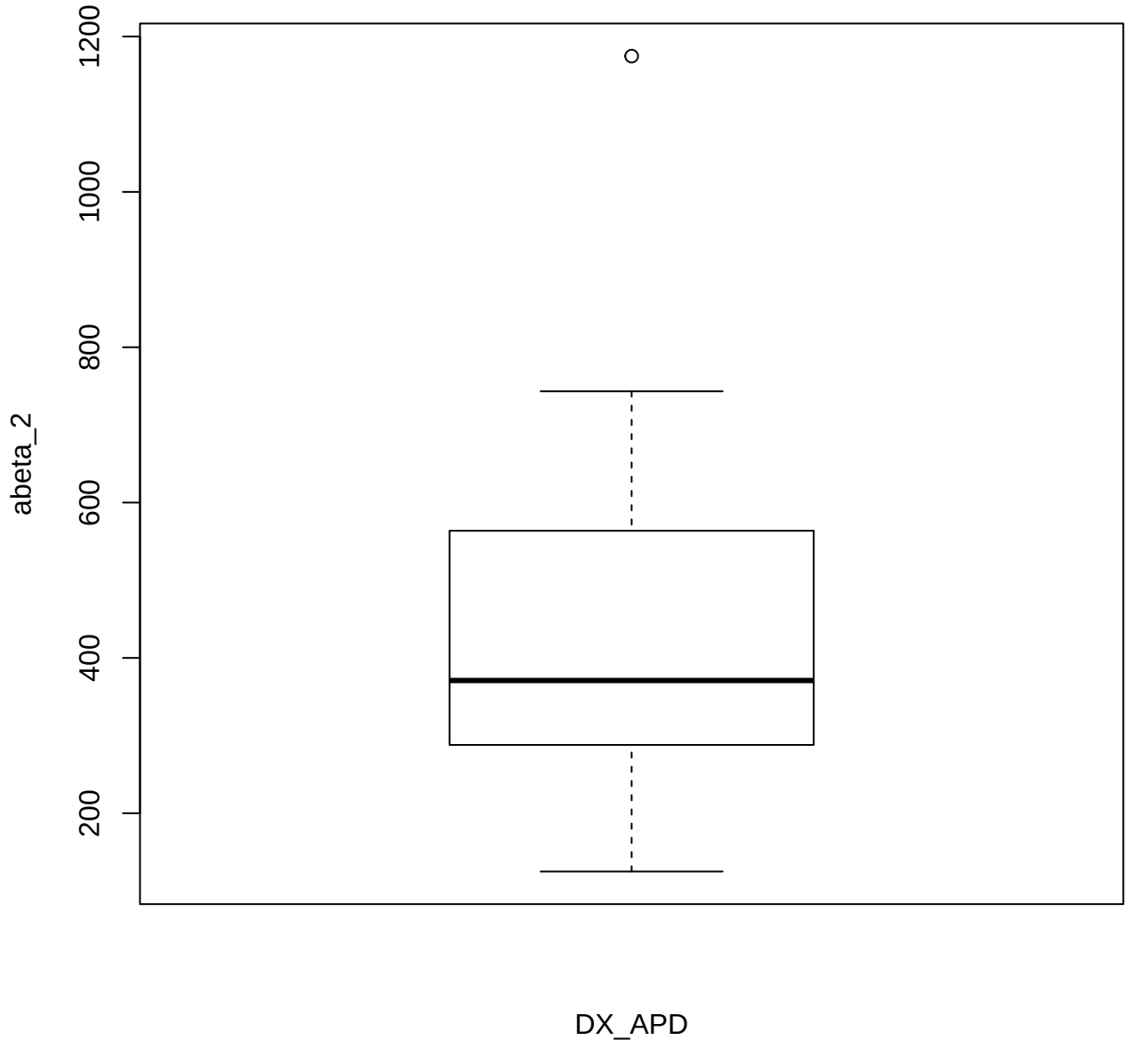

LP2_MOCA_Z.score
0
−2
−4
−6
−8
−10
DX_APD

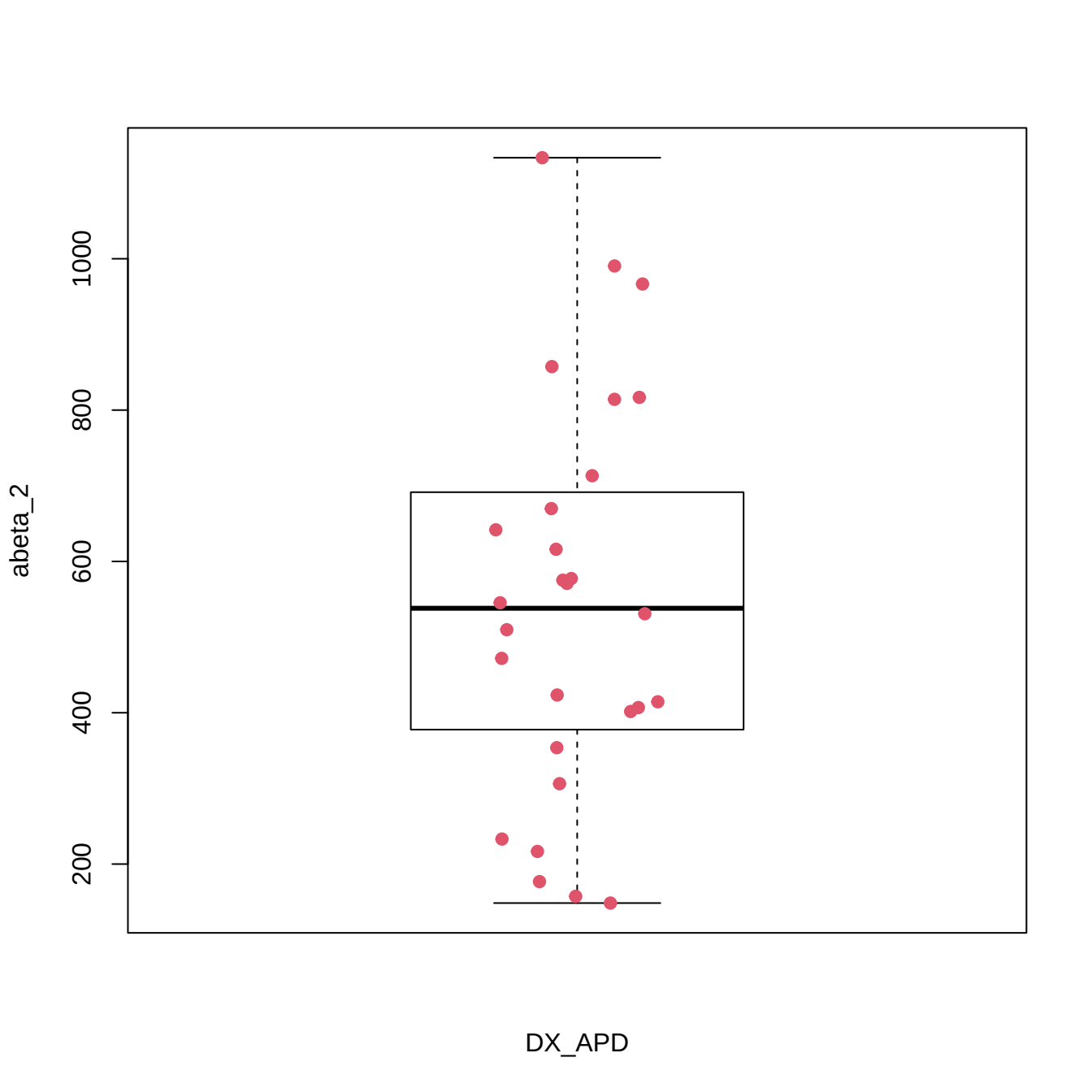

Histogram of df$LP2_MOCA_Z.score
Frequency
0
2
4
6
8
10
12
14
−20
−15
−10
−5
0
df$LP2_MOCA_Z.score

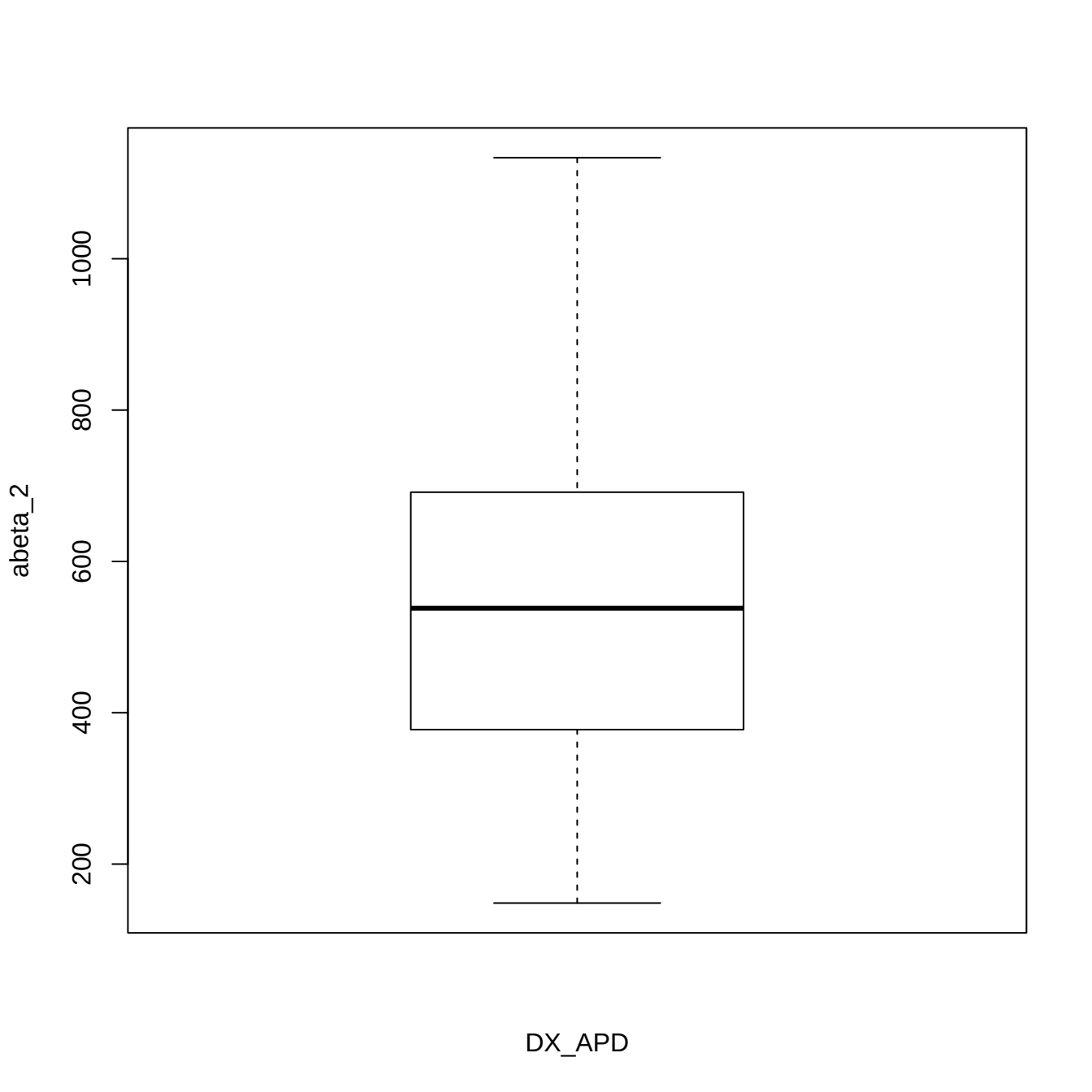

Histogram of CBSdf$LP2_MOCA_Z.score
Frequency
0
1
2
3
4
5
6
7
−20
−15
−10
−5
0
CBSdf$LP2_MOCA_Z.score

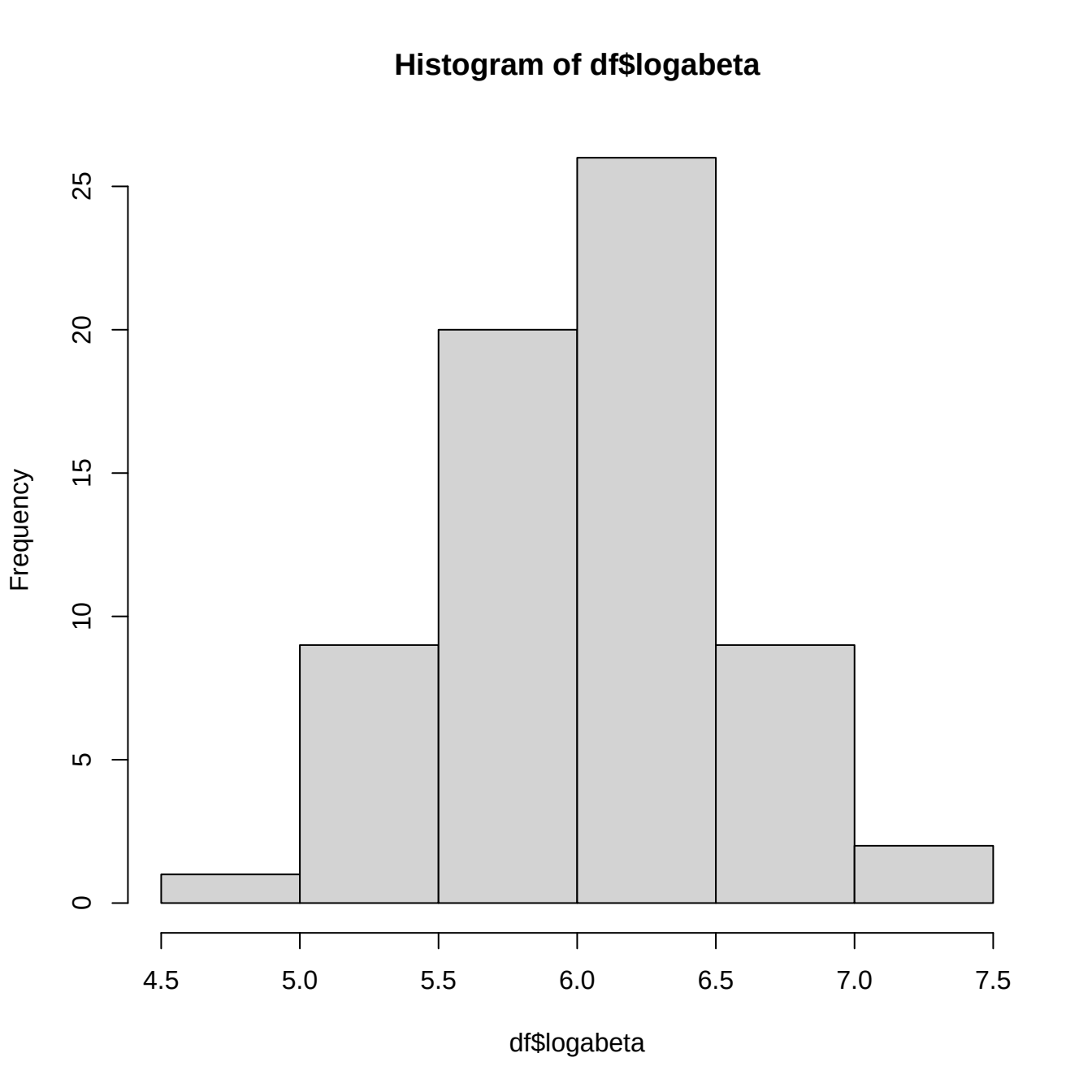

Histogram of PSPdf$LP2_MOCA_Z.score
Frequency
0
2
4
6
8
−12
−10
−8
−6
−4
−2
0
2
PSPdf$LP2_MOCA_Z.score

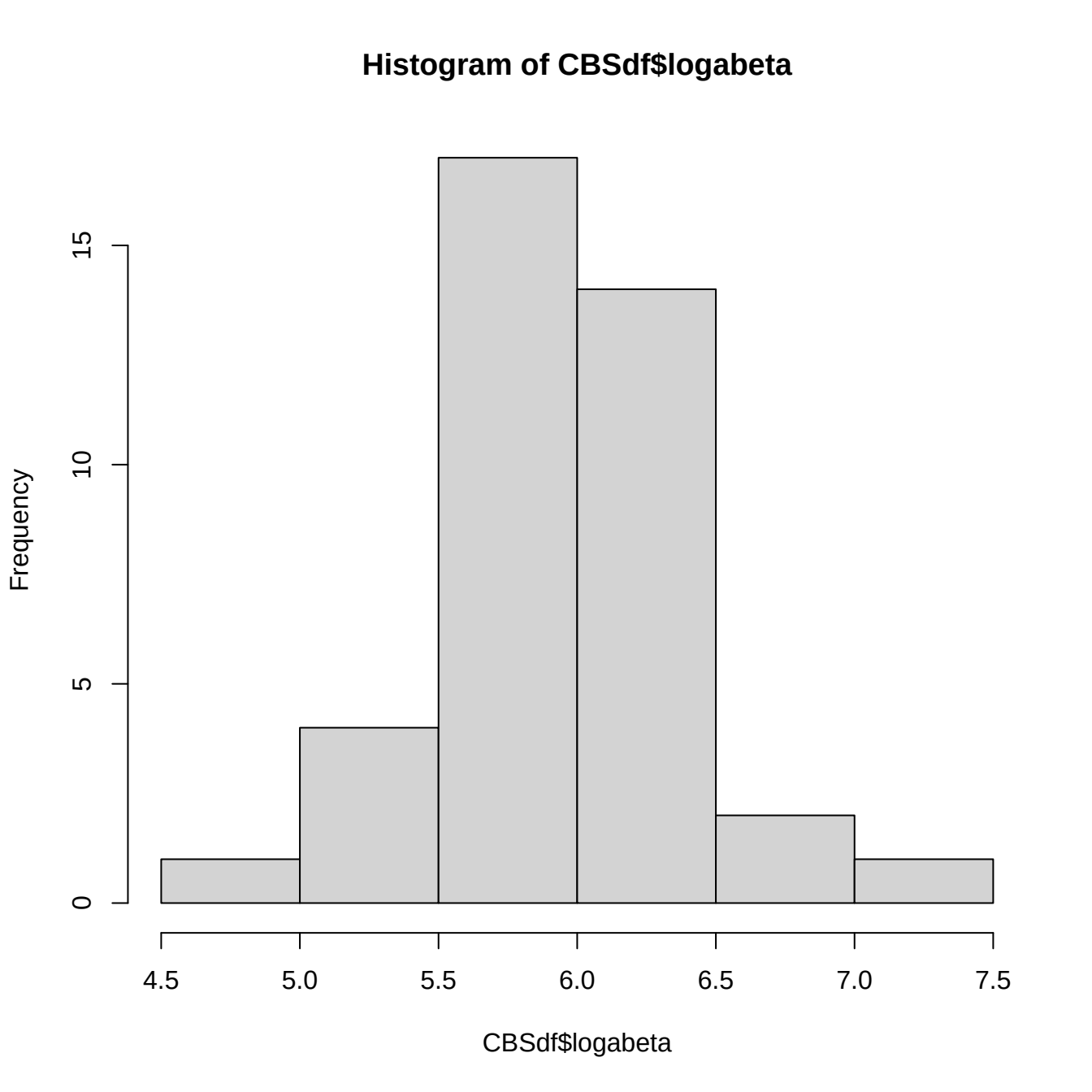

abeta_2
200
400
600
800
1000
1200
DX_APD

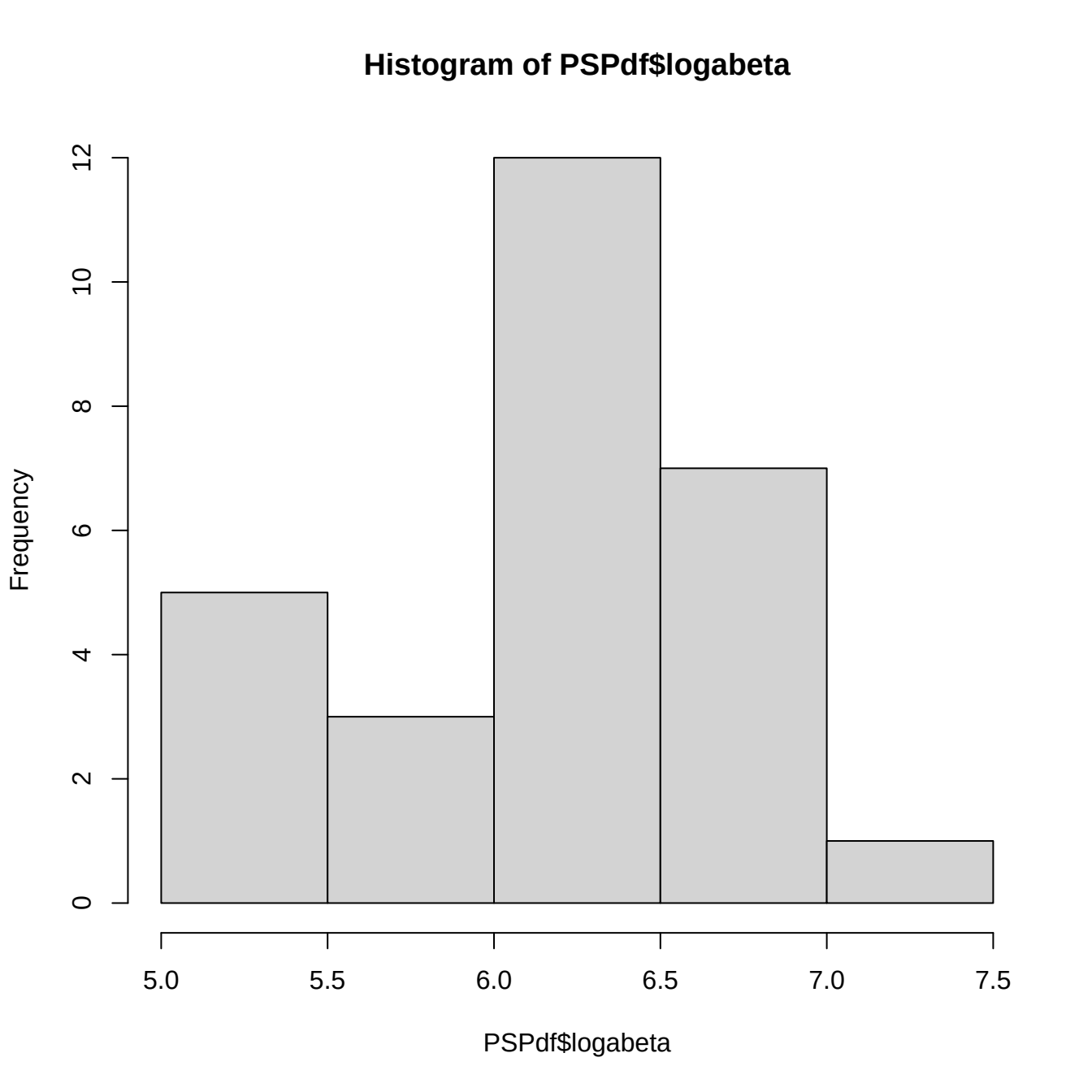

abeta_2
200
400
600
800
1000
1200
DX_APD

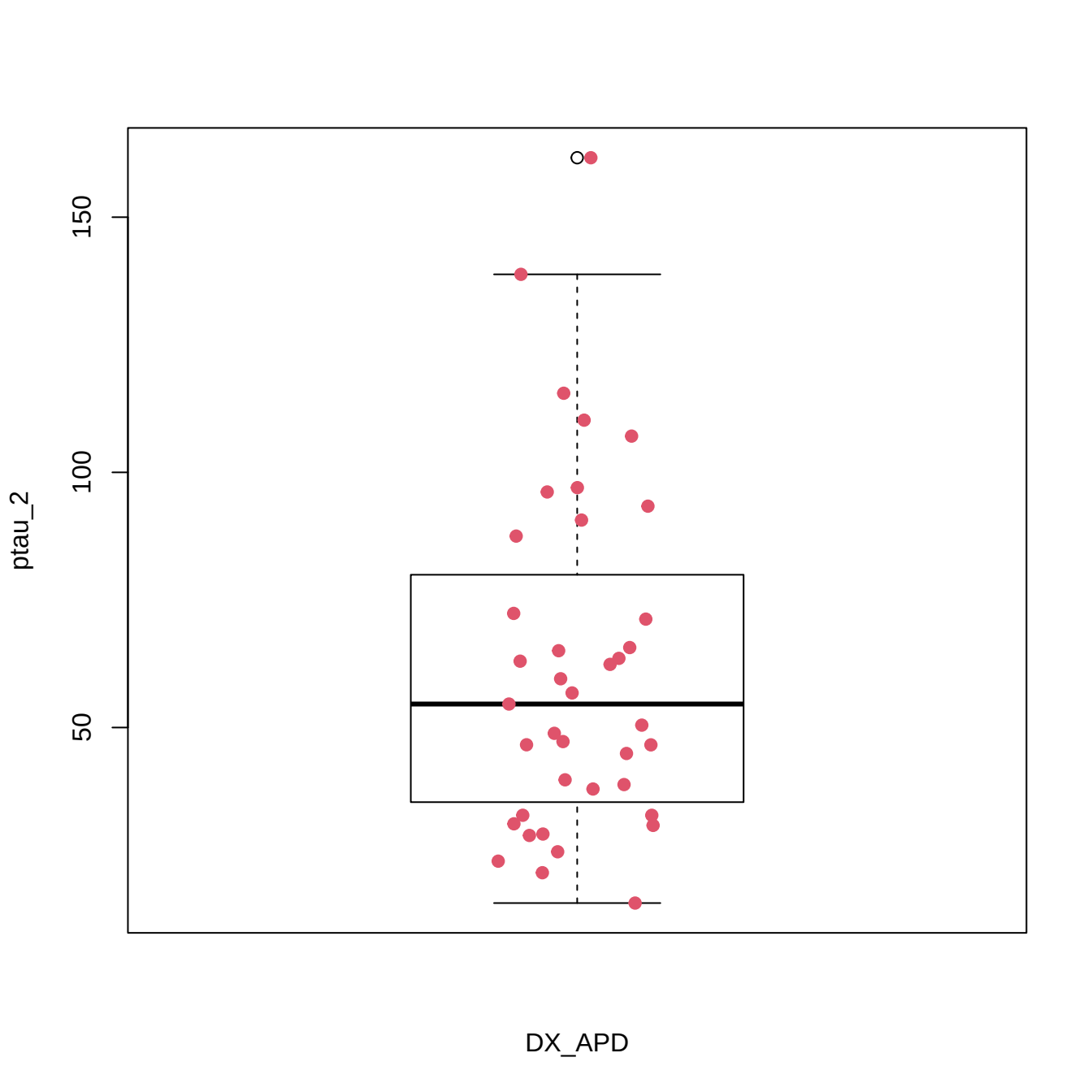

abeta_2
200
400
600
800
1000
DX_APD

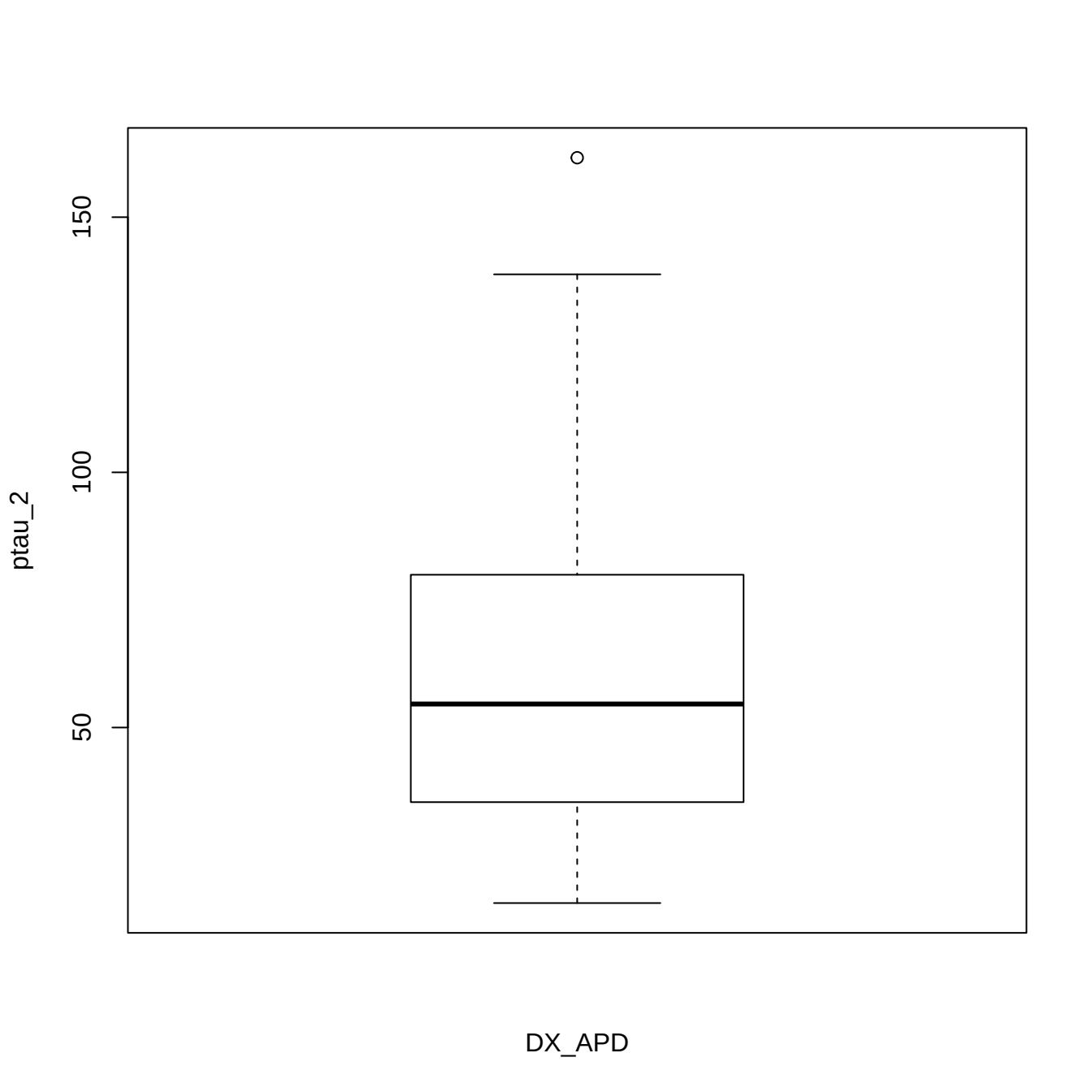

abeta_2
200
400
600
800
1000
DX_APD

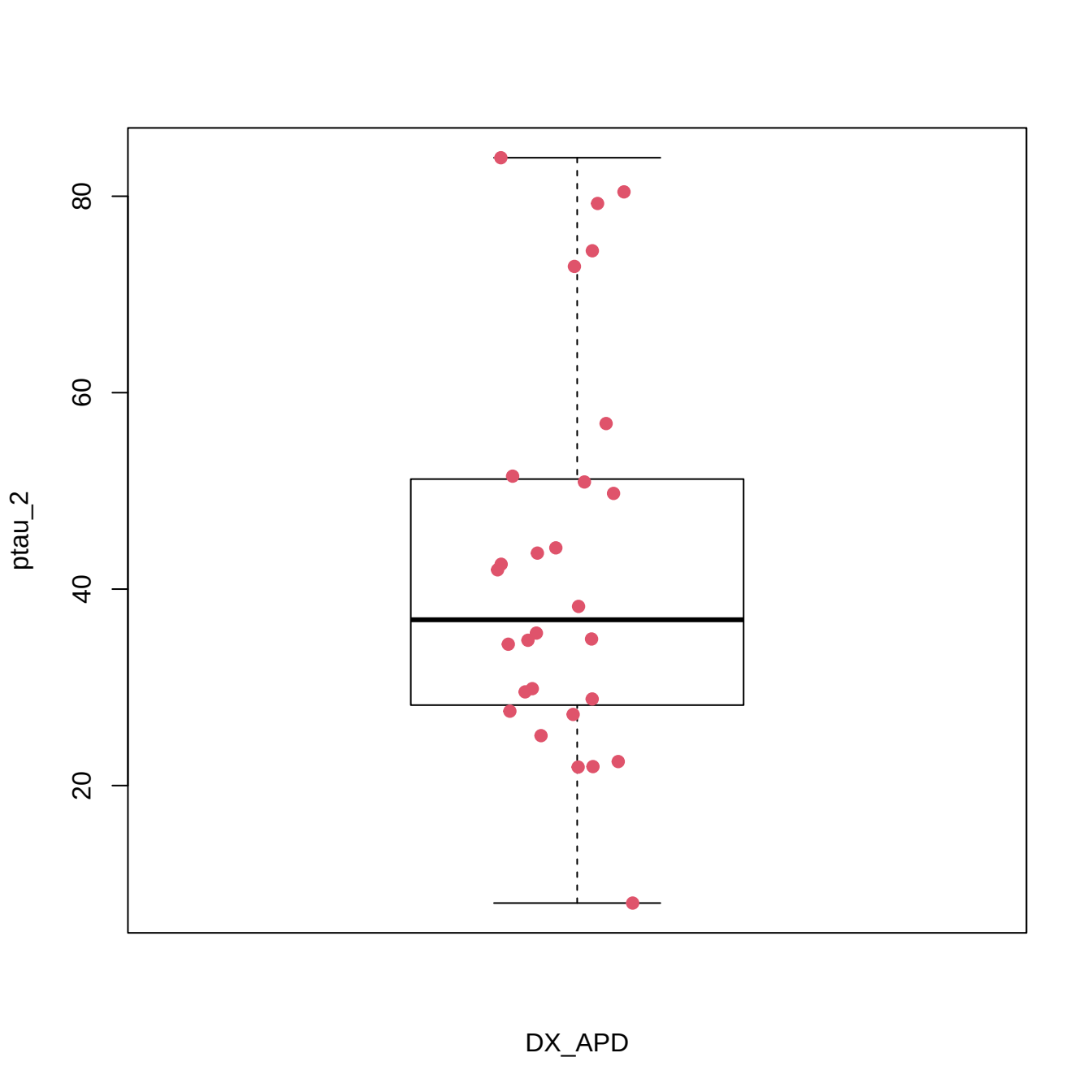

Histogram of df$logabeta
Frequency
0
5
10
15
20
25
4.5
5.0
5.5
6.0
6.5
7.0
7.5
df$logabeta

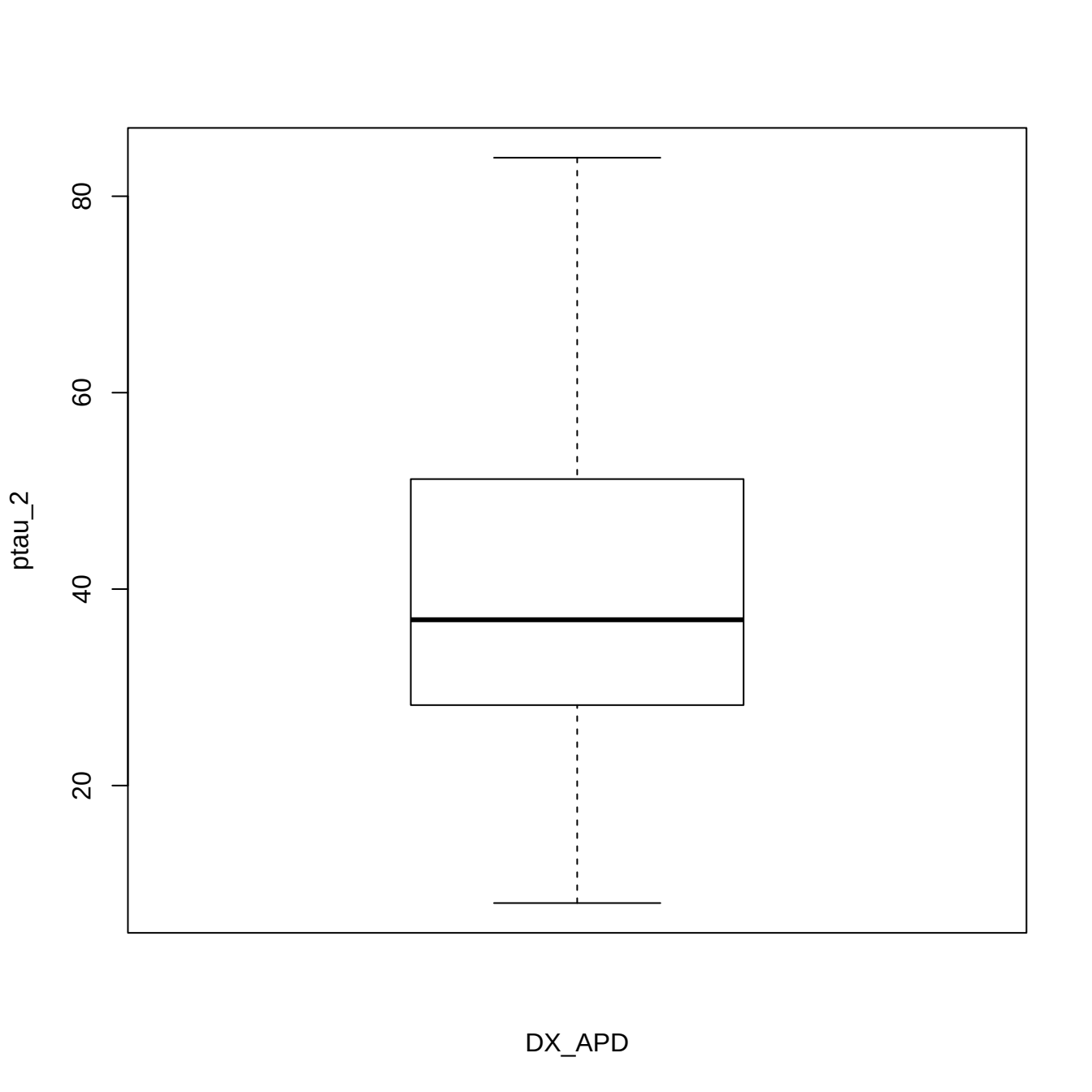

Histogram of CBSdf$logabeta
Frequency
0
5
10
15
4.5
5.0
5.5
6.0
6.5
7.0
7.5
CBSdf$logabeta

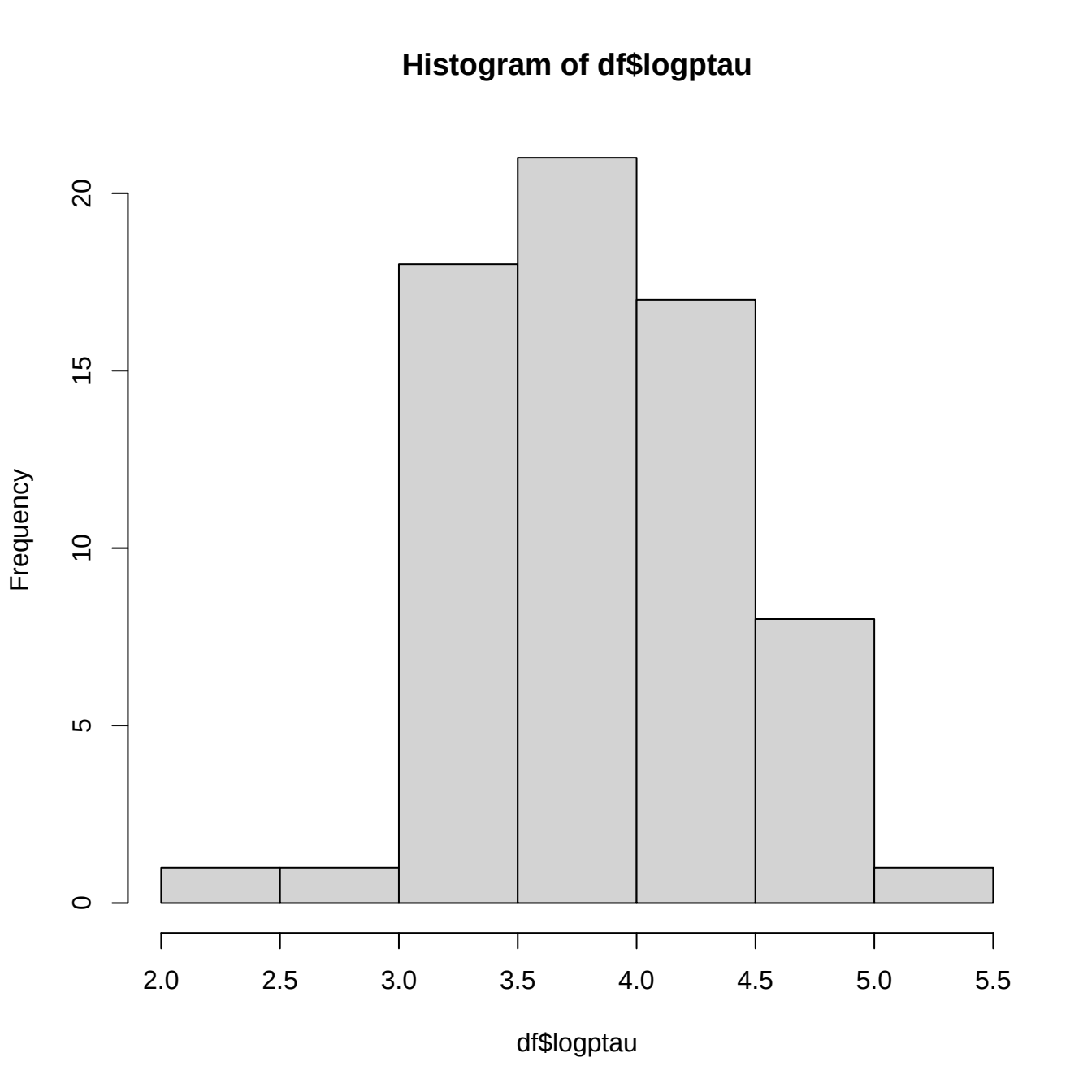

Histogram of PSPdf$logabeta
Frequency
0
2
4
6
8
10
12
5.0
5.5
6.0
6.5
7.0
7.5
PSPdf$logabeta

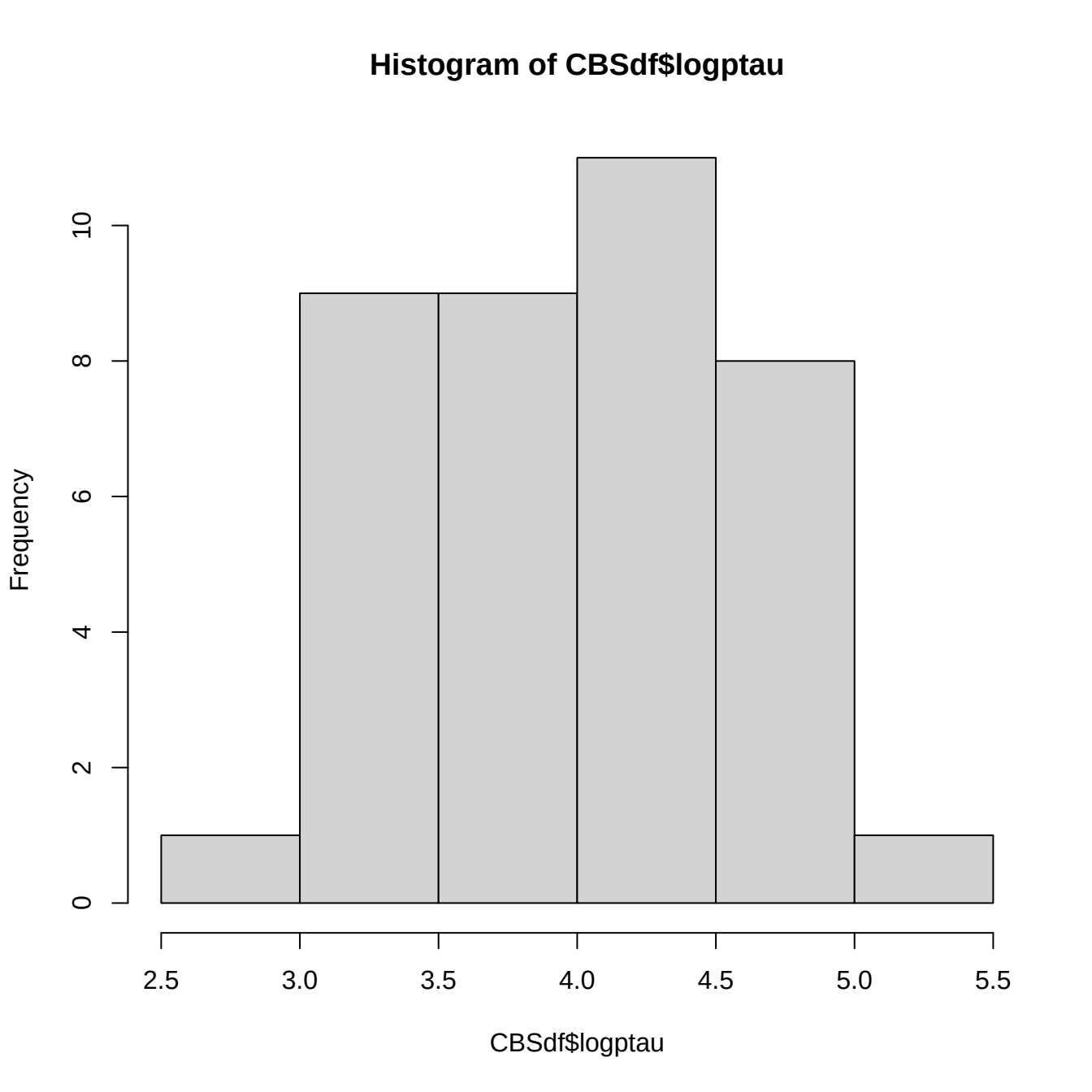

ptau_2
150
100
50
DX_APD

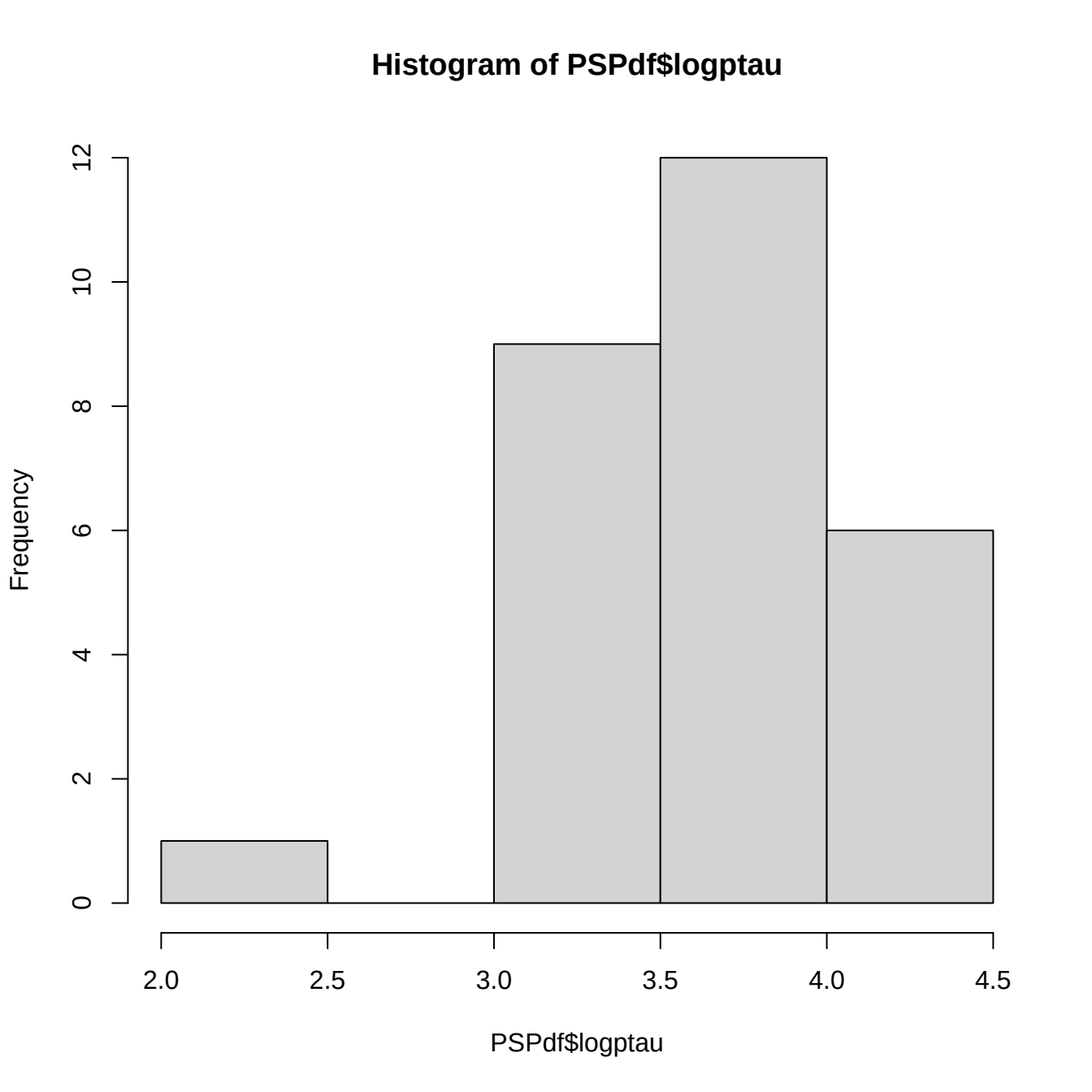

ptau_2
150
100
50
DX_APD

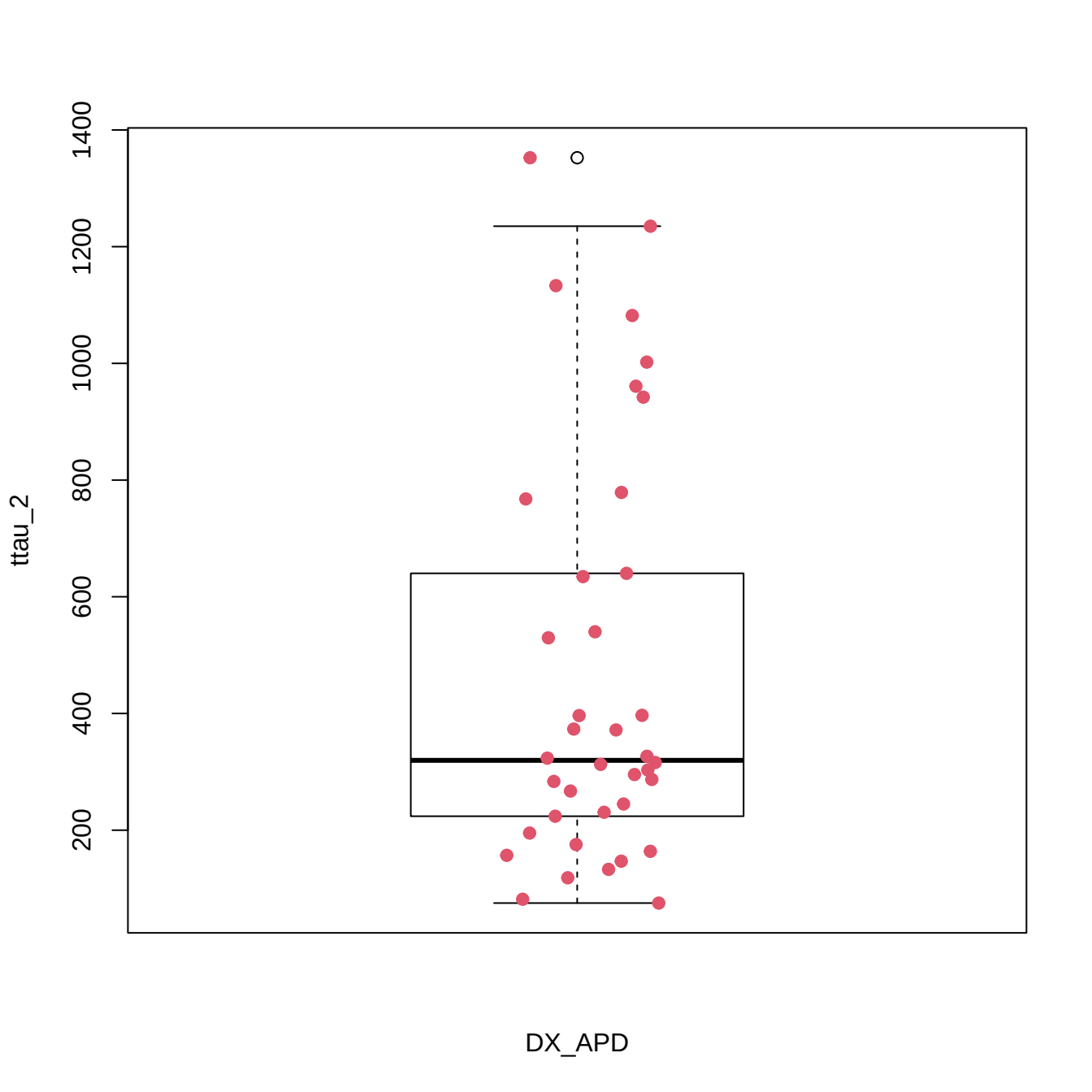

ptau_2
20
40
60
80
DX_APD

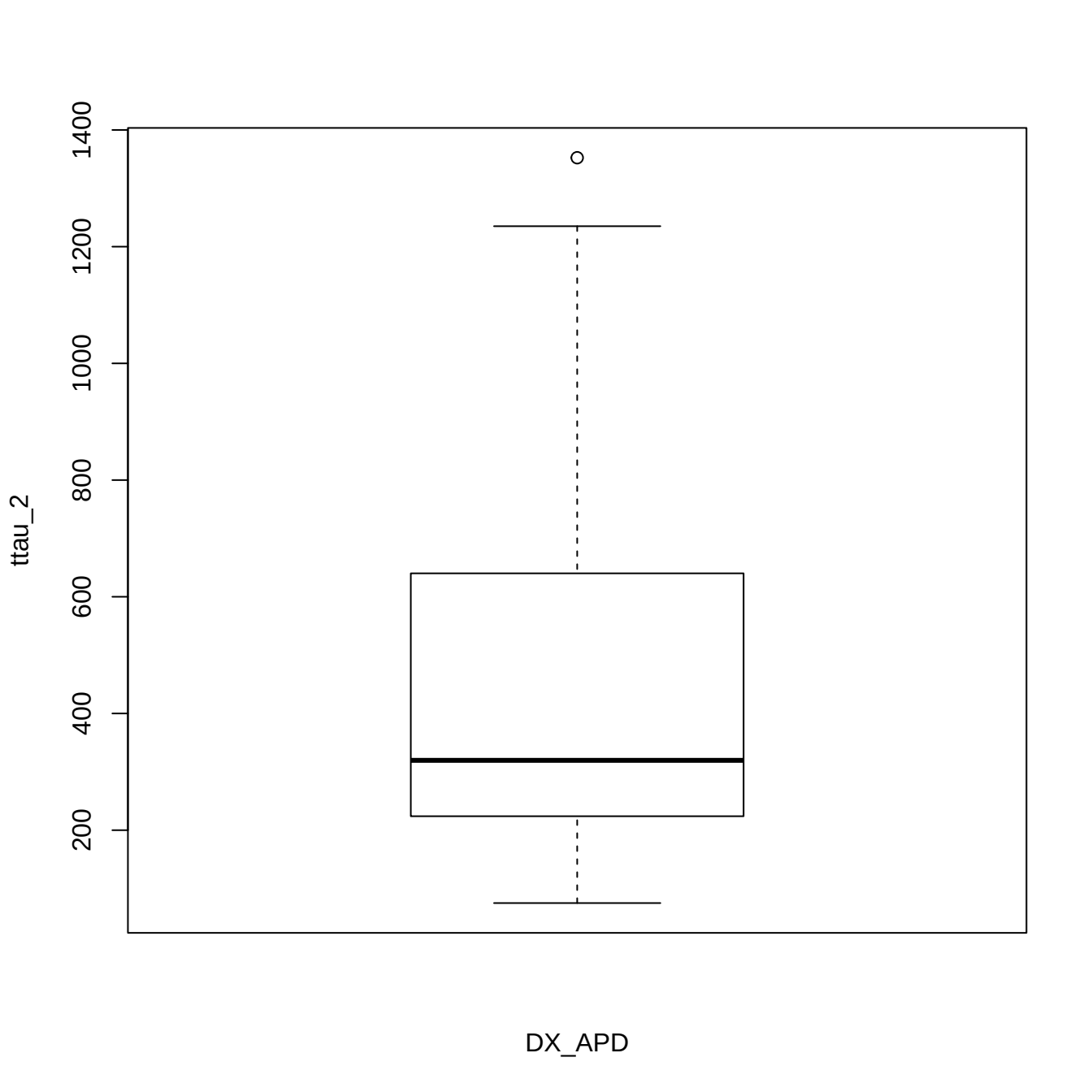

ptau_2
20
40
60
80
DX_APD

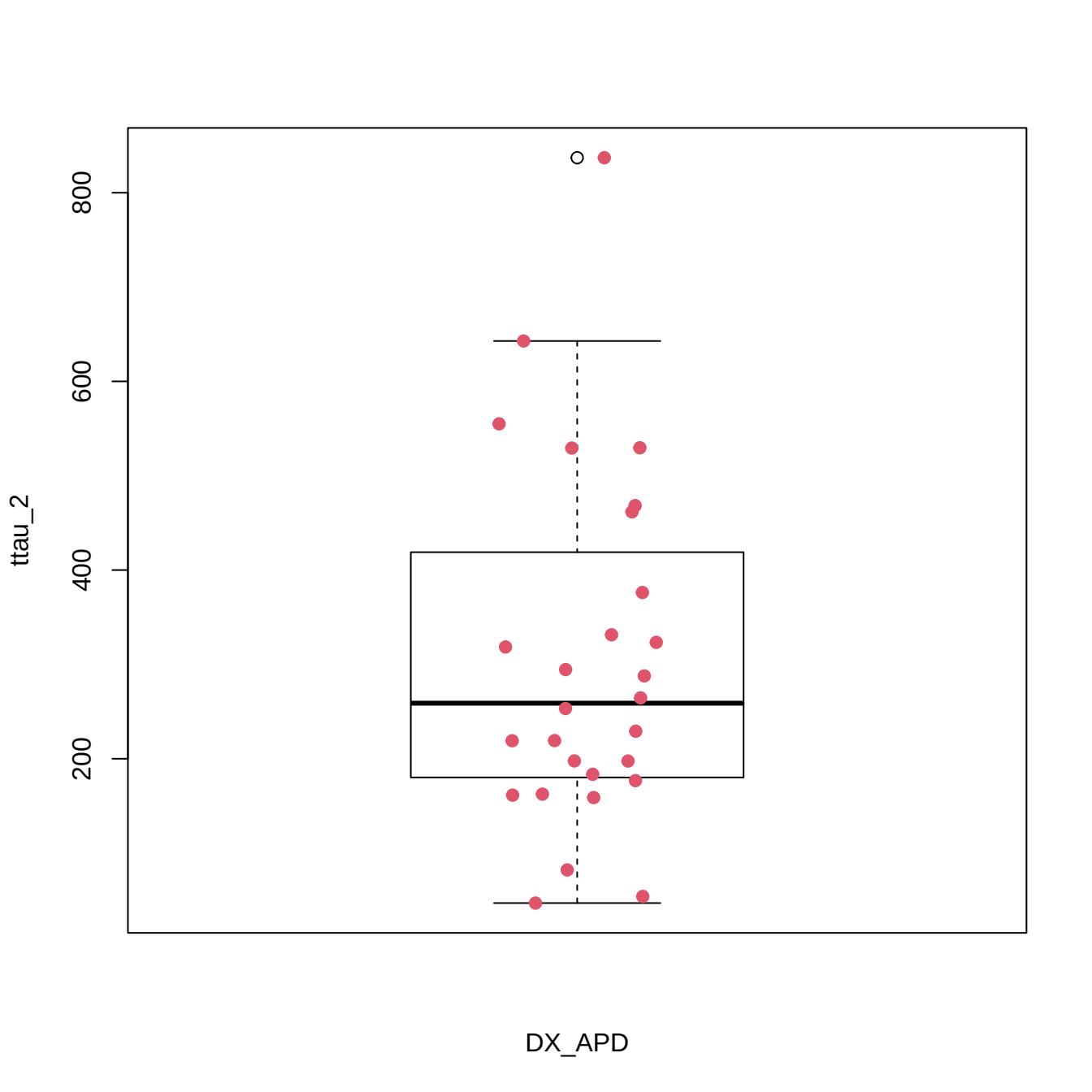

Histogram of df$logptau
Frequency
0
5
10
15
20
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
df$logptau

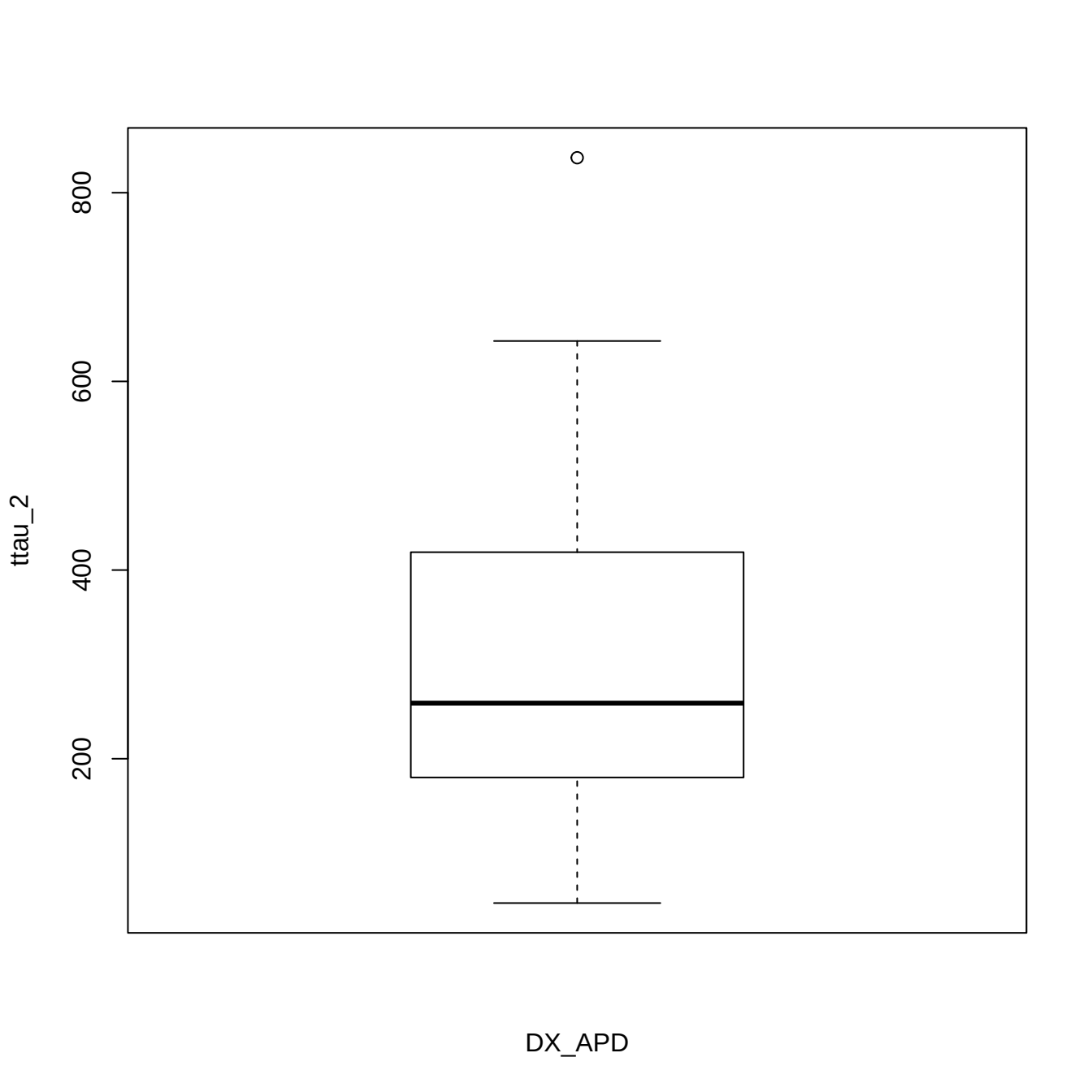

Histogram of CBSdf$logptau
Frequency
0
2
4
6
8
10
2.5
3.0
3.5
4.0
4.5
5.0
5.5
CBSdf$logptau

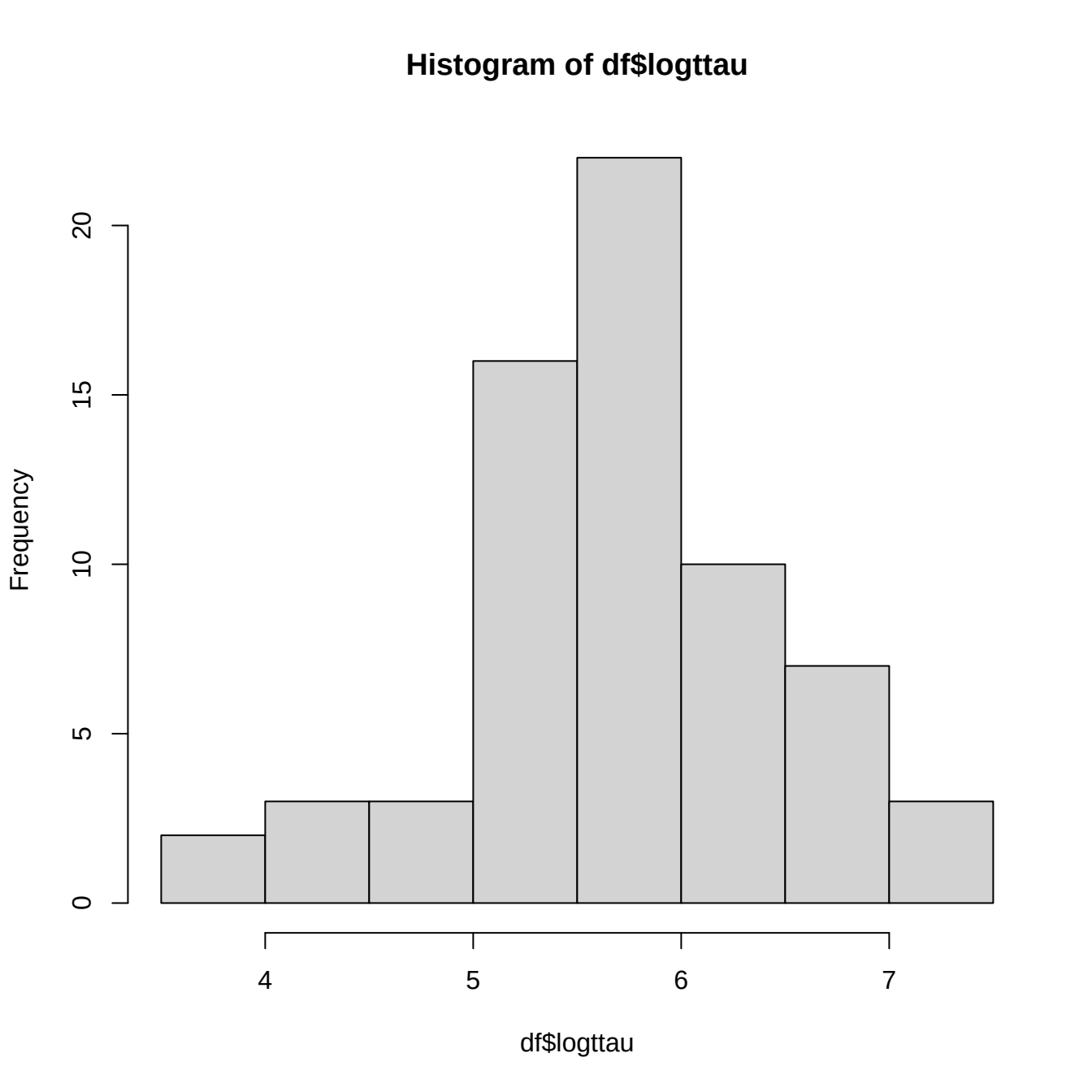

Histogram of PSPdf$logptau
Frequency
0
2
4
6
8
10
12
2.0
2.5
3.0
3.5
4.0
4.5
PSPdf$logptau

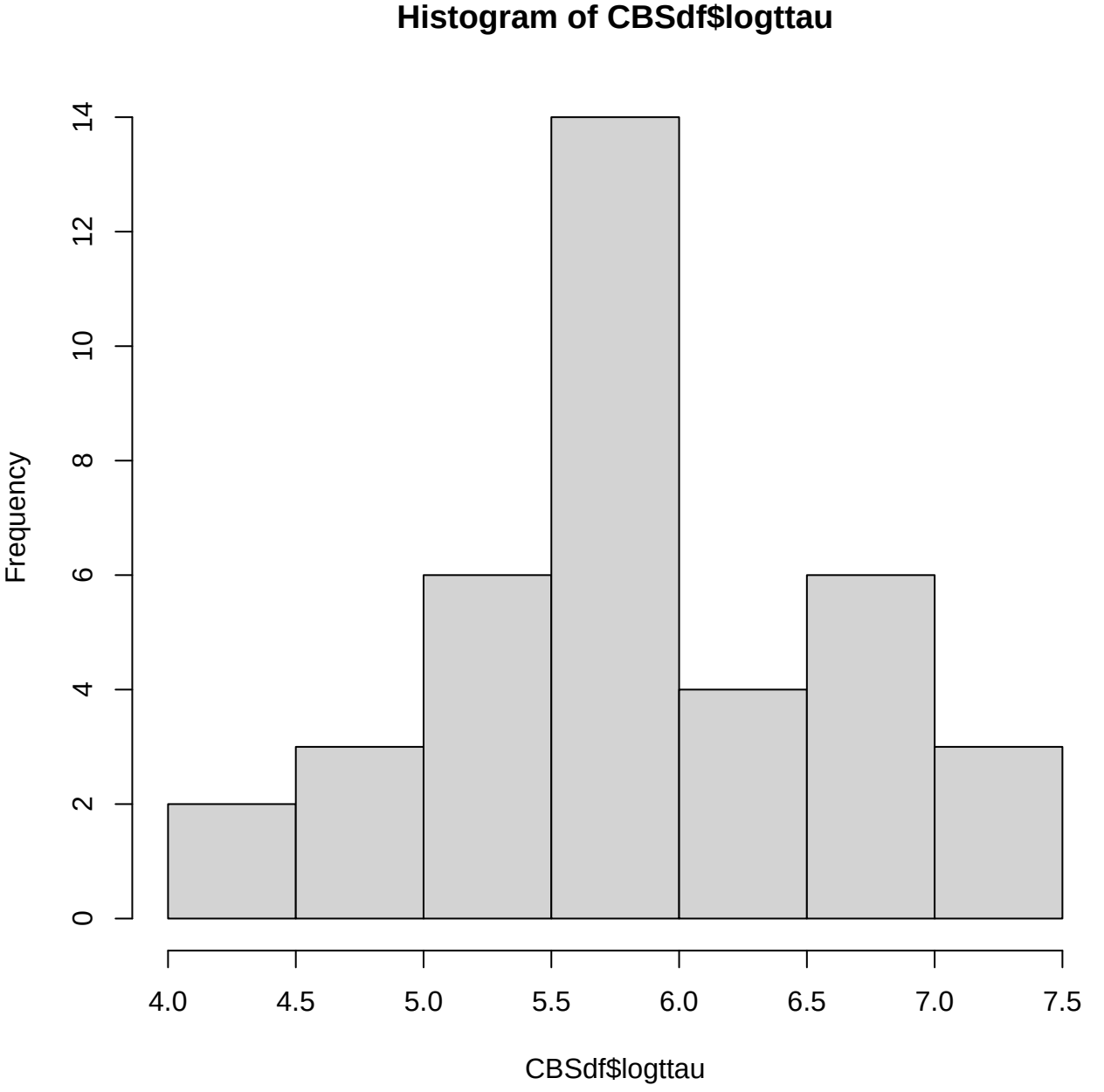

ttau_2
1400
1200
1000
800
600
400
200
DX_APD

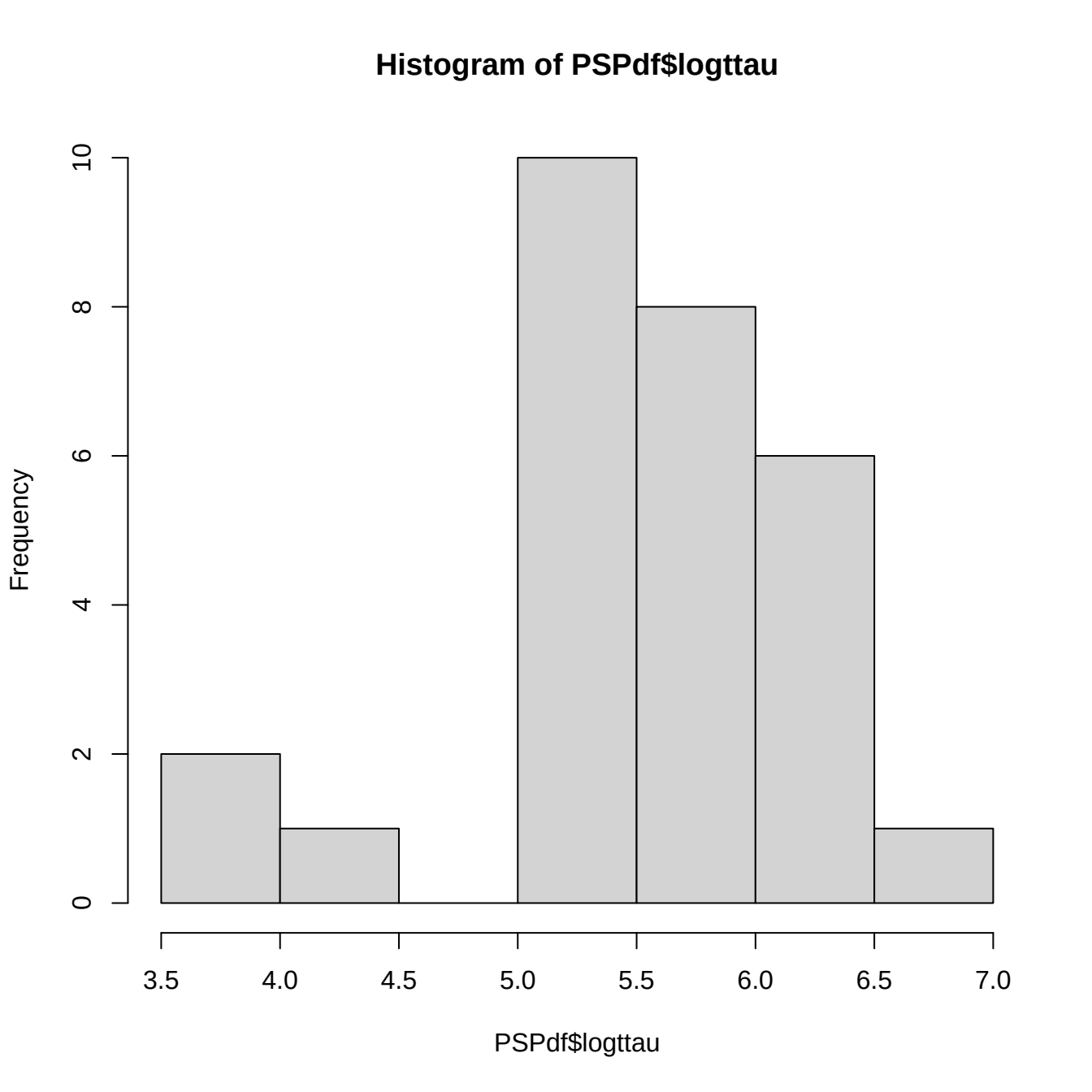

ttau_2
200
400
600
800
1000
1200
1400
DX_APD

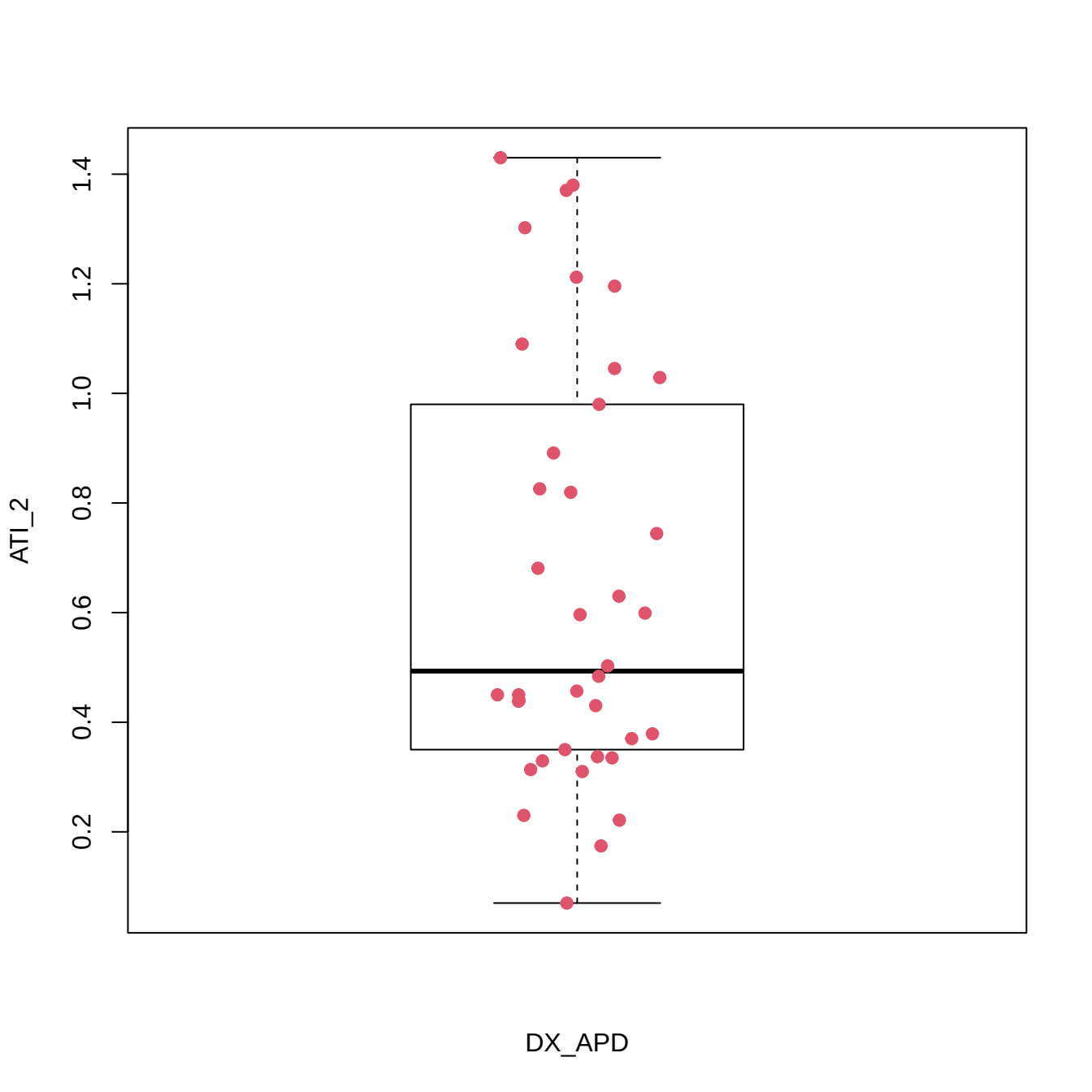

ttau_2
800
600
400
200
DX_APD

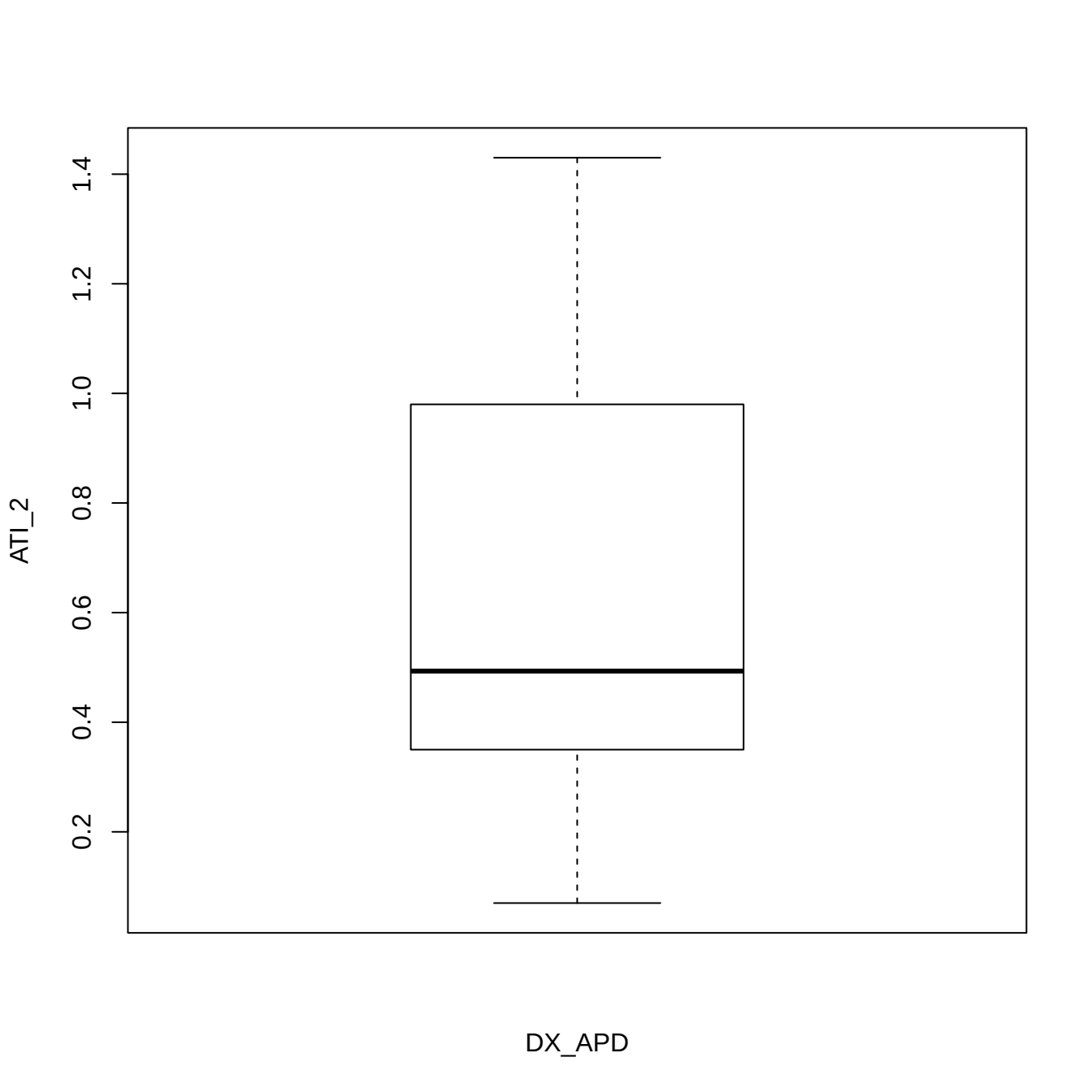

ttau_2
200
400
600
800
DX_APD

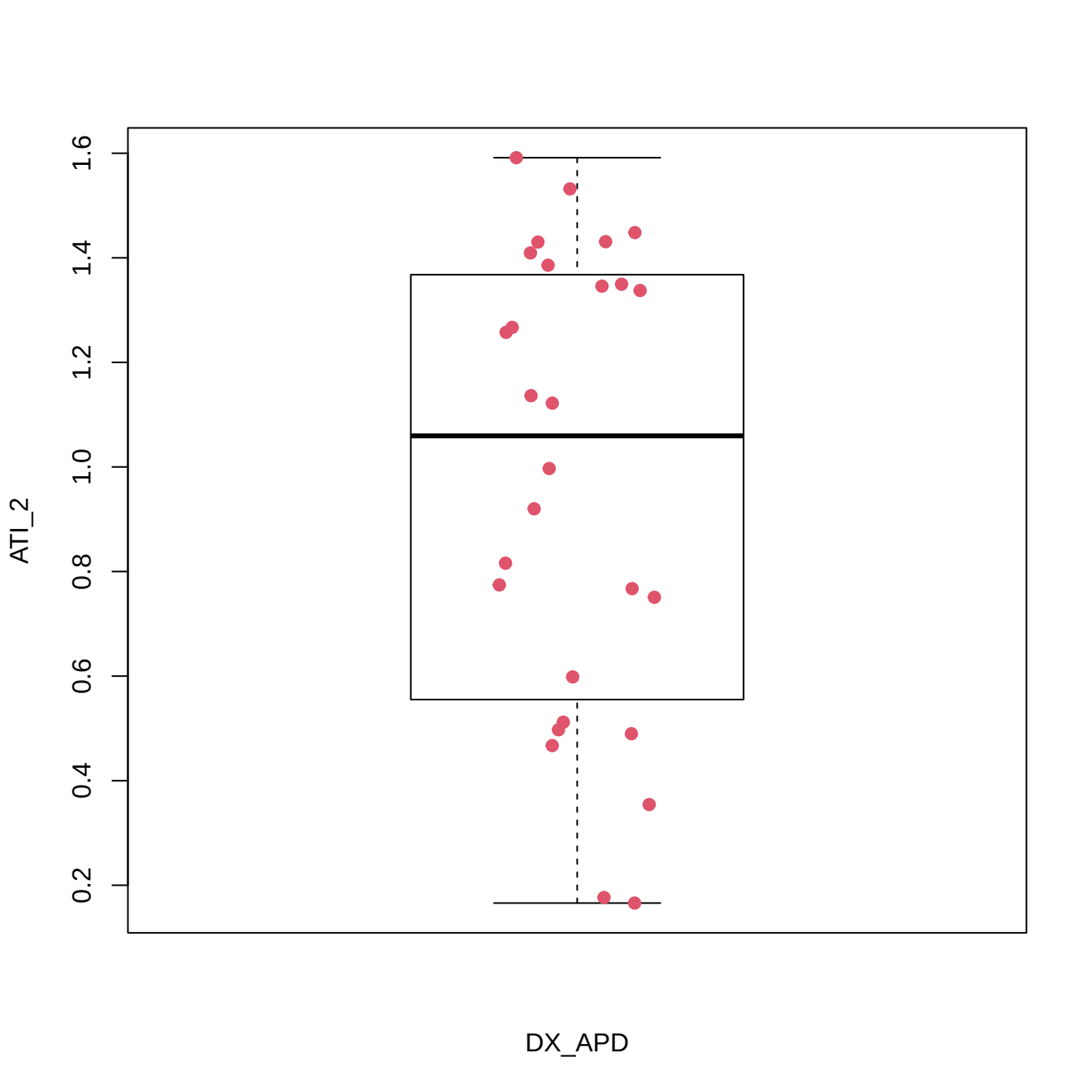

Histogram of df$logttau
Frequency
0
5
10
15
20
4
5
6
7
df$logttau

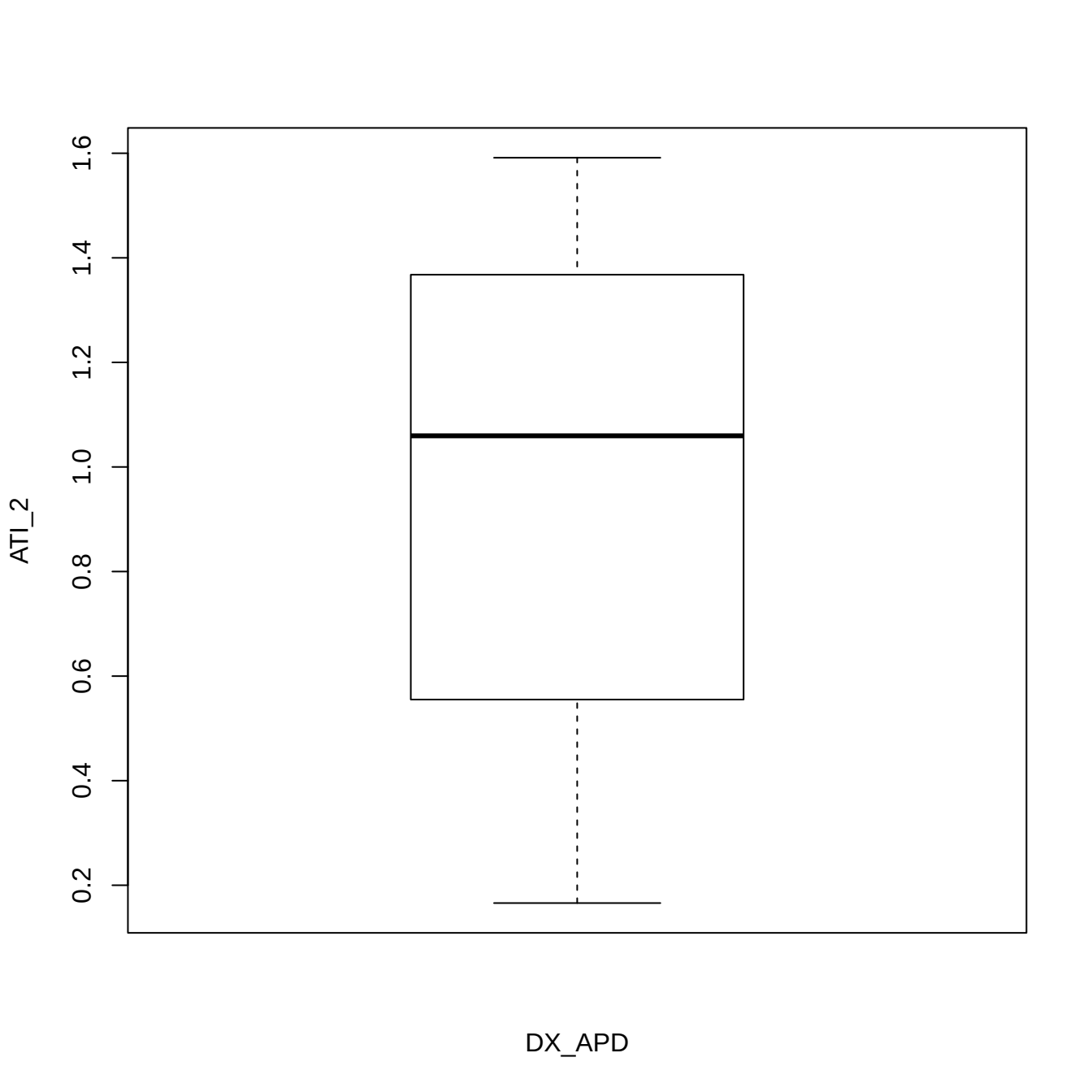

Histogram of CBSdf$logttau
Frequency
0
2
4
6
8
10
12
14
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
CBSdf$logttau

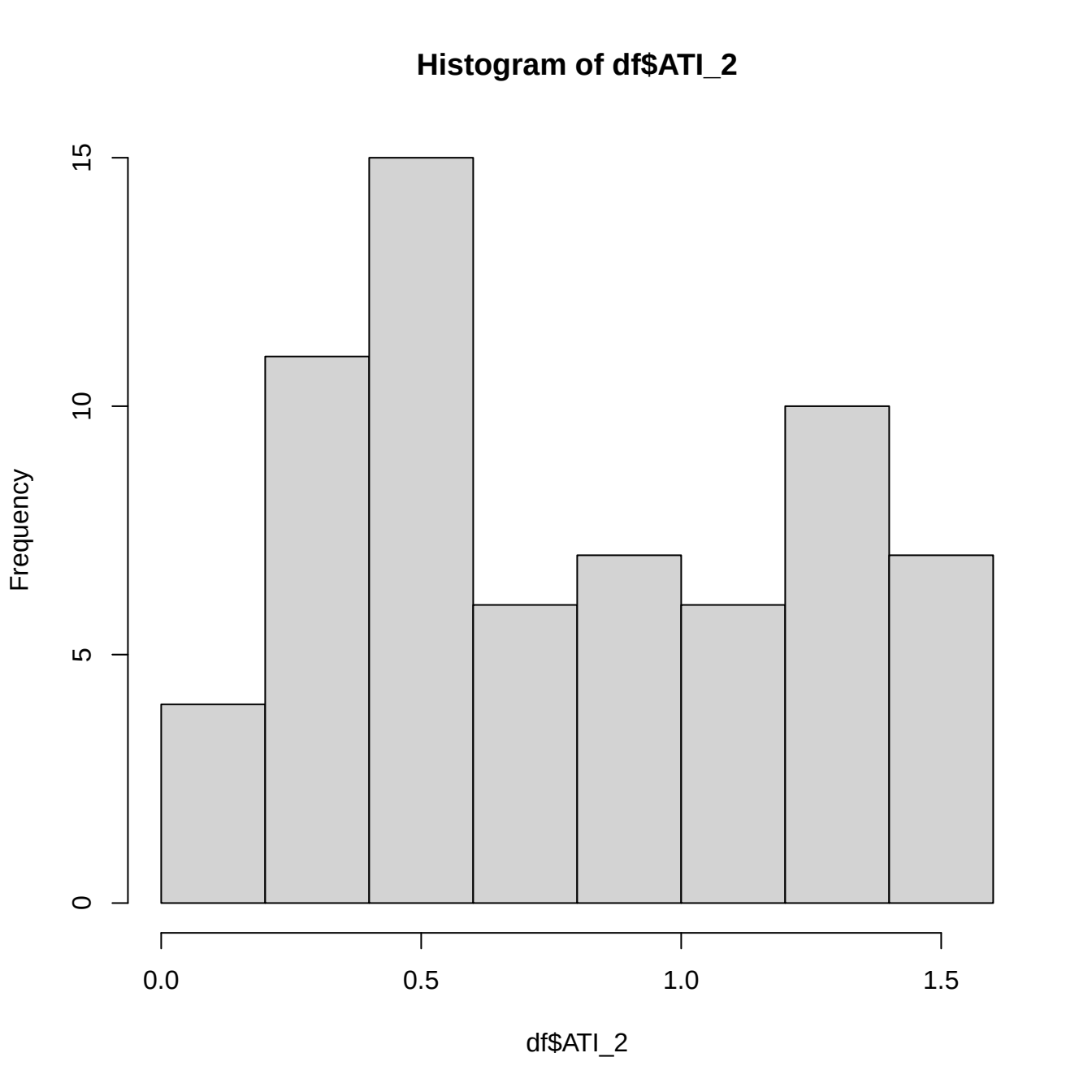

Histogram of PSPdf$logttau
Frequency
0
2
4
6
8
10
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
PSPdf$logttau

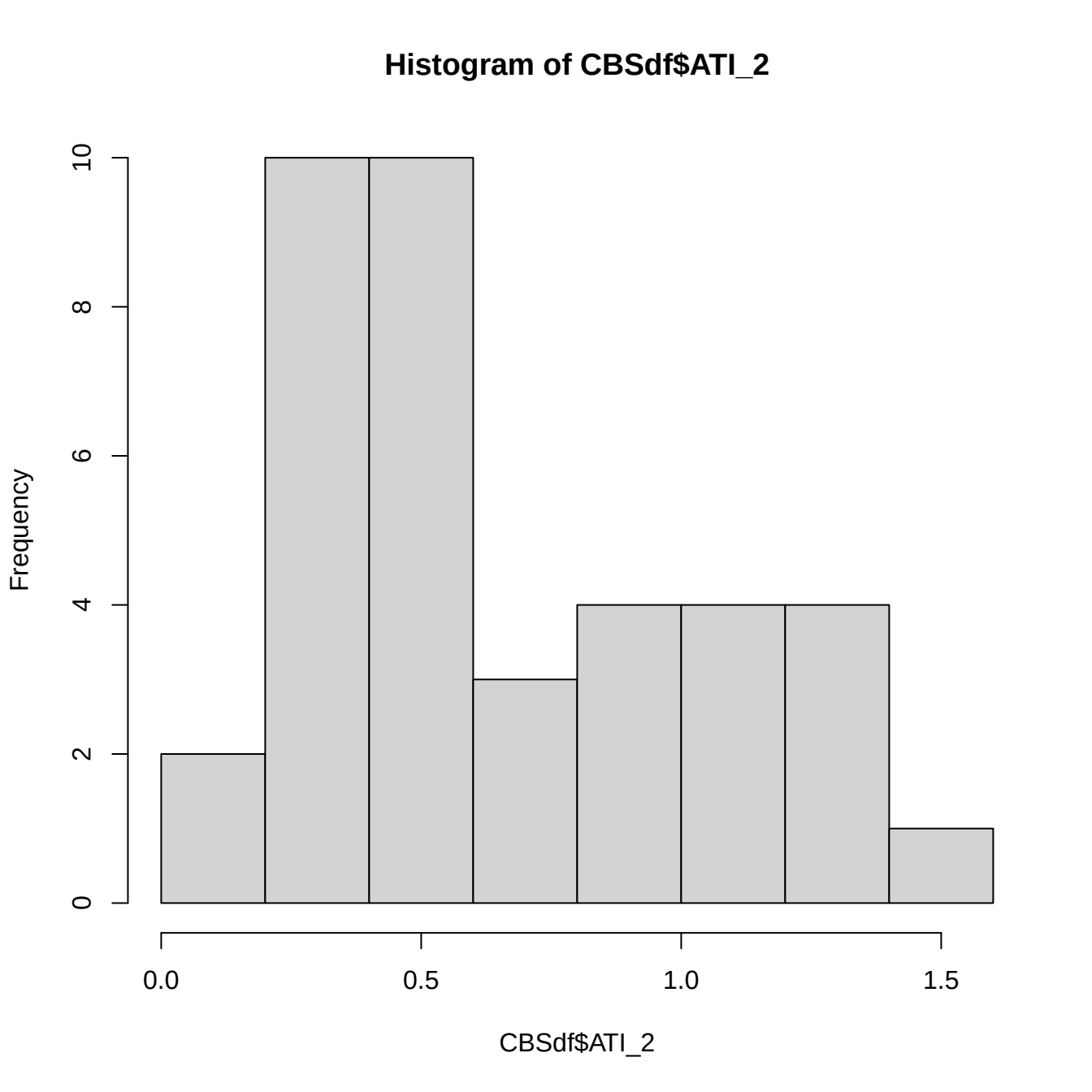

ATI_2
0.2
0.4
0.6
0.8
1.0
1.2
1.4
DX_APD

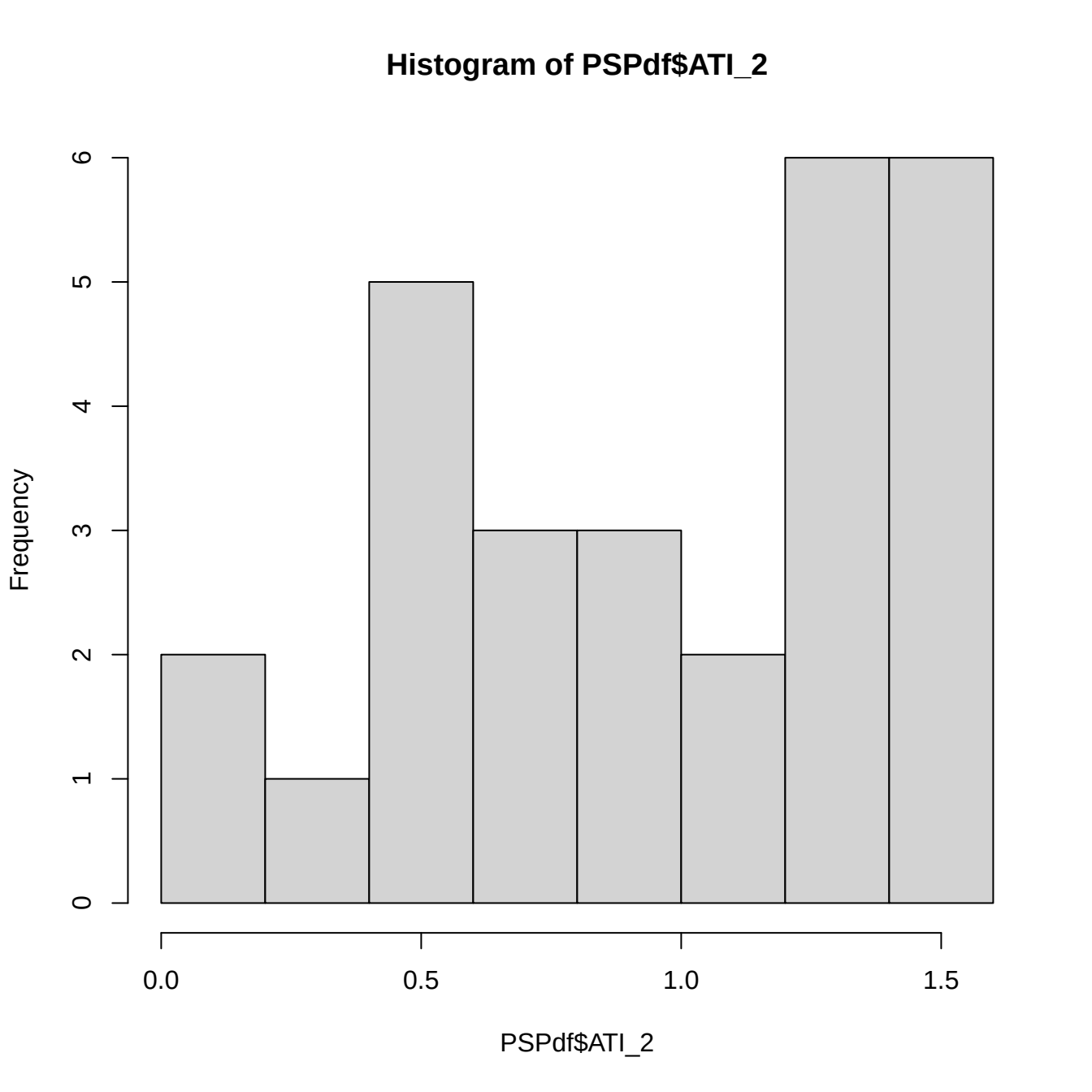

ATI_2
0.2
0.4
0.6
0.8
1.0
1.2
1.4
DX_APD

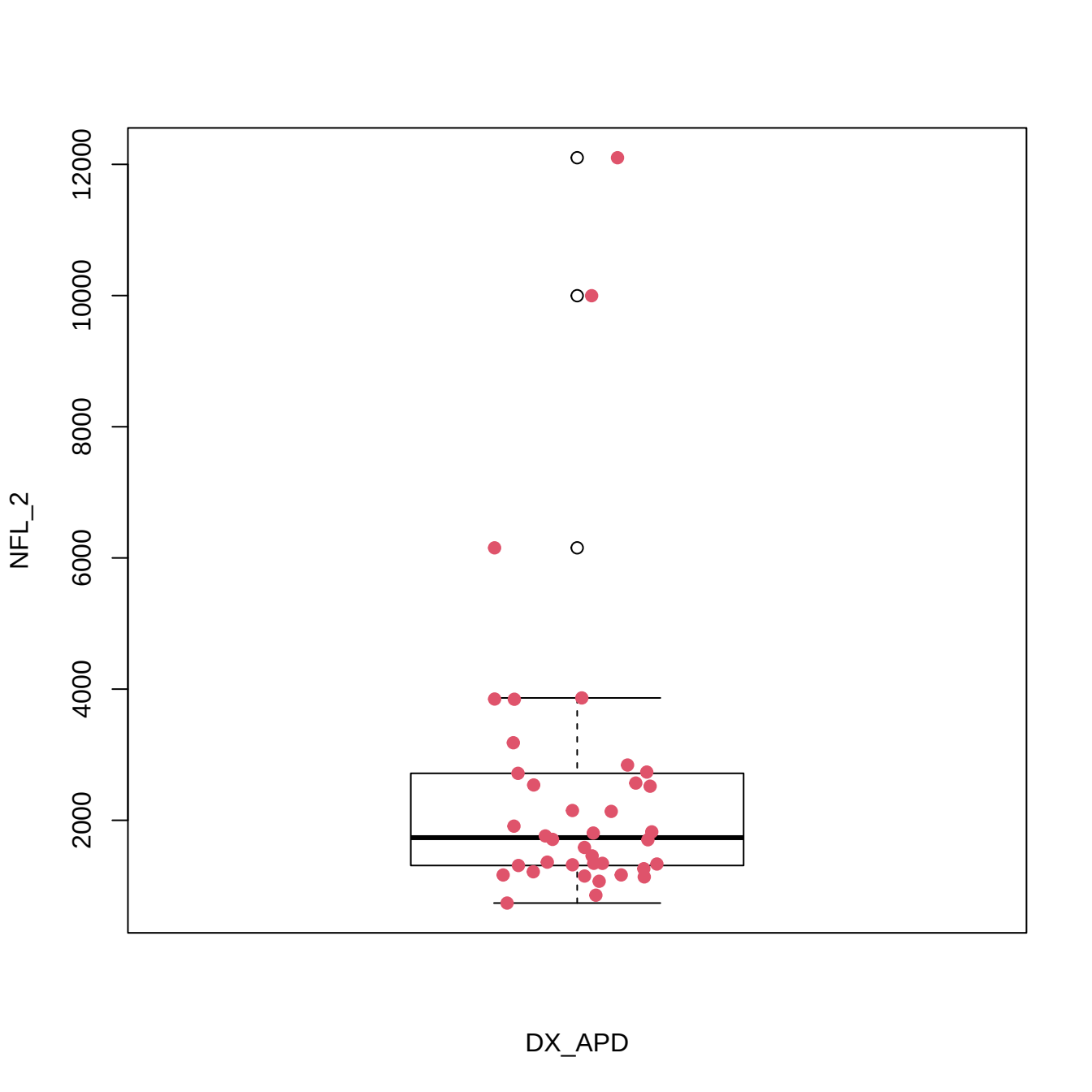

ATI_2
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
DX_APD

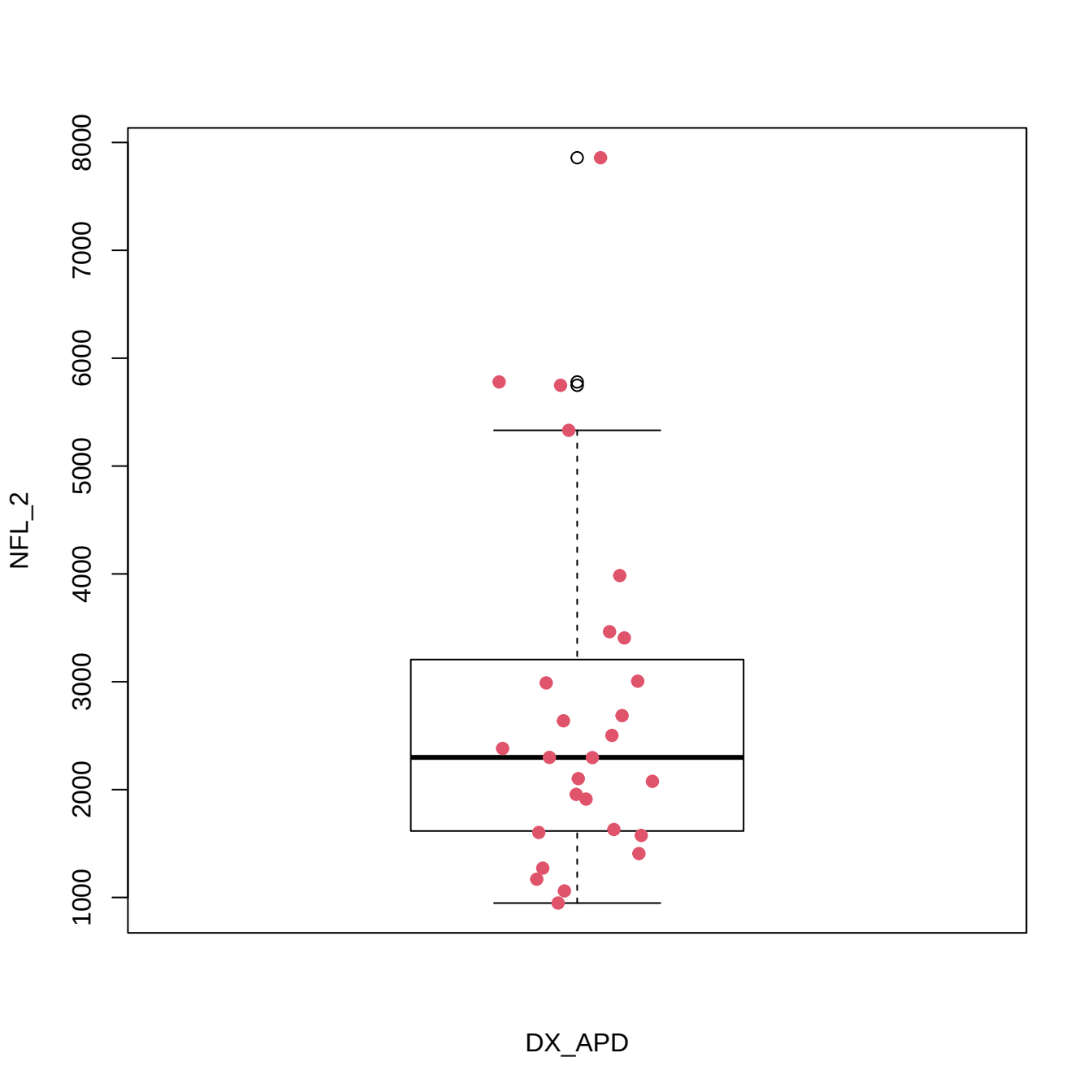

ATI_2
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
DX_APD

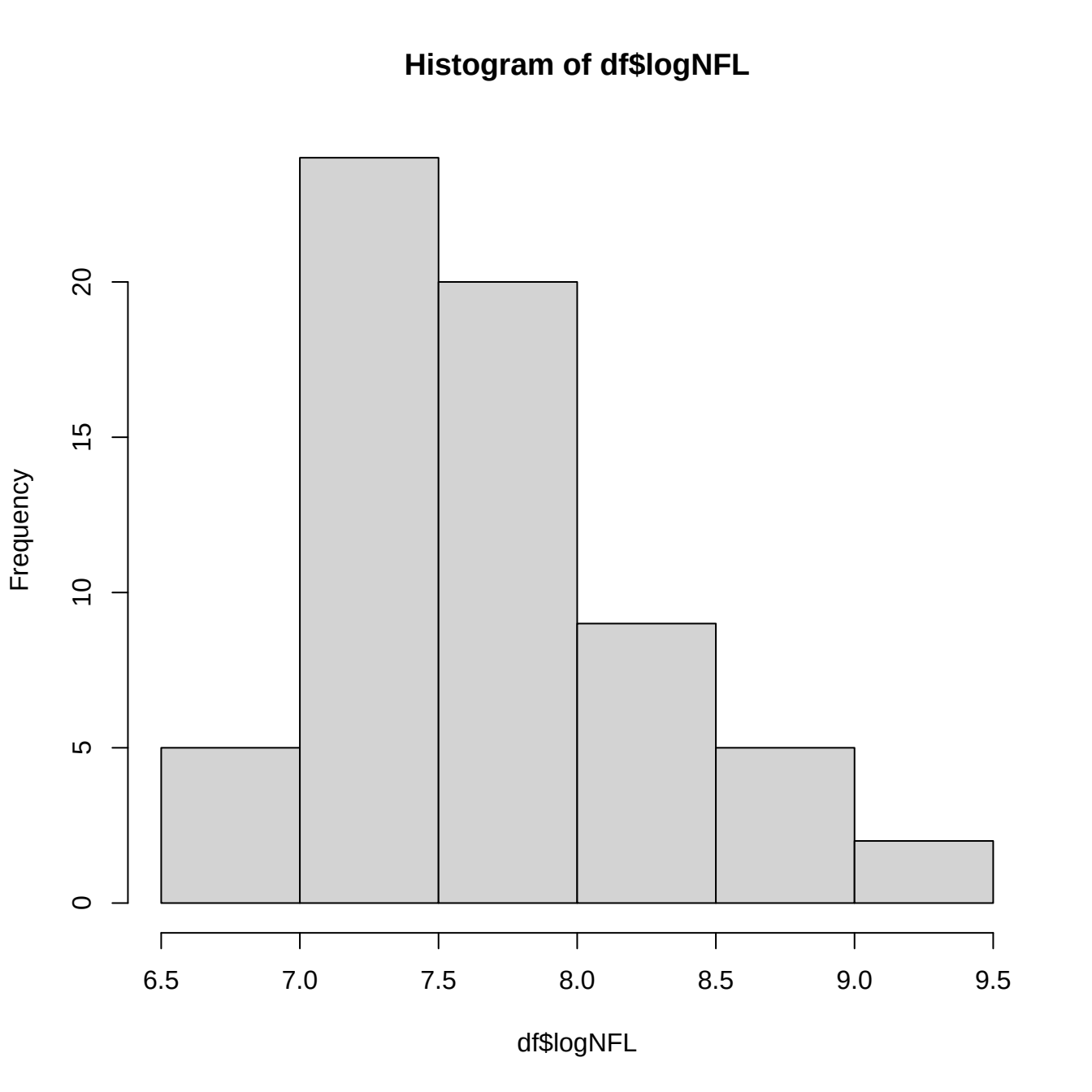

Histogram of df$ATI_2
Frequency
0
5
10
15
0.0
0.5
1.0
1.5
df$ATI_2

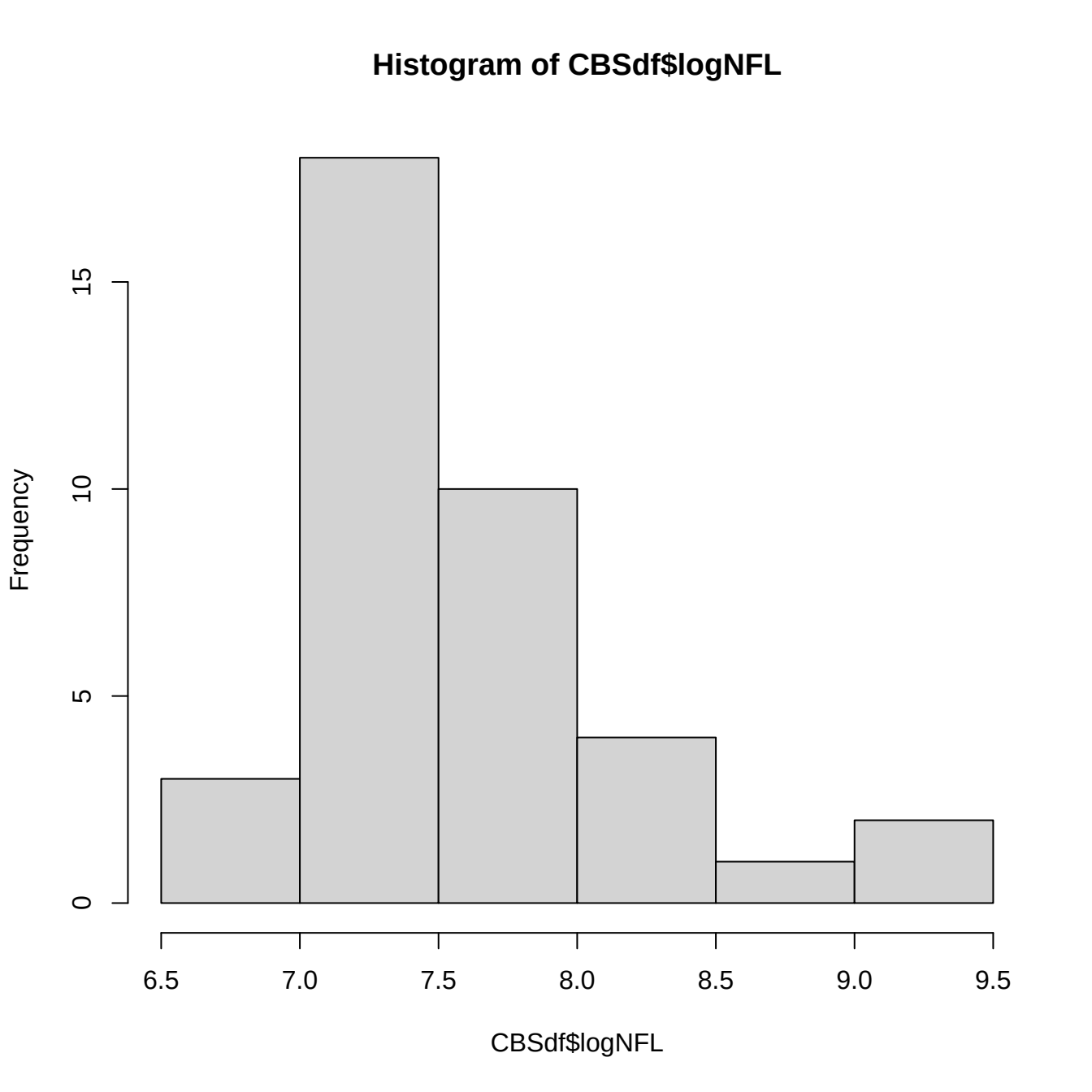

Histogram of CBSdf$ATI_2
Frequency
0
2
4
6
8
10
0.0
0.5
1.0
1.5
CBSdf$ATI_2

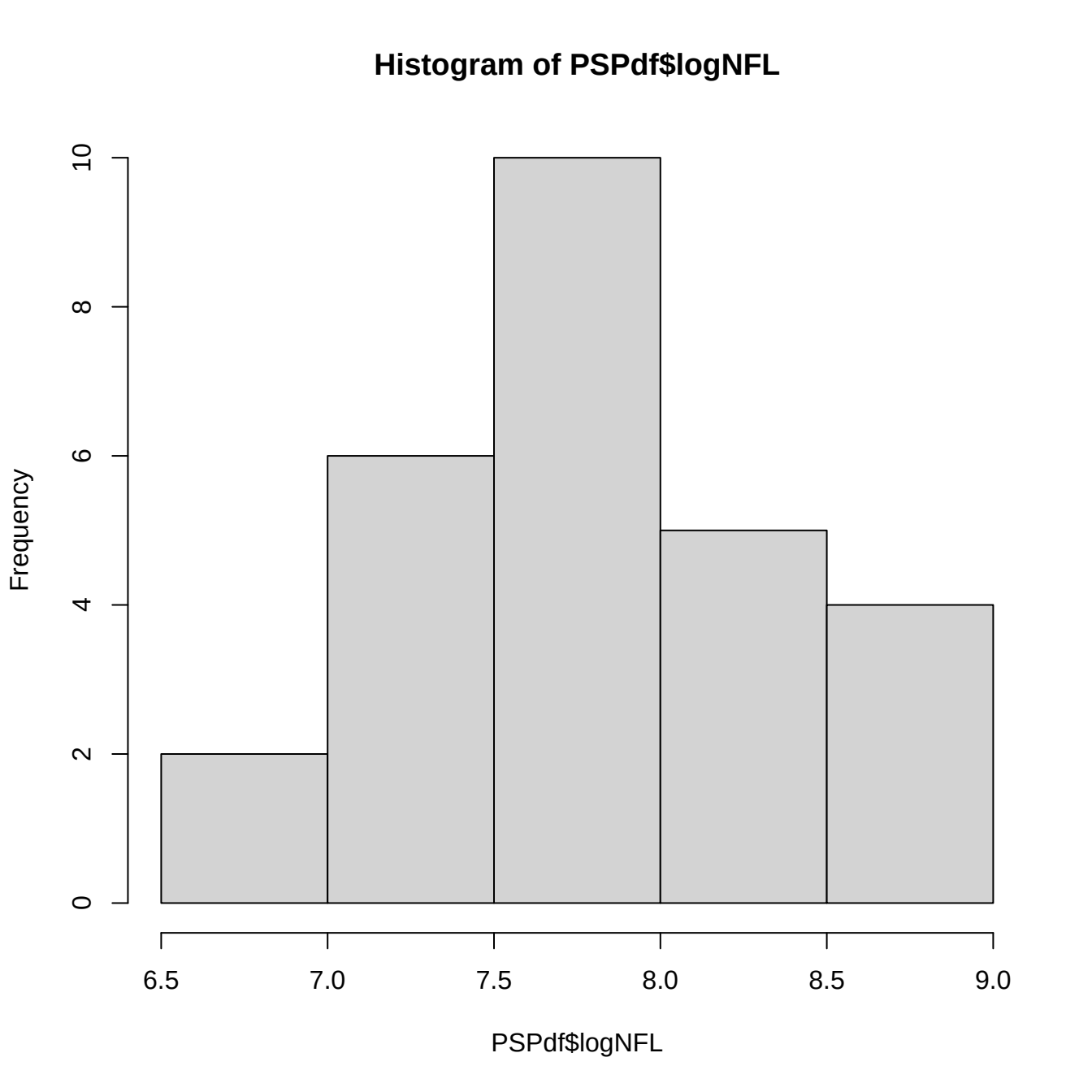

Histogram of PSPdf$ATI_2
Frequency
0
1
2
3
4
5
6
0.0
0.5
1.0
1.5
PSPdf$ATI_2

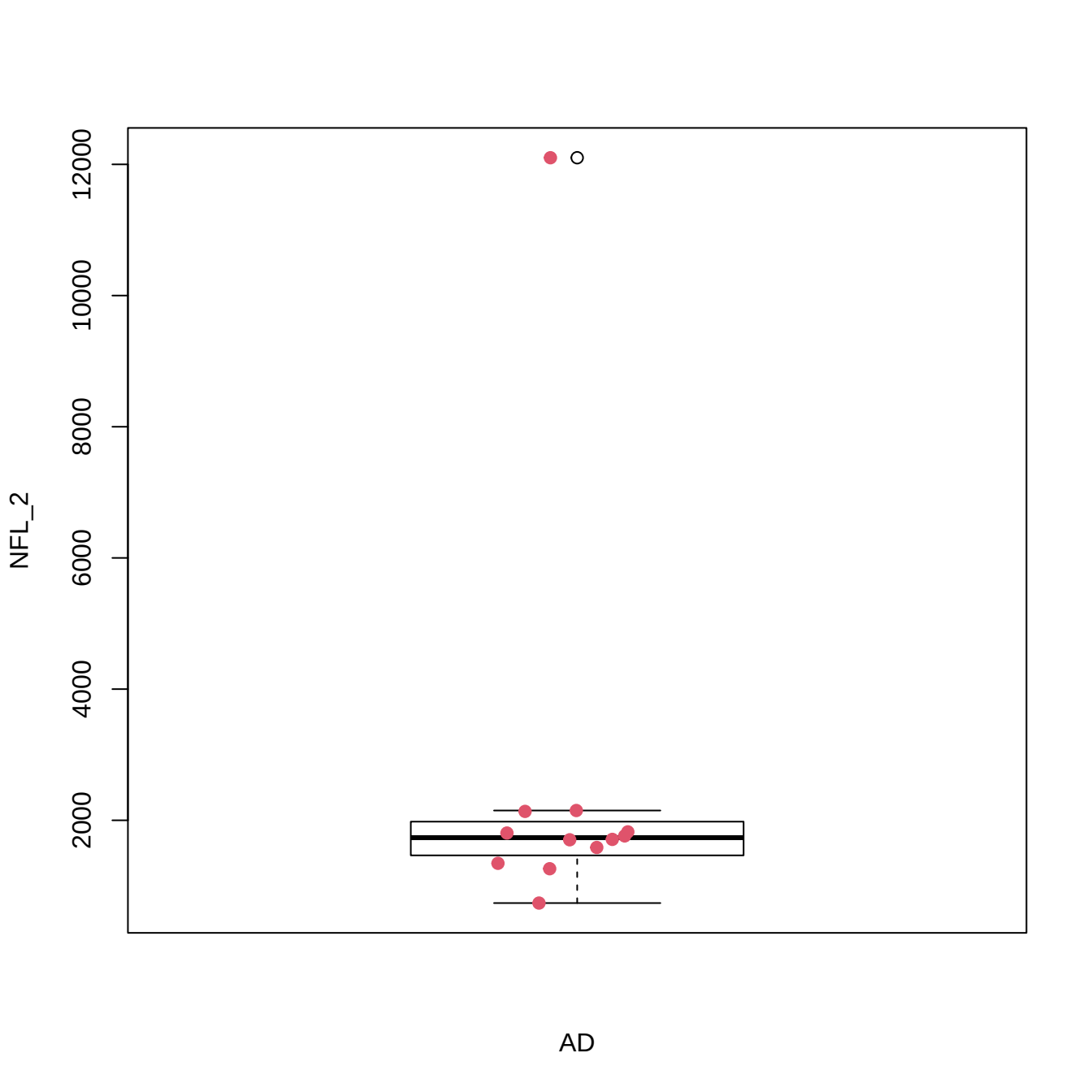

NFL_2
2000
4000
6000
8000
10000
12000
DX_APD

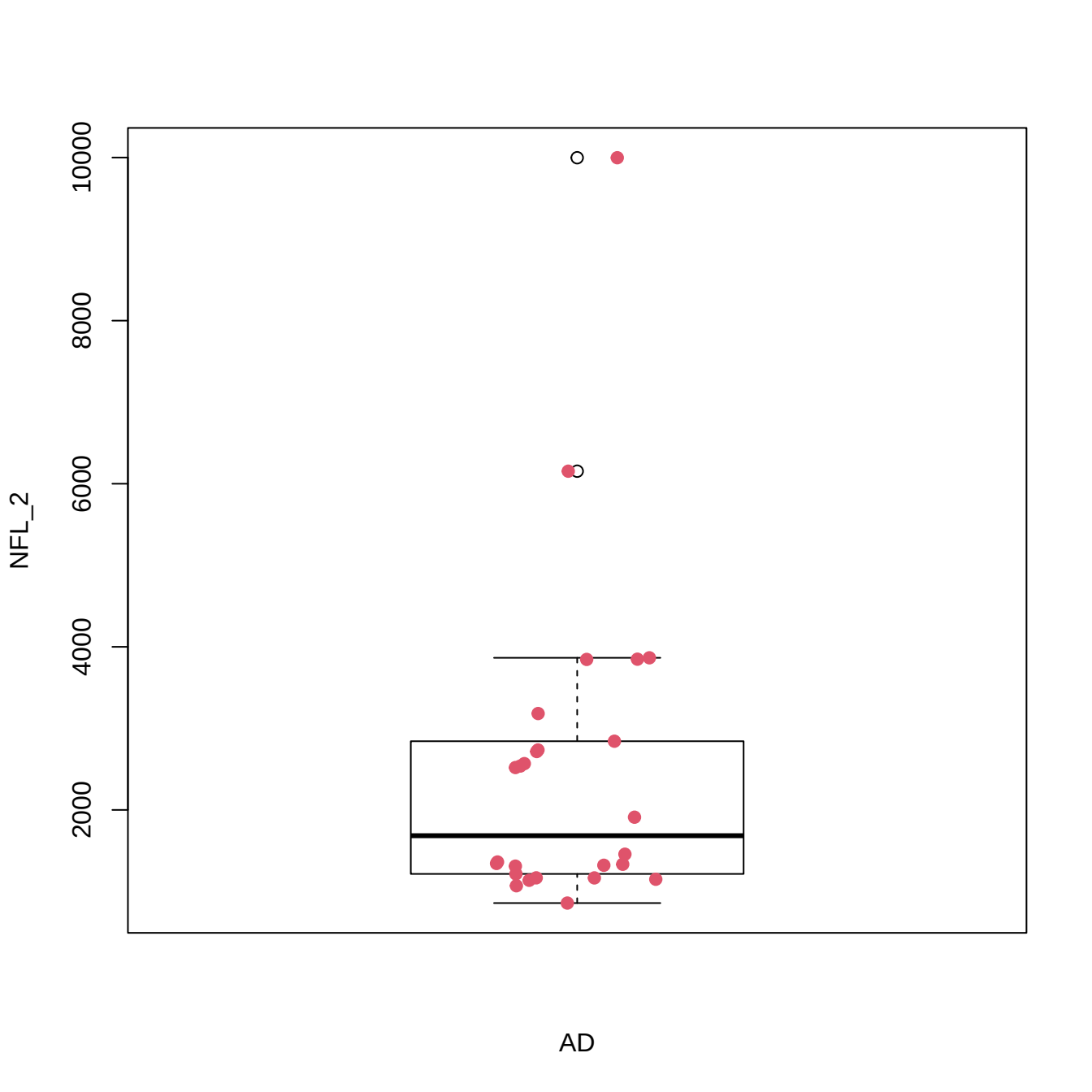

NFL_2
8000
7000
6000
5000
4000
3000
2000
1000
DX_APD

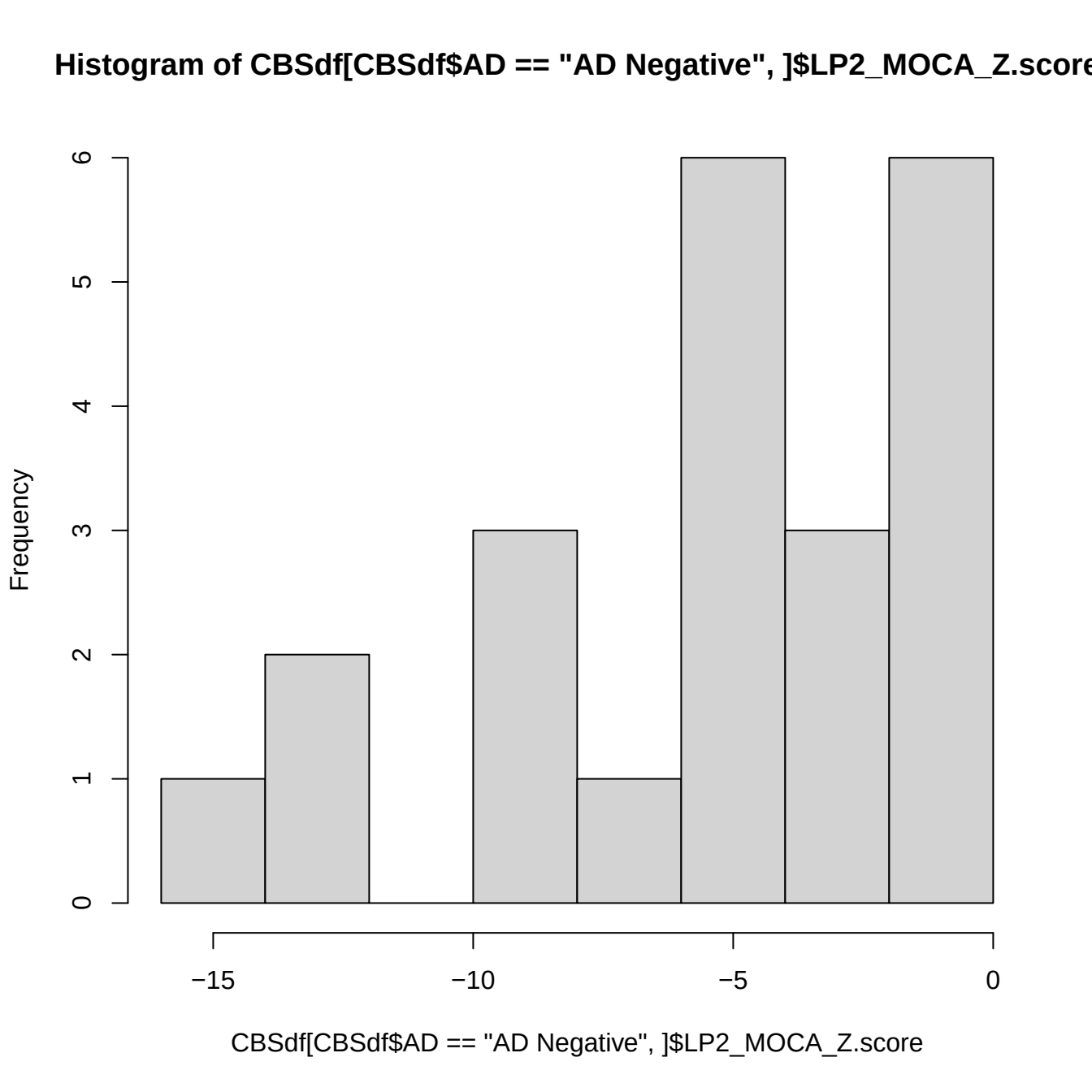

Histogram of df$logNFL
Frequency
0
5
10
15
20
6.5
7.0
7.5
8.0
8.5
9.0
9.5
df$logNFL

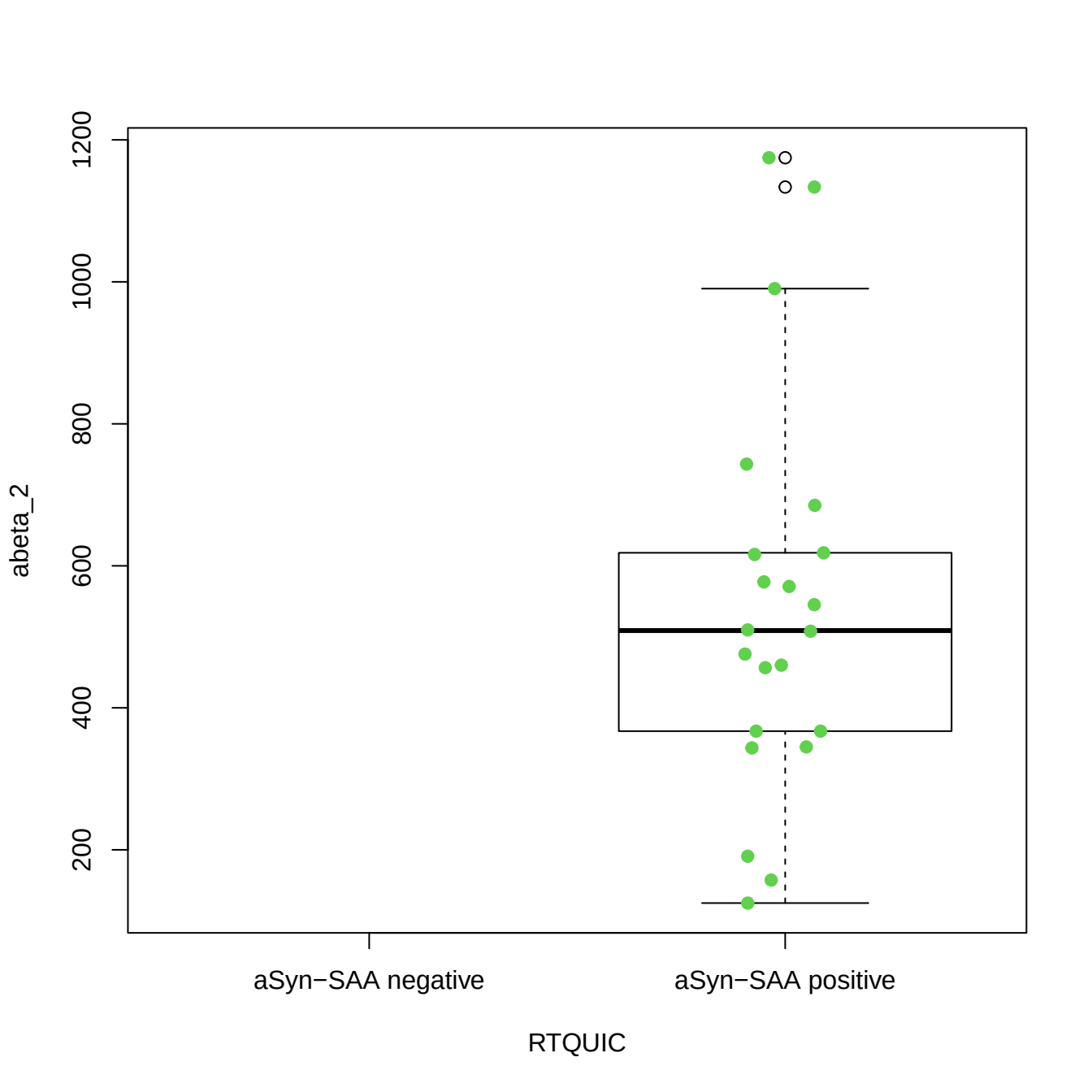

Histogram of CBSdf$logNFL
Frequency
0
5
10
15
6.5
7.0
7.5
8.0
8.5
9.0
9.5
CBSdf$logNFL

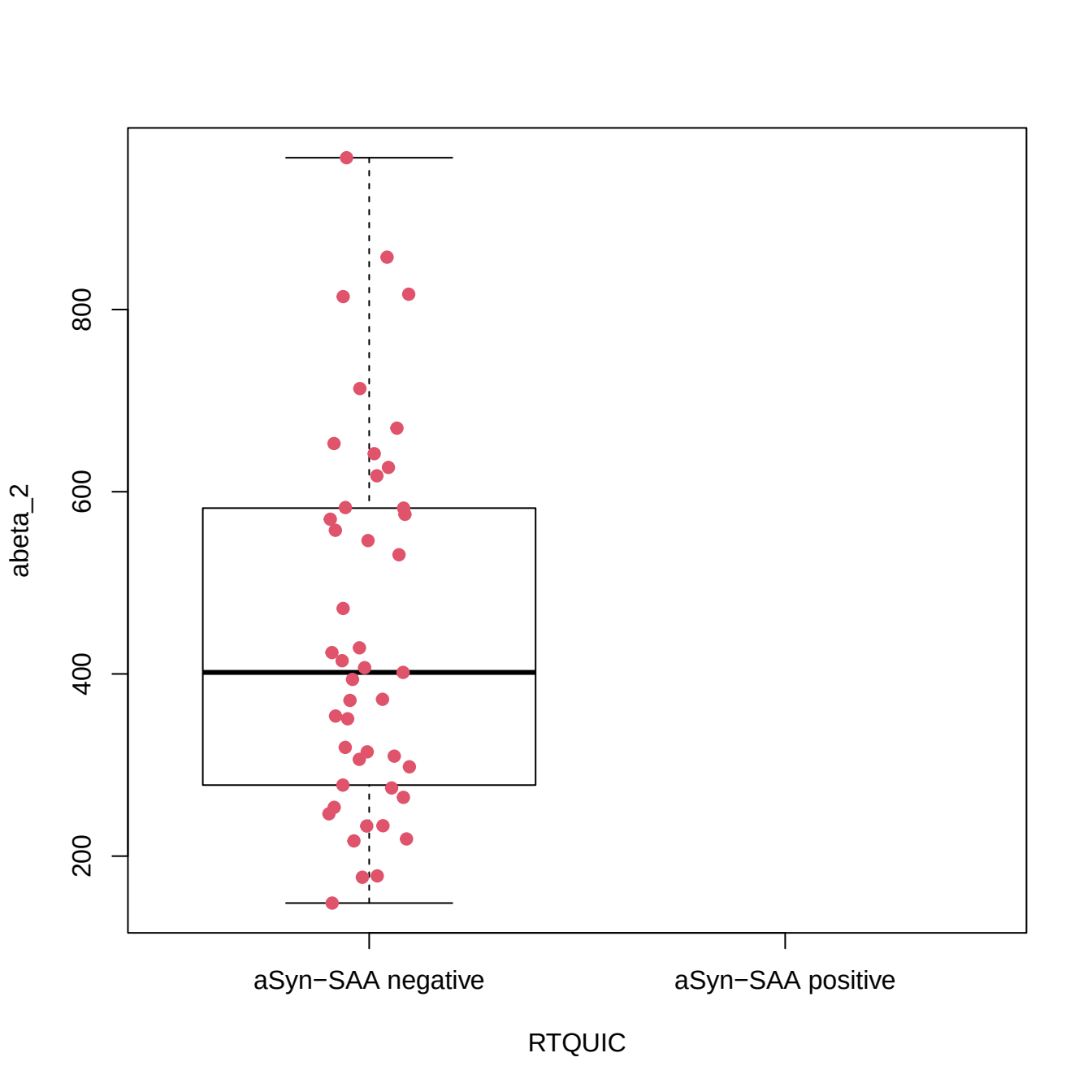

Histogram of PSPdf$logNFL
Frequency
0
2
4
6
8
10
6.5
7.0
7.5
8.0
8.5
9.0
PSPdf$logNFL

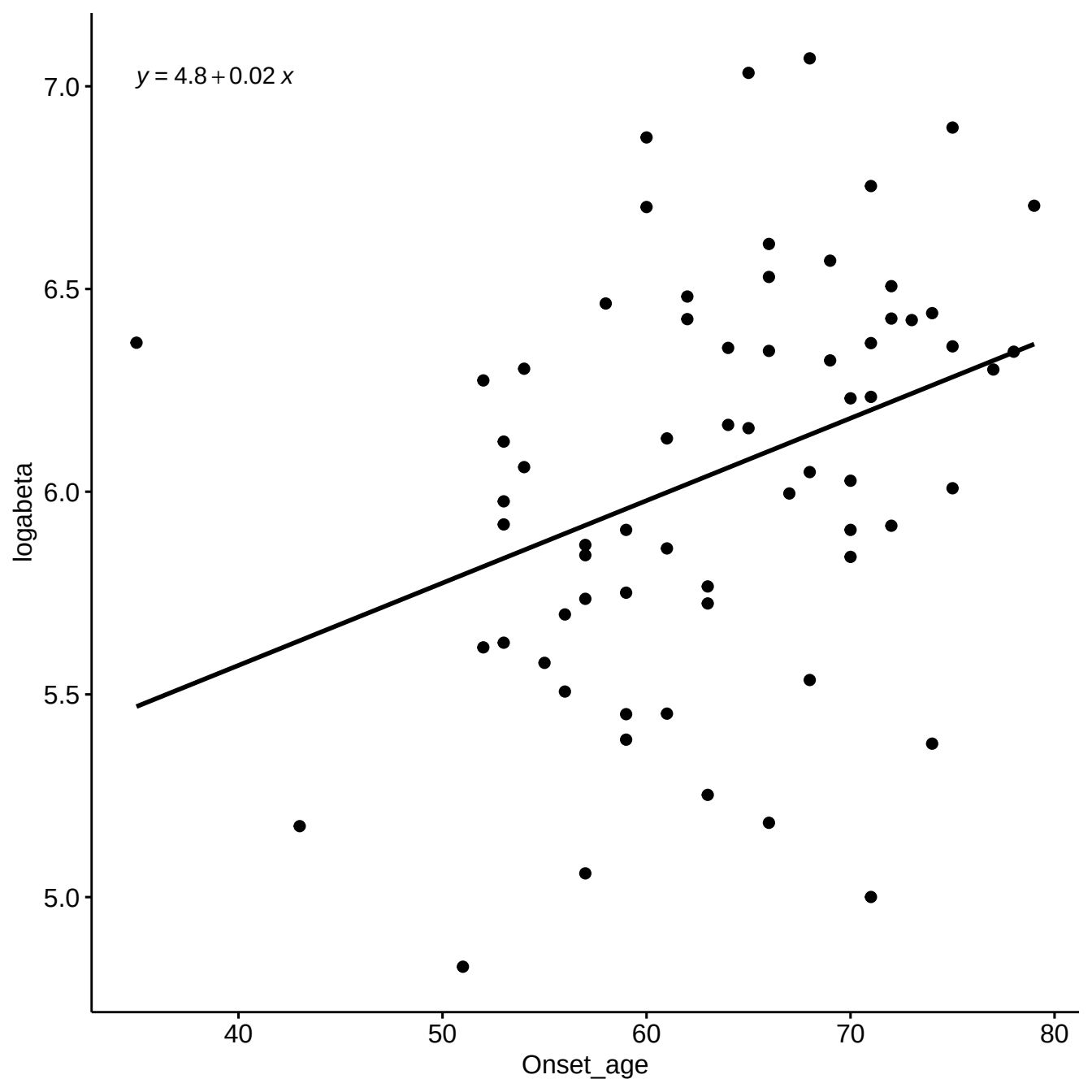

NFL_2
2000
4000
6000
8000
10000
12000
AD

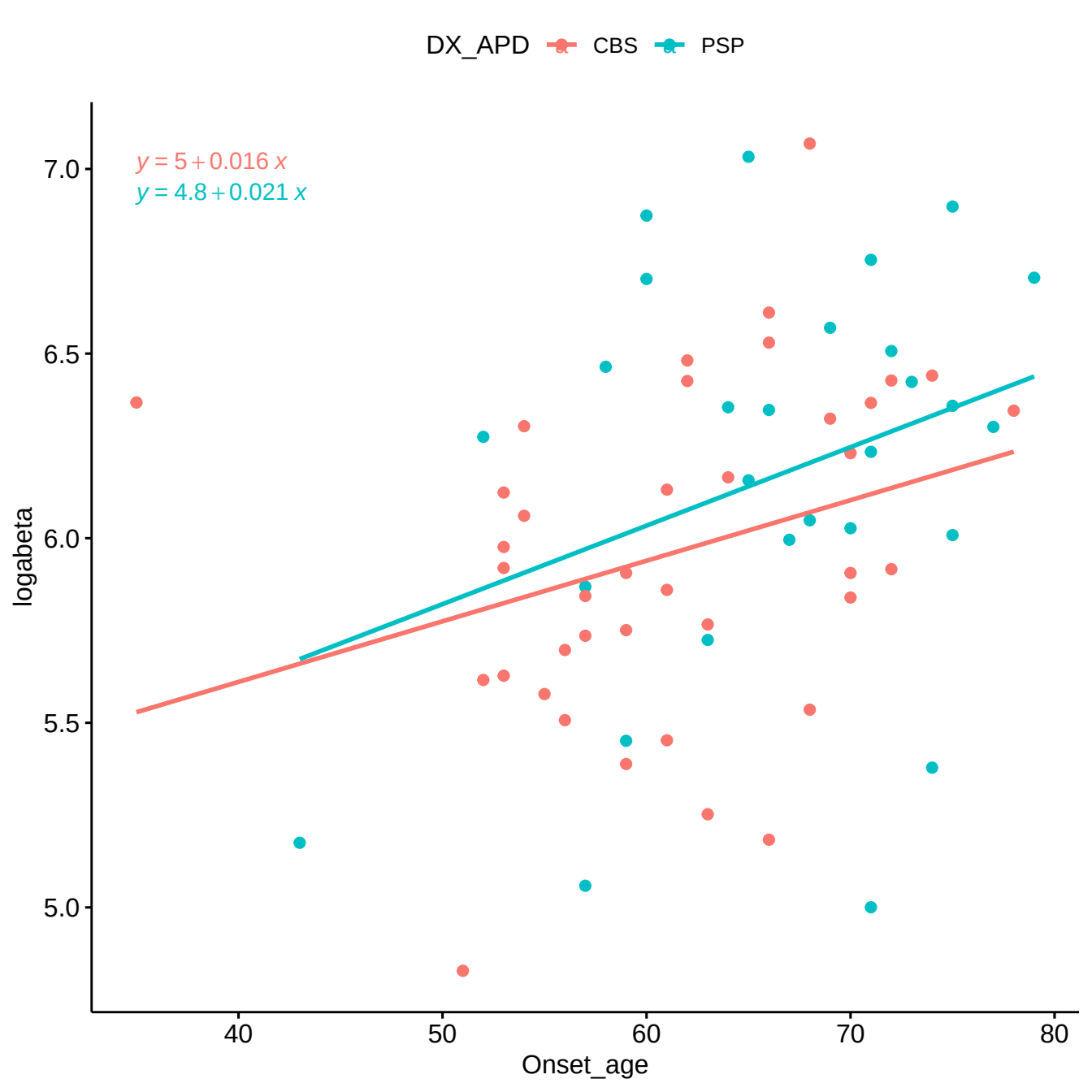

NFL_2
10000
8000
6000
4000
2000
AD

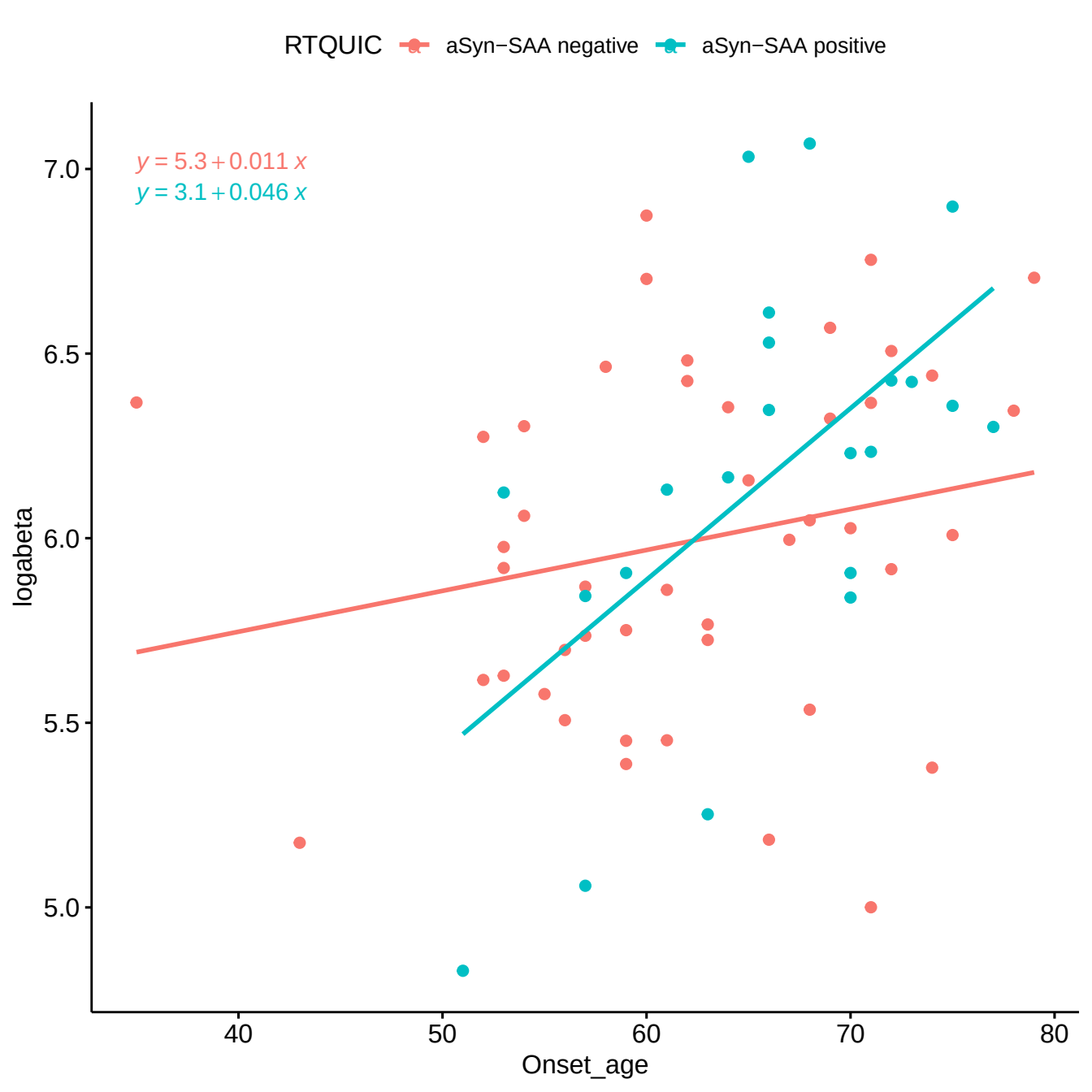

Histogram of CBSdf[CBSdf$AD == "AD Negative",]$LP2_MOCA_Z.score
Frequency
0
1
2
3
4
5
6
−15
−10
−5
0
CBSdf[CBSdf$AD == "AD Negative",]$LP2_MOCA_Z.score

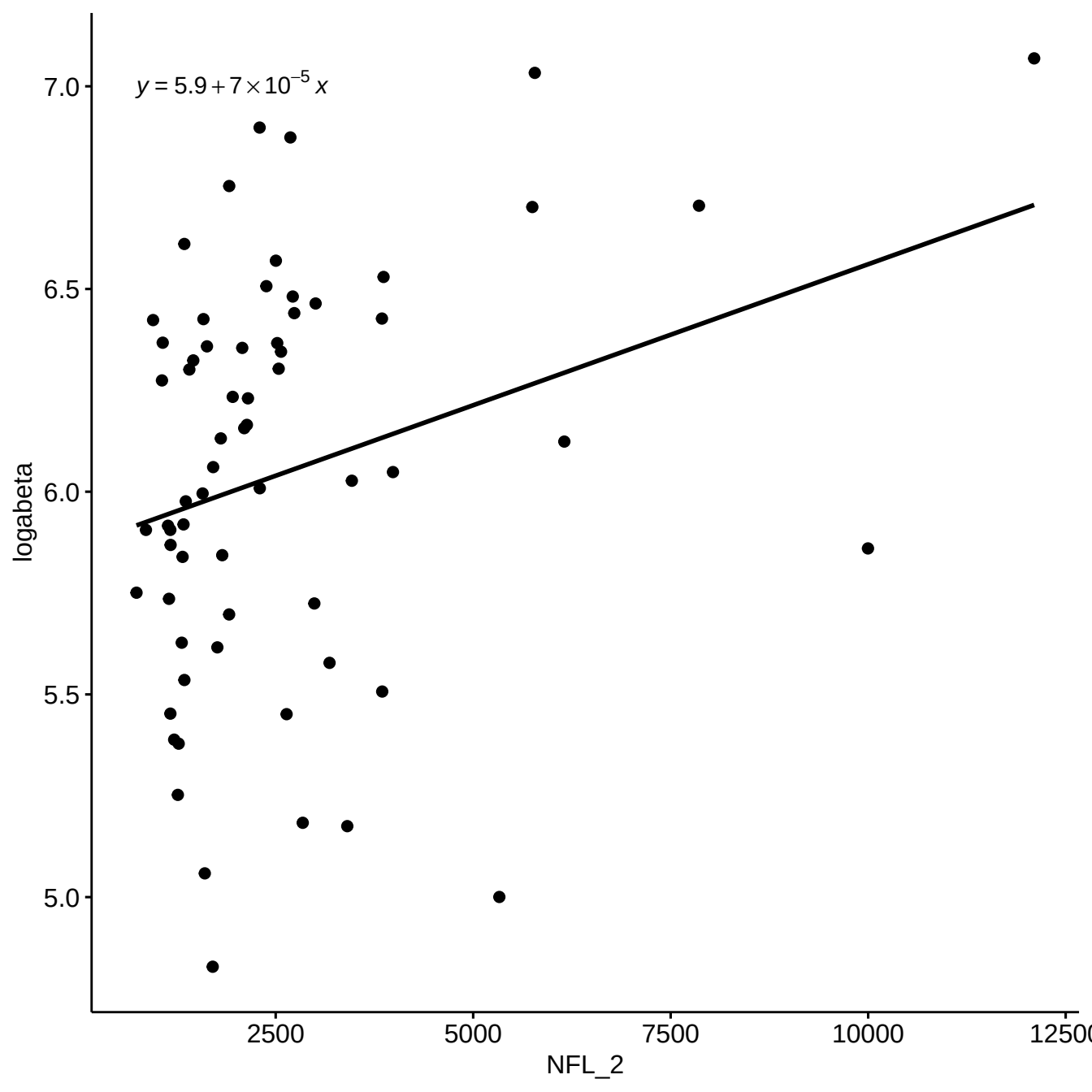

abeta_2
1200
1000
800
600
400
200
aSyn−SAA negative
aSyn−SAA positive
RTQUIC

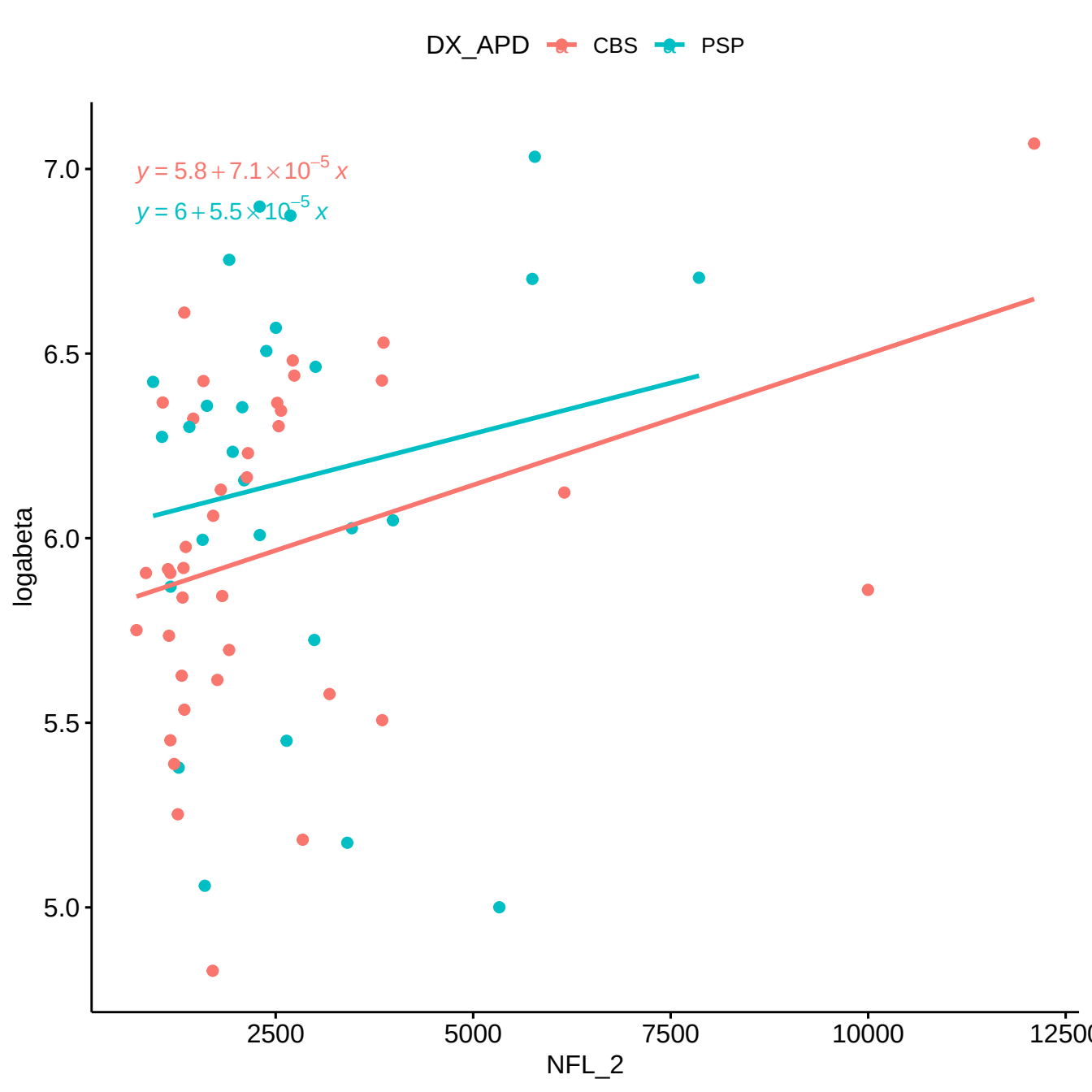

abeta_2
200
400
600
800
aSyn−SAA negative
aSyn−SAA positive
RTQUIC

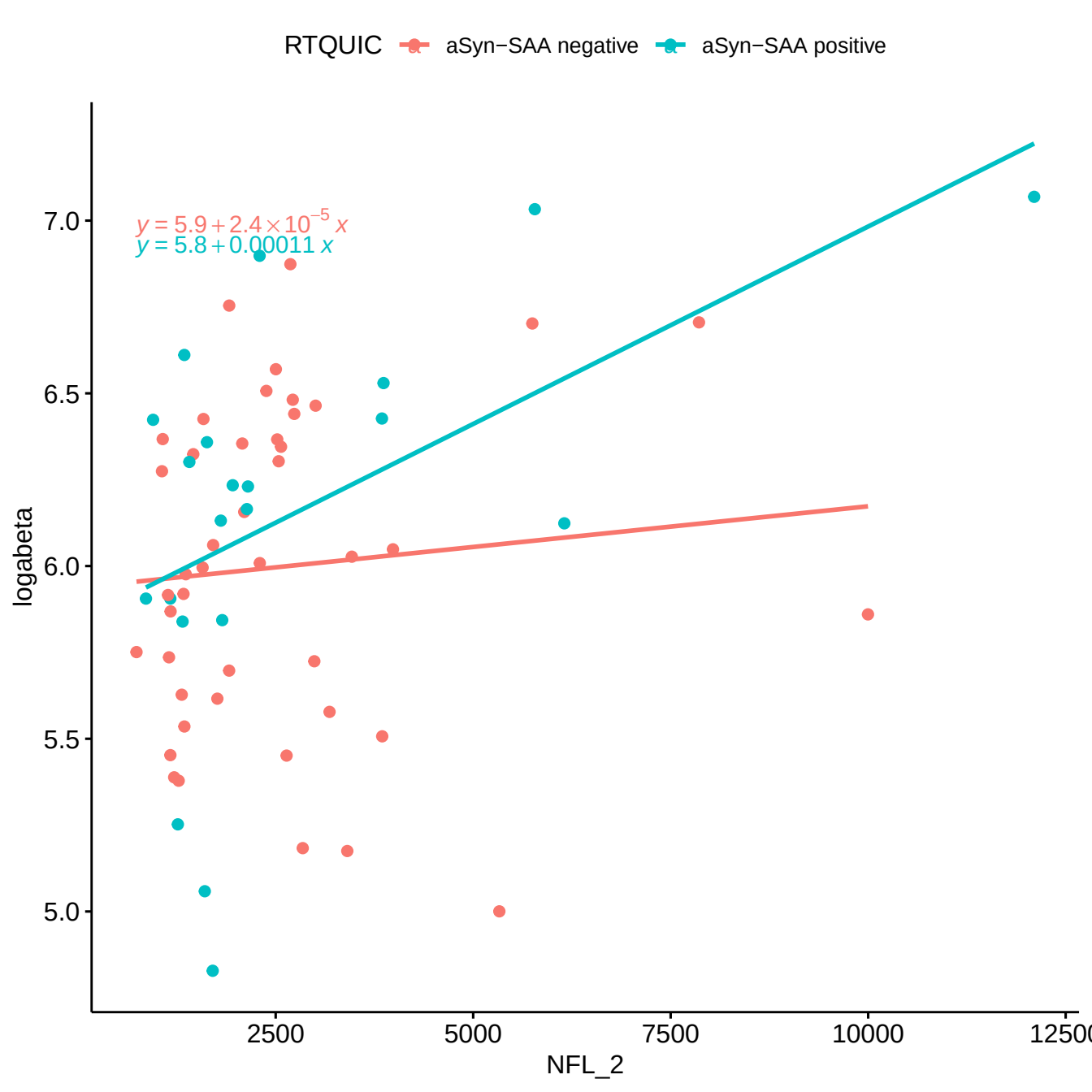

y = 4.8 + 0.02 x
7.0
6.5
6.0
5.5
5.0
logabeta
40
50
60
70
80
Onset_age

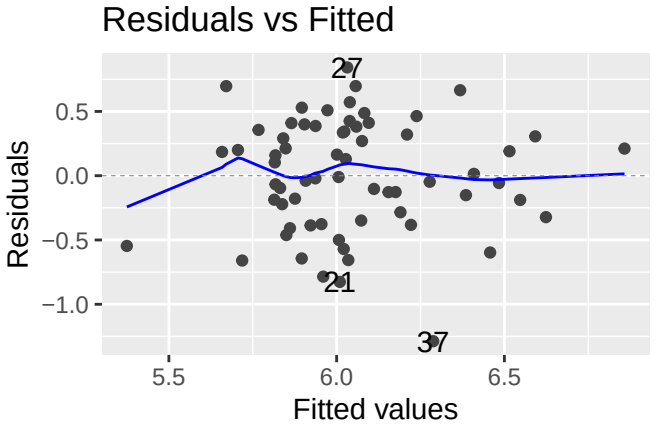

DX_APD
CBS
PSP
y = 5 + 0.016 x
y = 4.8 + 0.021 x
7.0
6.5
6.0
5.5
5.0
logabeta
40
50
60
70
80
Onset_age

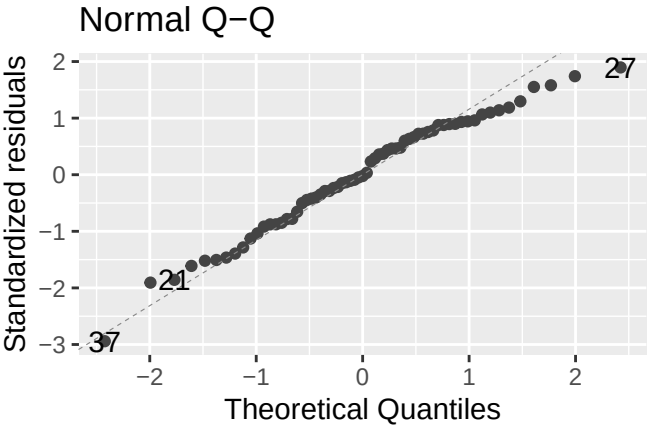

RTQUIC
aSyn−SAA negative
aSyn−SAA positive
y = 5.3 + 0.011 x
y = 3.1 + 0.046 x
7.0
6.5
6.0
5.5
5.0
logabeta
40
50
60
70
80
Onset_age

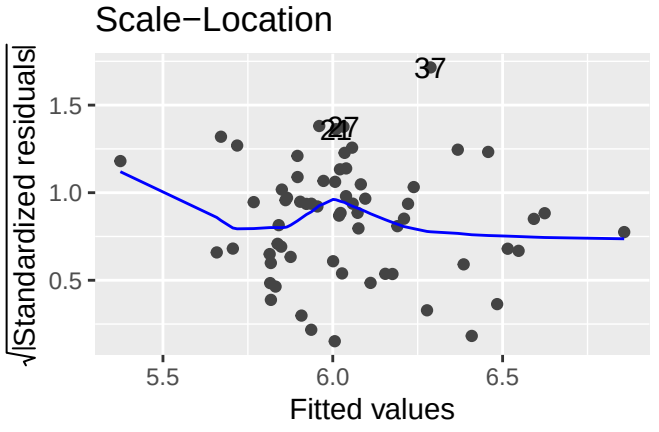

$y = 5.9 + 7 \times 10^{-5} x$
7.0
6.5
6.0
5.5
5.0
logabeta
2500
5000
7500
10000
12500
NFL_2

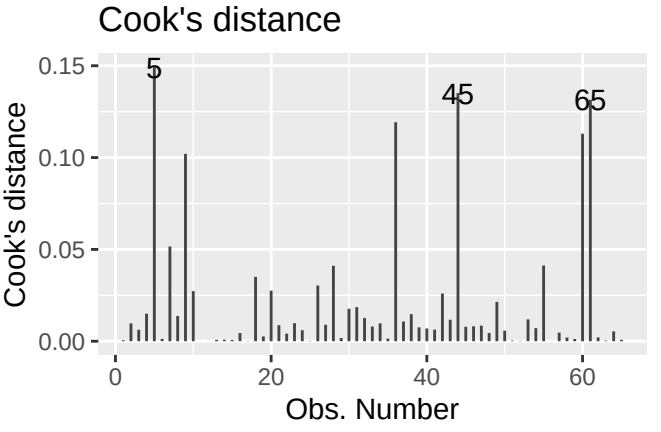

DX_APD
CBS
PSP
$y = 5.8 + 7.1 \times 10^{-5}\, x$
$y = 6 + 5.5 \times 10^{-5}\, x$
7.0
6.5
6.0
5.5
5.0
logabeta
2500
5000
7500
10000
12500
NFL_2

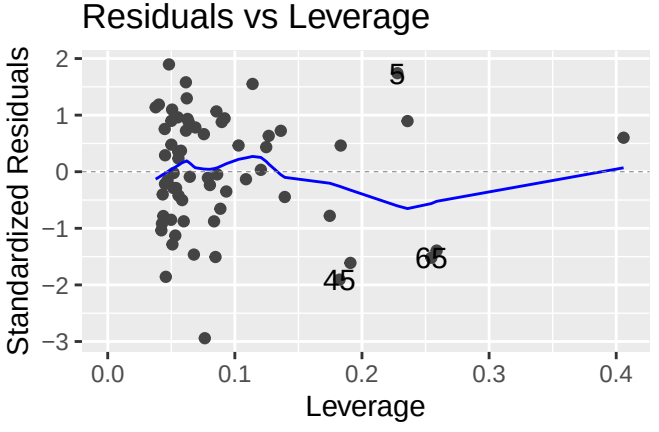

RTQUIC
aSyn−SAA negative
aSyn−SAA positive
$y = 5.9 + 2.4 \times 10^{-5}\, x$
$y = 5.8 + 0.00011\, x$
logabeta
7.0
6.5
6.0
5.5
5.0
2500
5000
7500
10000
12500
NFL_2

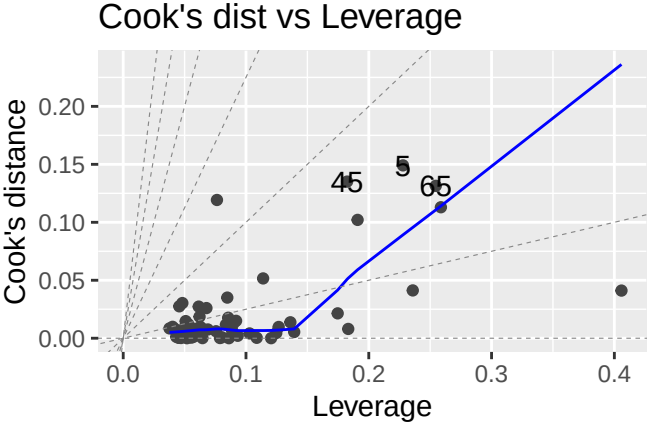

Residuals vs Fitted
Residuals
Fitted values
27
21
37
0.5
0.0
−0.5
−1.0
5.5
6.0
6.5

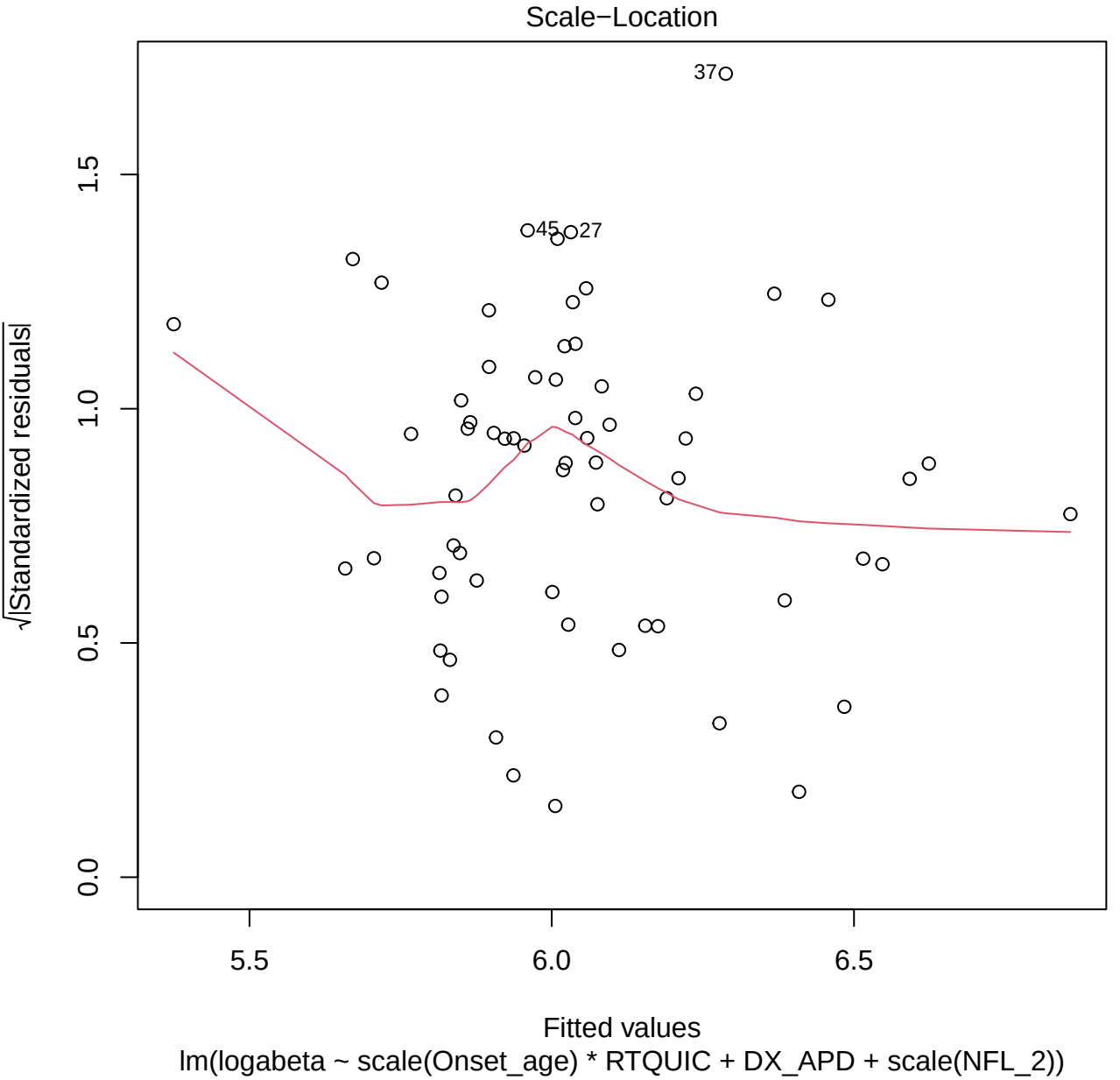

Normal Q−Q
Standardized residuals
Theoretical Quantiles
27
21
37
2
1
0
−1
−2
−3

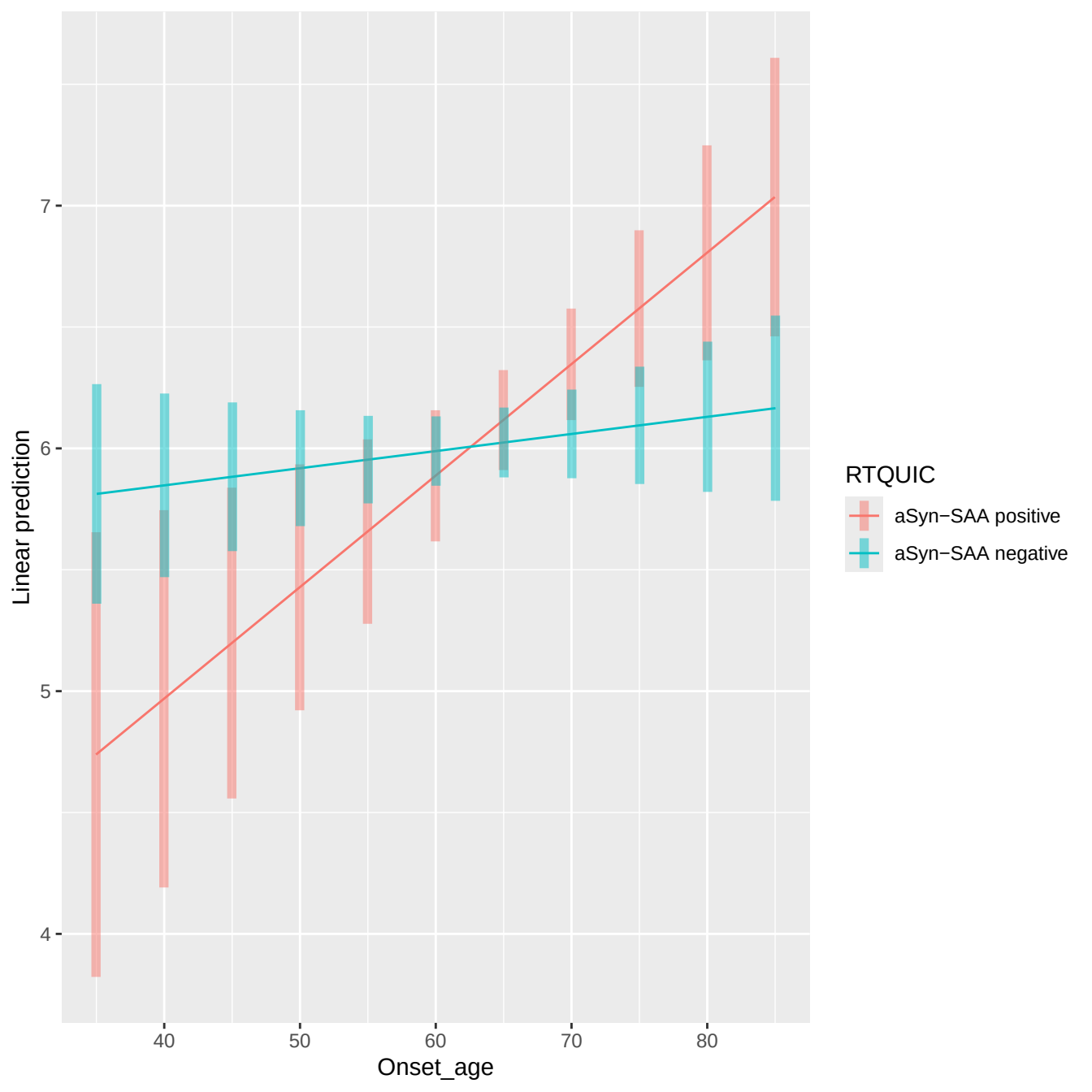

Scale−Location
√|Standardized residuals|
Fitted values
37
27
21
1.5
1.0
0.5
5.5
6.0
6.5


Cook's distance
Cook's distance
Obs. Number
5
45
65
0.15
0.10
0.05
0.00
0
20
40
60


Residuals vs Leverage
Standardized Residuals
Leverage
5
65
45
2
1
0
−1
−2
−3
0.0
0.1
0.2
0.3
0.4

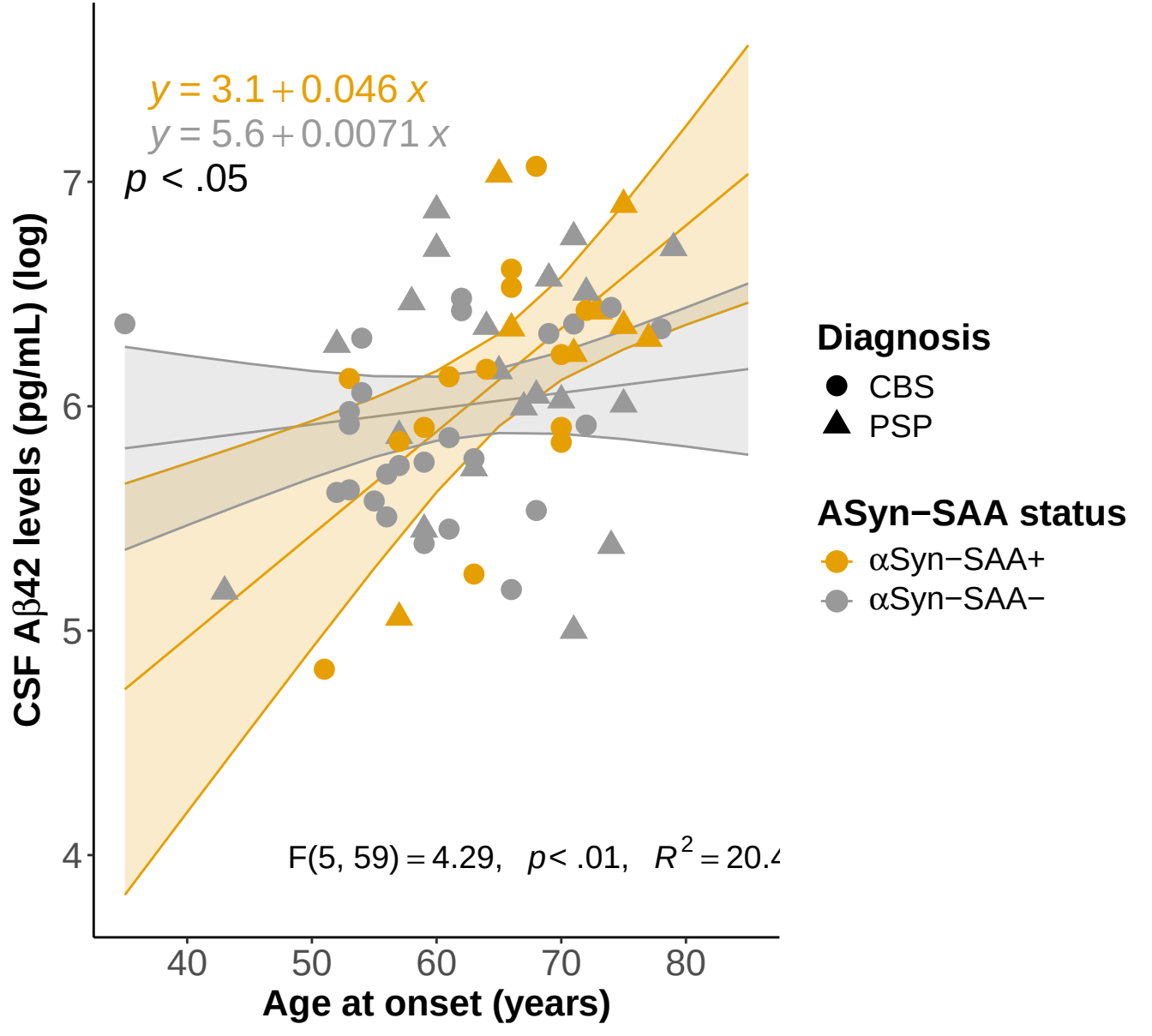

Cook's dist vs Leverage
Cook's distance
Leverage
45
5
65
0.20
0.15
0.10
0.05
0.00
0.0
0.1
0.2
0.3
0.4

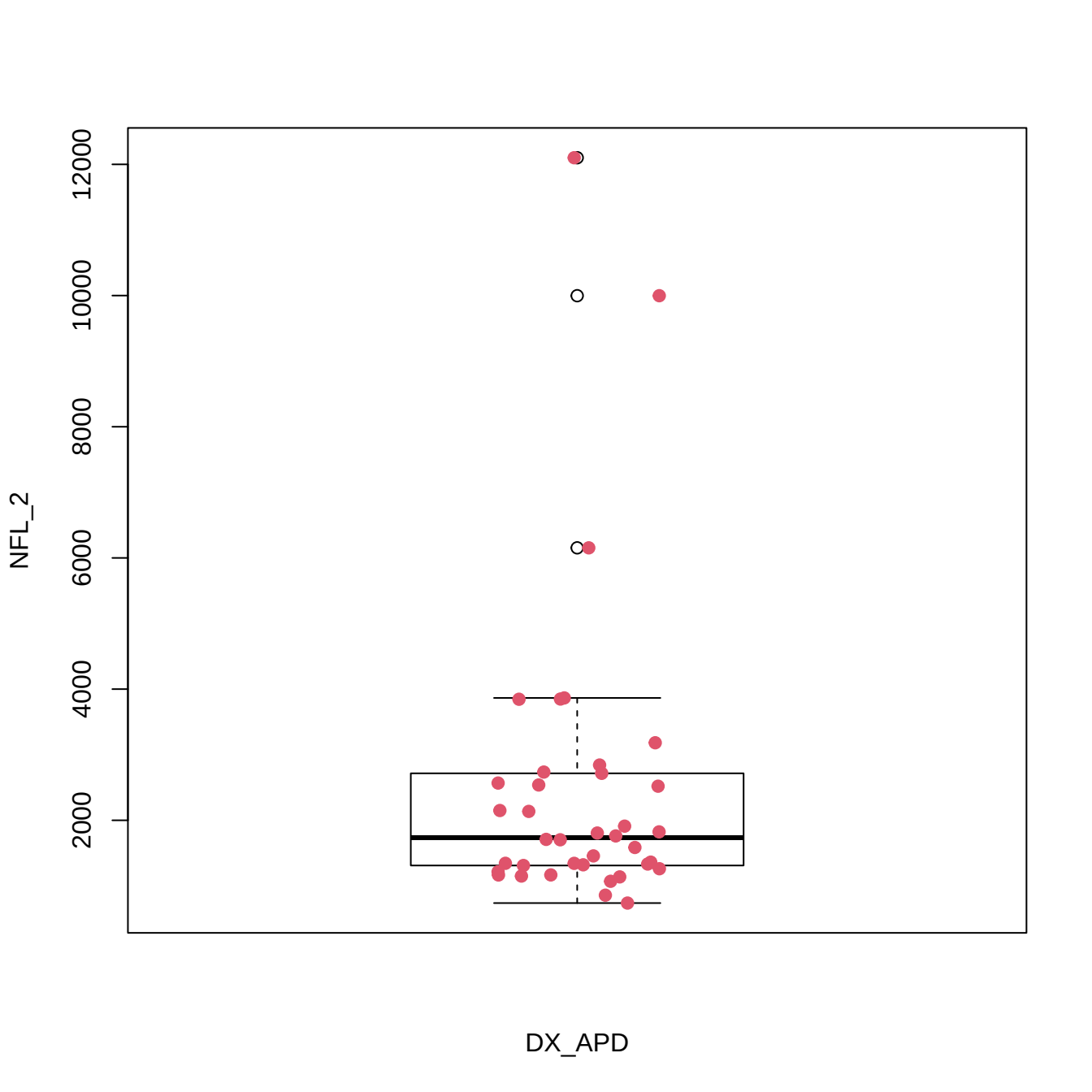

Scale−Location
37
45
27
√|Standardized residuals|
0.0
0.5
1.0
1.5
5.5
6.0
6.5
Fitted values
lm(logabeta ~ scale(Onset_age) * RTQUIC + DX_APD + scale(NFL_2))

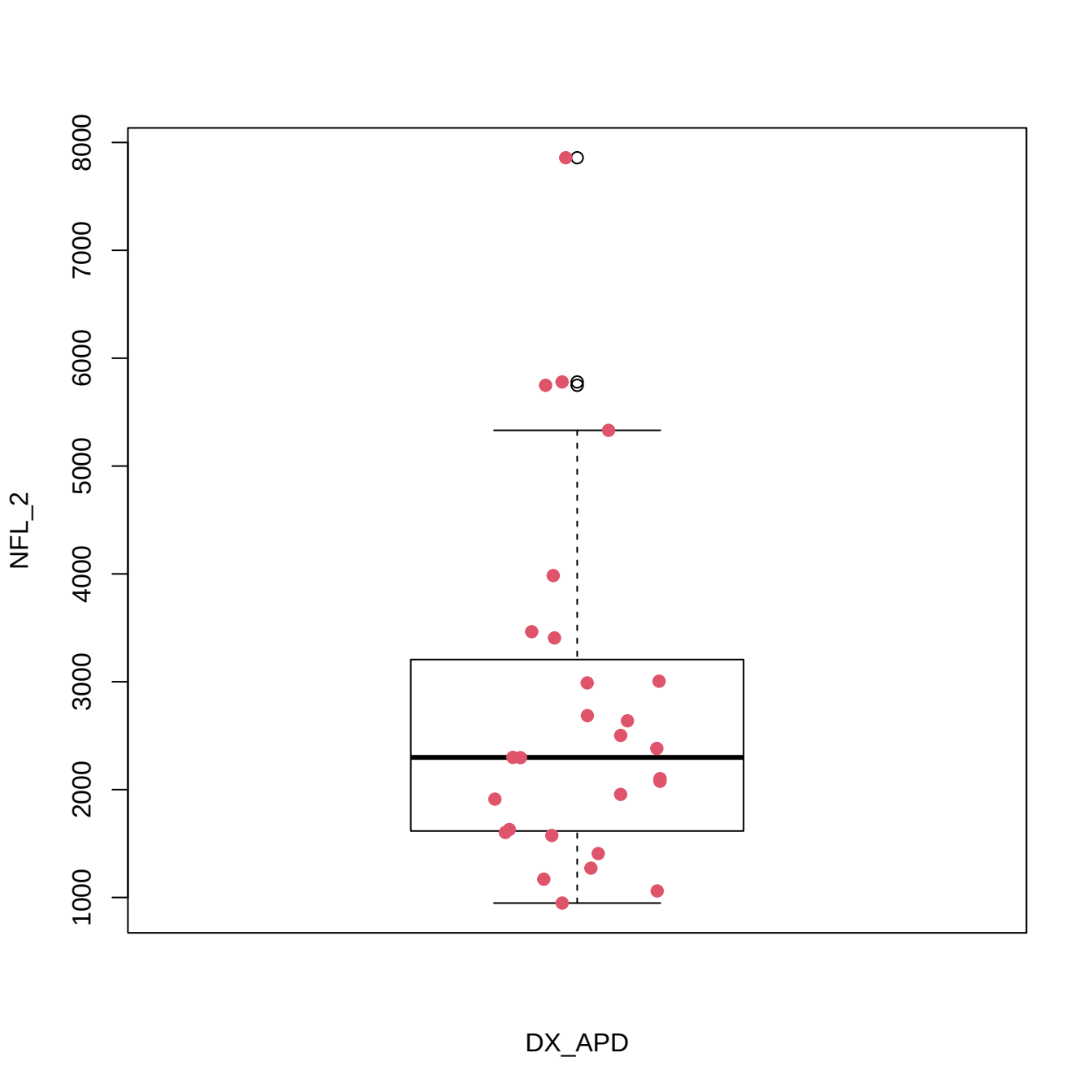

Linear prediction
7
6
5
4
40
50
60
70
80
Onset_age
RTQUIC
aSyn−SAA positive
aSyn−SAA negative

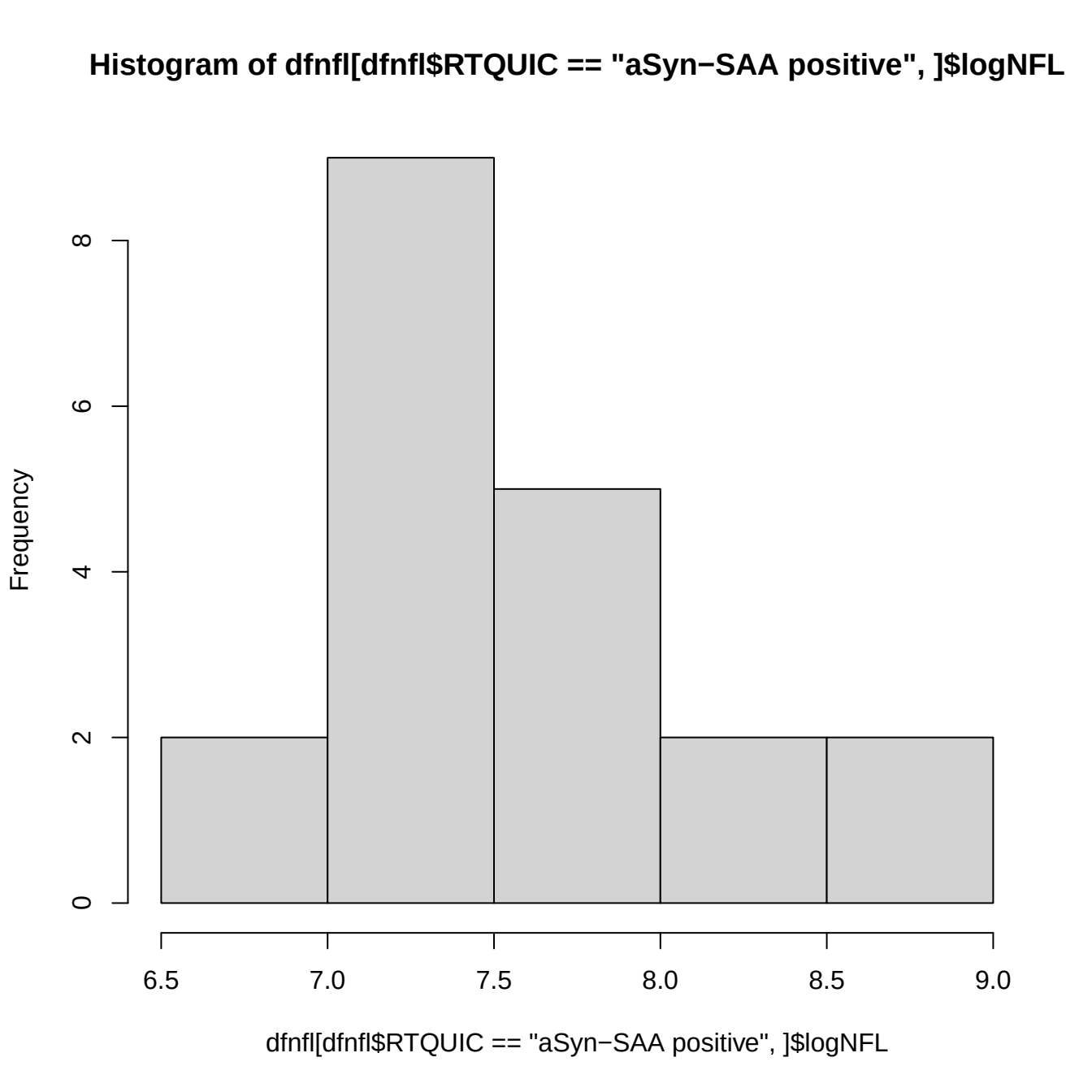
presentation of the interaction of age at onset by αSyn−SAA

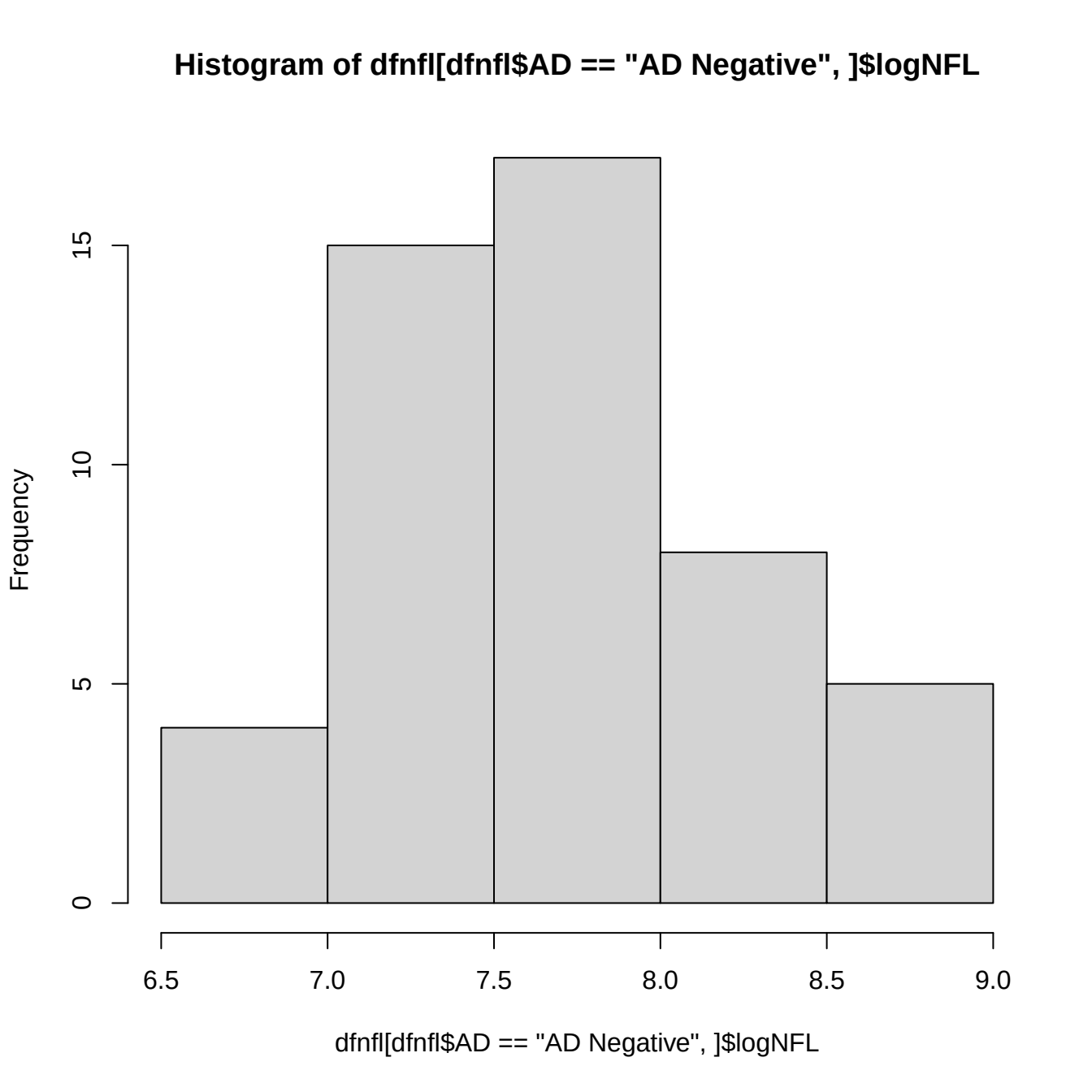
the model: log(Aβ42) ~ Age at onset * αSyn−SAA + Diagnosis + NfL

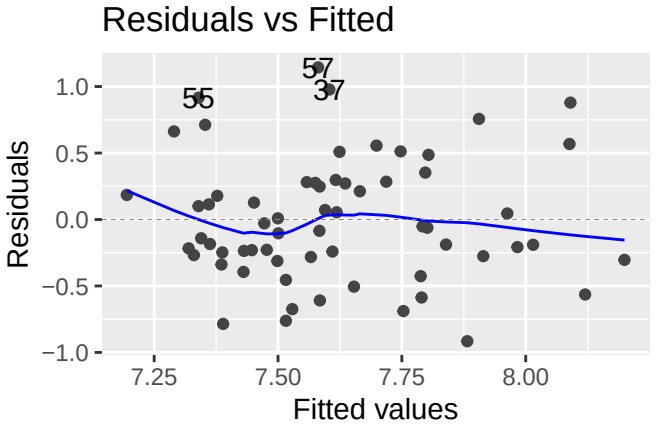


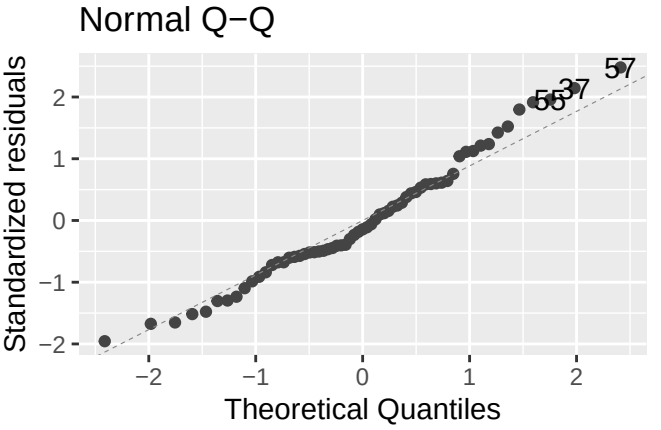

NFL_2
2000
4000
6000
8000
10000
12000
DX_APD

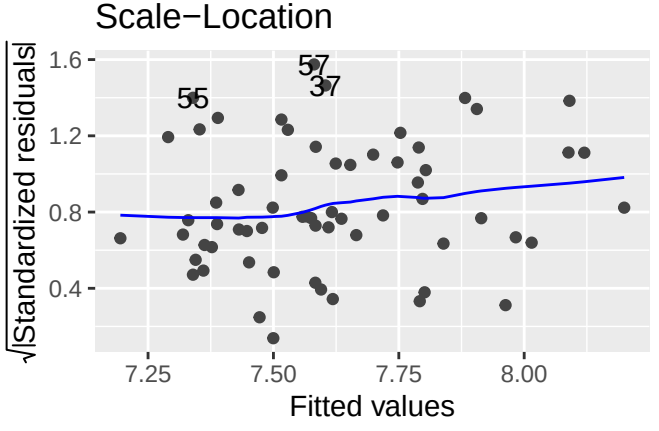

NFL_2
8000
7000
6000
5000
4000
3000
2000
1000
DX_APD

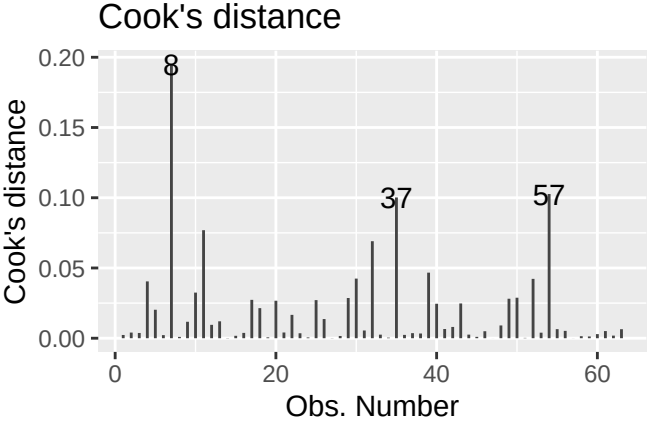

Histogram of dfnfl[dfnfl$RTQUIC == "aSyn−SAA positive",]$logNFL
Frequency
0
2
4
6
8
6.5
7.0
7.5
8.0
8.5
9.0
dfnfl[dfnfl$RTQUIC == "aSyn−SAA positive",]$logNFL

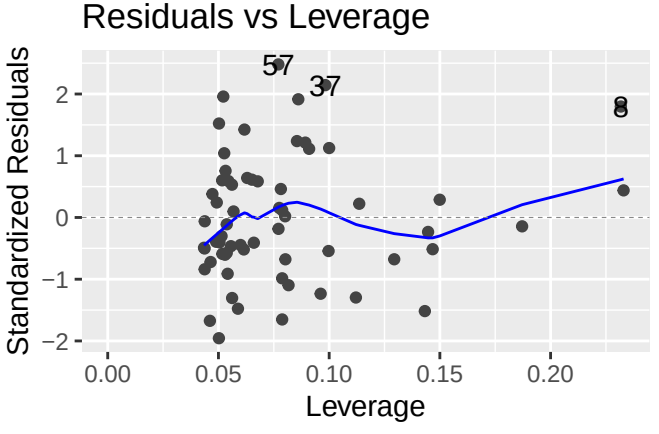

Histogram of dfnfl[dfnfl$AD == "AD Negative",]$logNFL
Frequency
0
5
10
15
6.5
7.0
7.5
8.0
8.5
9.0
dfnfl[dfnfl$AD == "AD Negative",]$logNFL

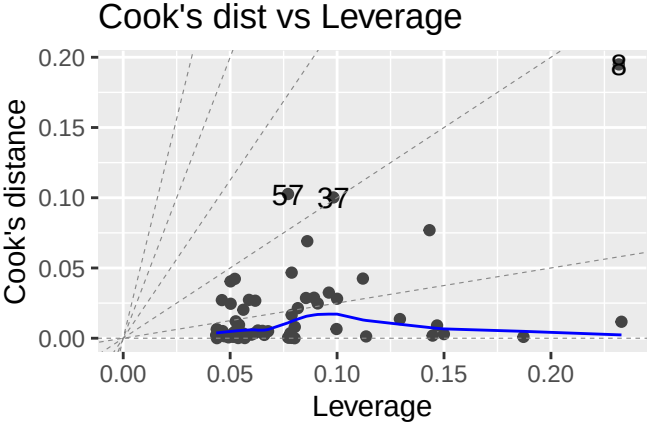

Residuals vs Fitted
Residuals
Fitted values
57
37
55
1.0
0.5
0.0
−0.5
−1.0
7.25
7.50
7.75
8.00

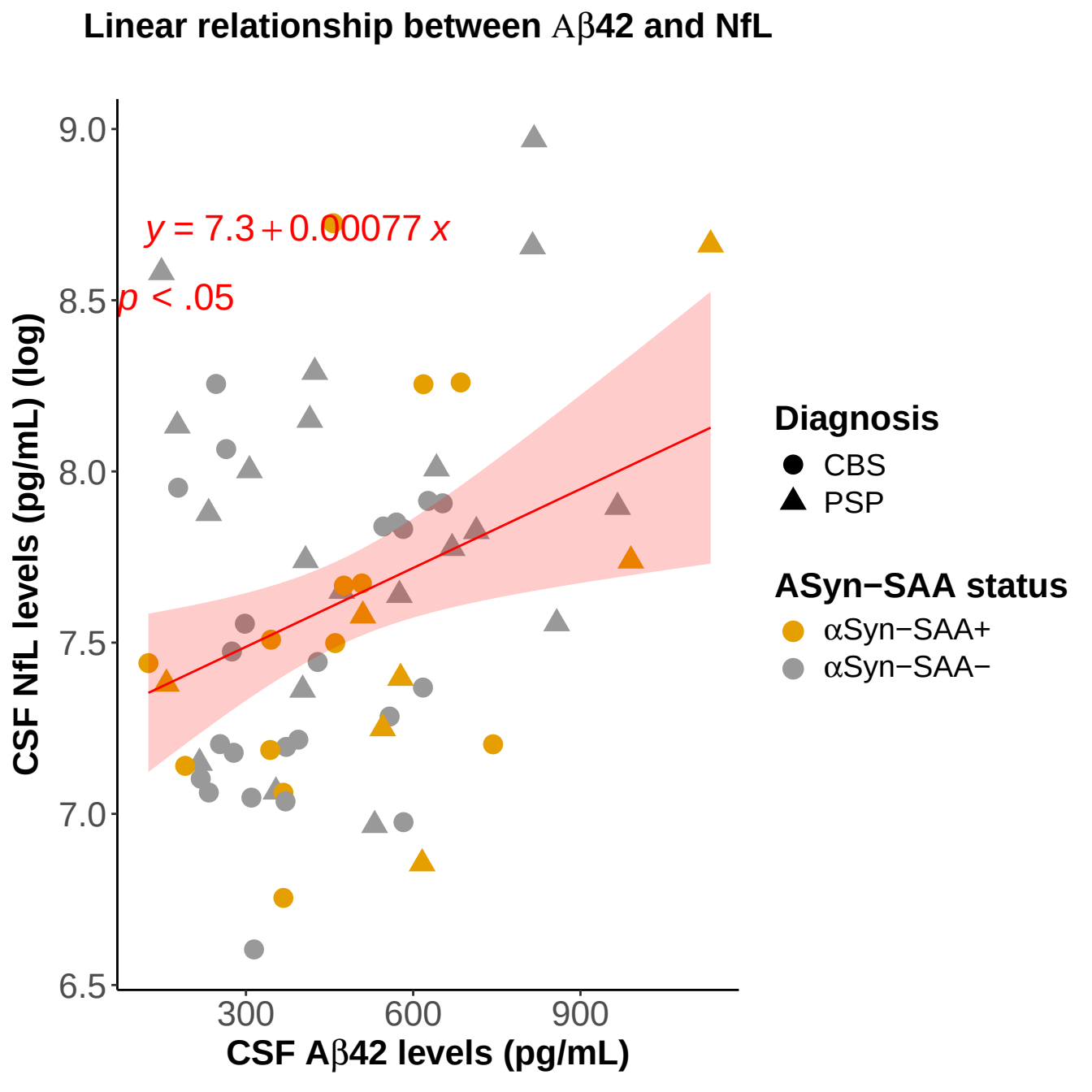

Normal Q−Q
Standardized residuals
Theoretical Quantiles
57
37
55
2
1
0
−1
−2

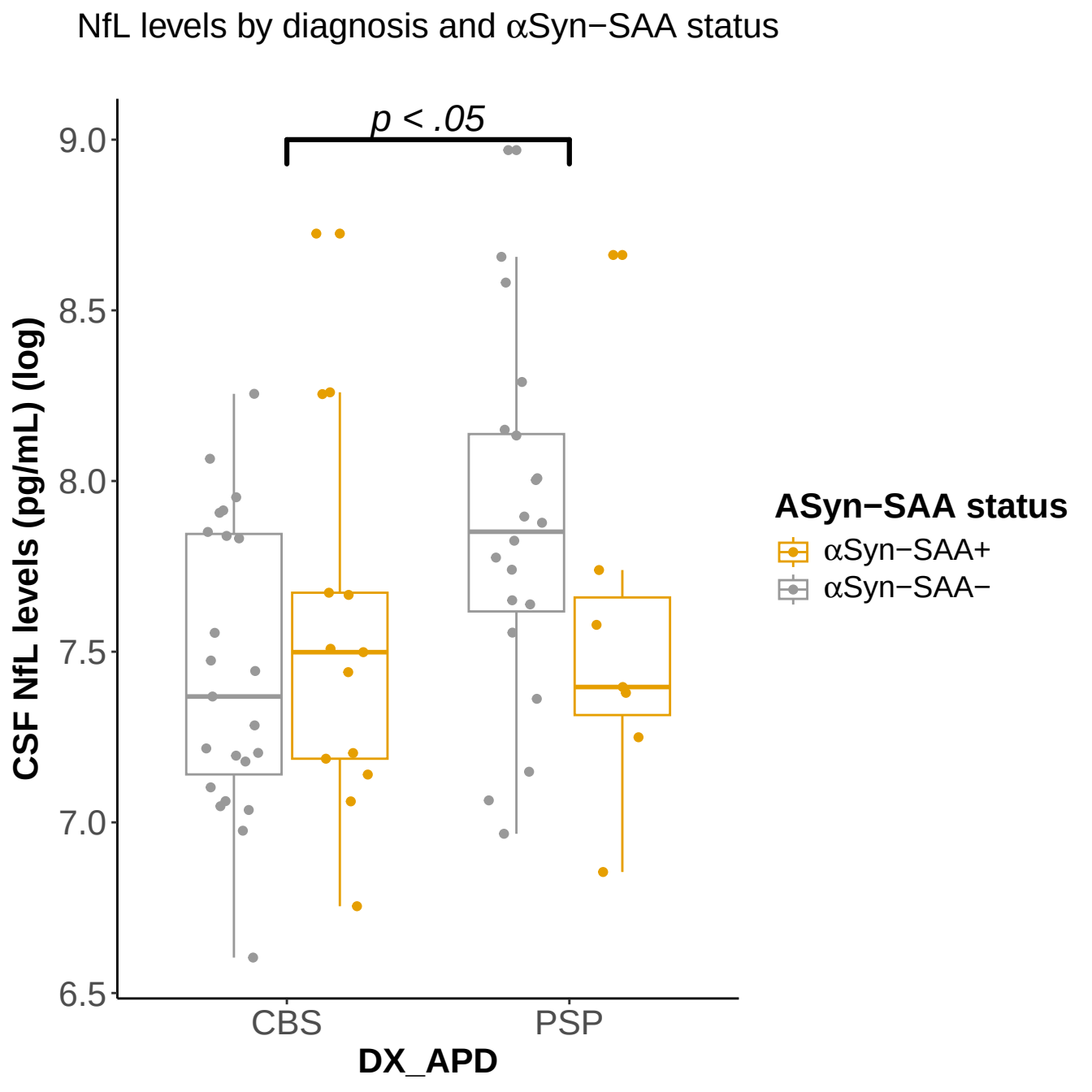

Scale−Location
√|Standardized residuals|
Fitted values
57
37
55
1.6
1.2
0.8
0.4
7.25
7.50
7.75
8.00


Cook's distance
Cook's distance
Obs. Number
8
37
57
0.20
0.15
0.10
0.05
0.00
0
20
40
60

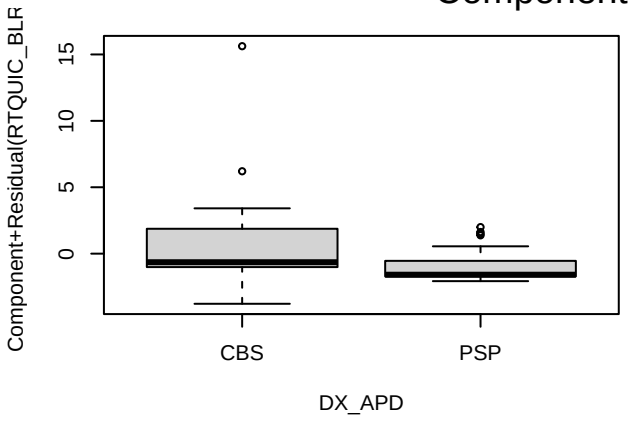

Residuals vs Leverage
Standardized Residuals
Leverage
57
37
8
2
1
0
−1
−2
0.00
0.05
0.10
0.15
0.20

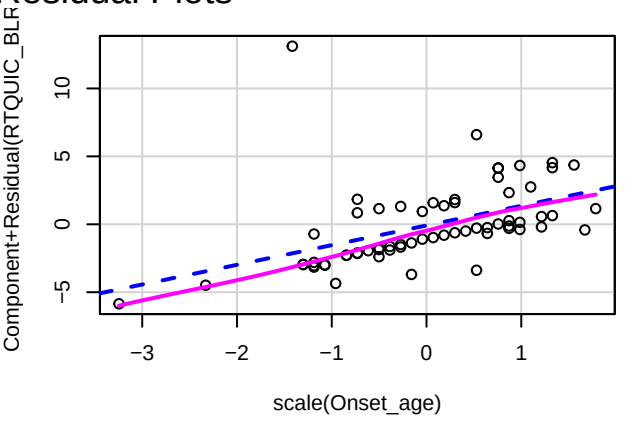

Cook's dist vs Leverage
Cook's distance
Leverage
8
57
37
0.20
0.15
0.10
0.05
0.00
0.00
0.05
0.10
0.15
0.20

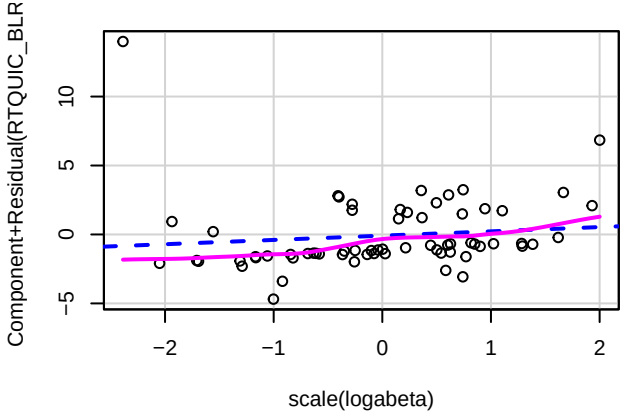

Linear relationship between Aβ42 and NfL
y = 7.3 + 0.00077 x
p < .05
CSF NfL levels (pg/mL) (log)
9.0
8.5
8.0
7.5
7.0
6.5
300
600
900
CSF Aβ42 levels (pg/mL)
Diagnosis
CBS
PSP
ASyn−SAA status
αSyn−SAA+
αSyn−SAA−

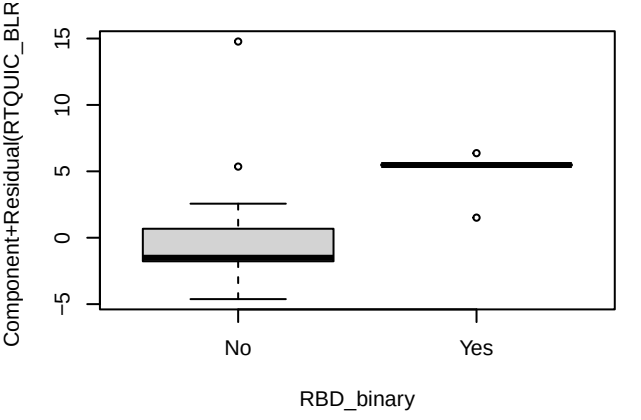

NfL levels by diagnosis and αSyn−SAA status
p < .05
9.0
8.5
8.0
7.5
7.0
6.5
CSF NfL levels (pg/mL) (log)
CBS
PSP
DX_APD
ASyn−SAA status
αSyn−SAA+
αSyn−SAA−

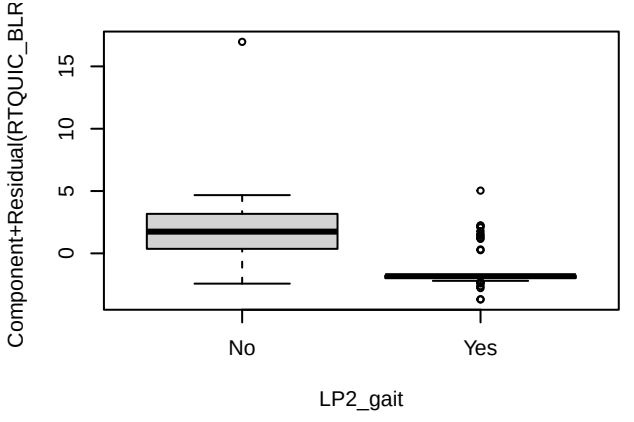
Component + Residual Plots

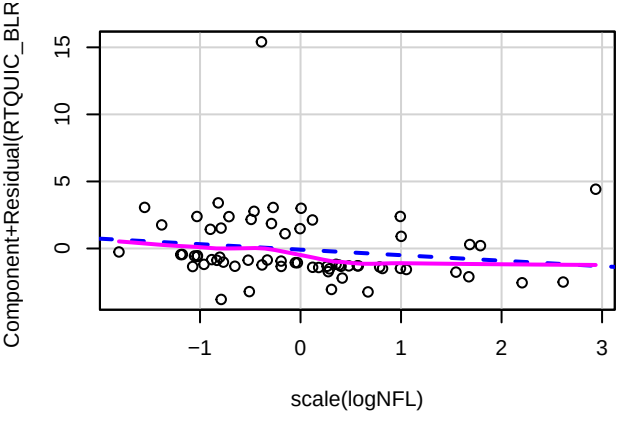


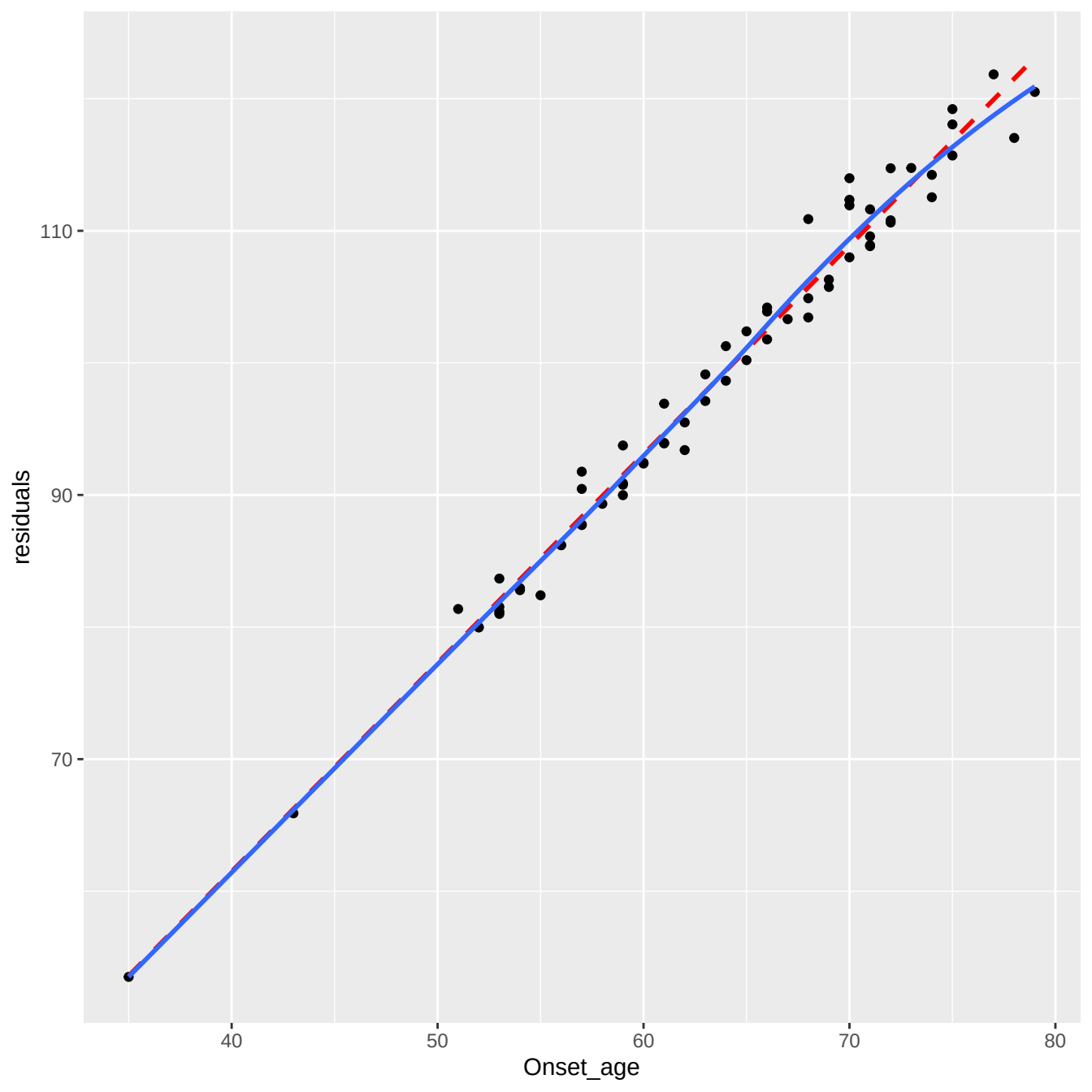


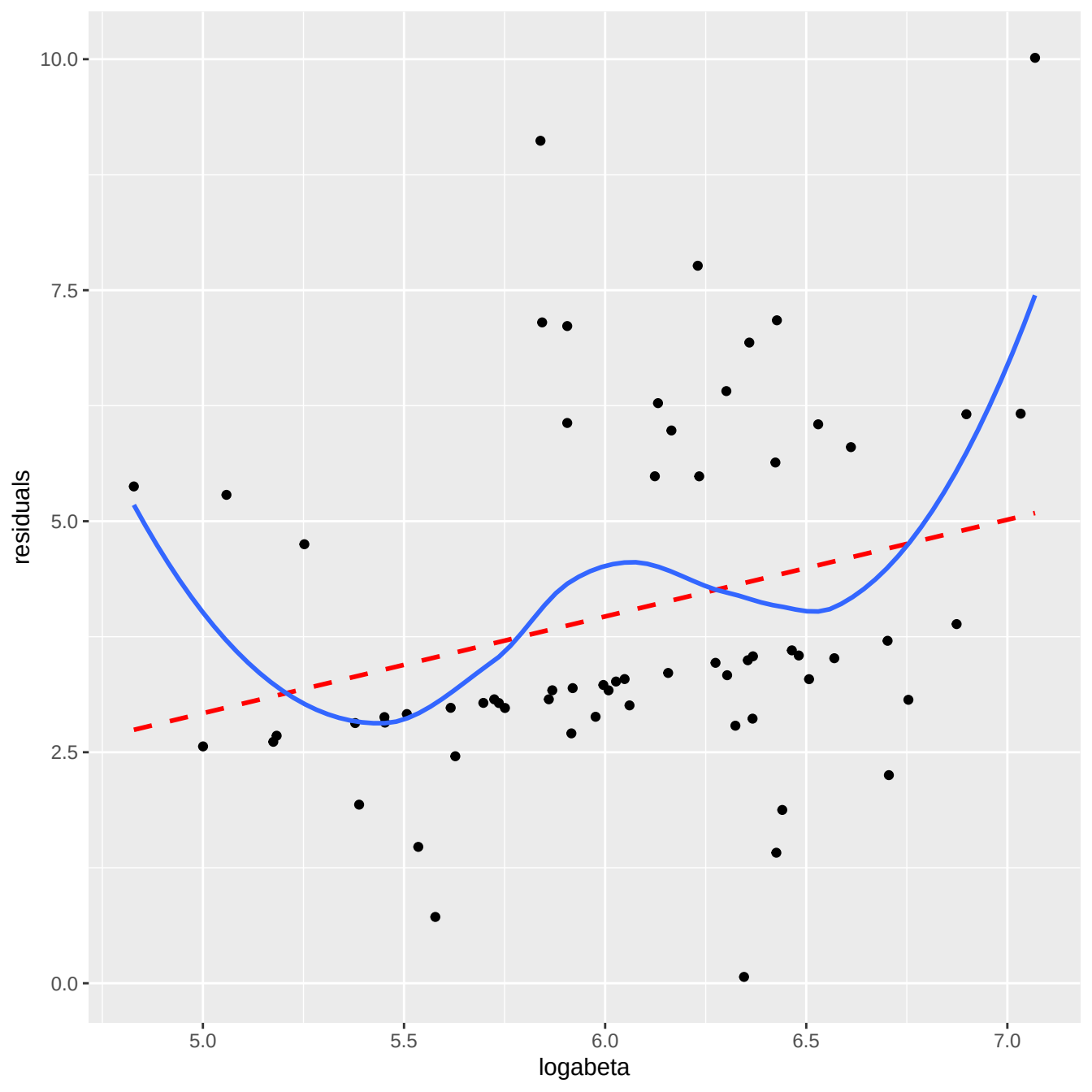


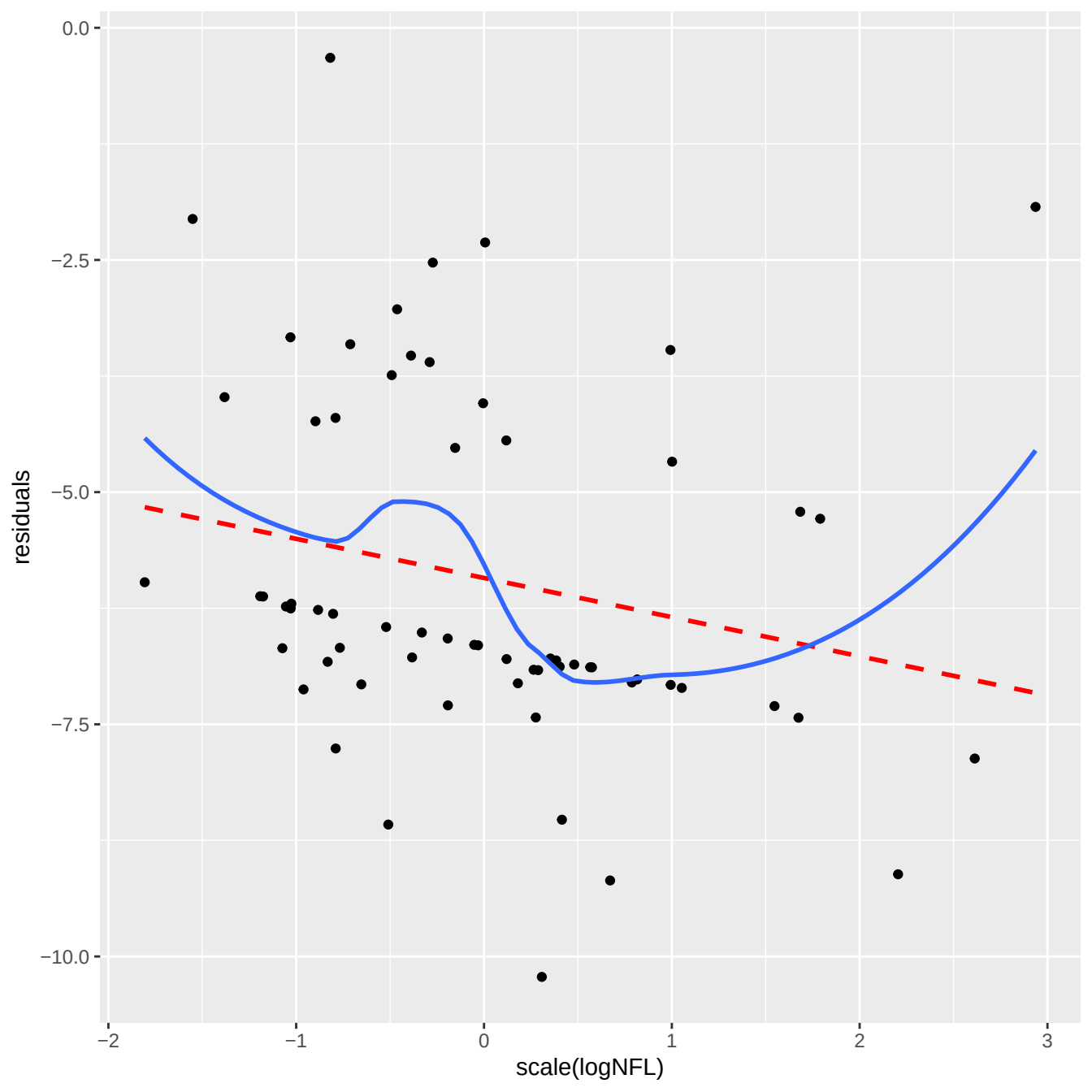


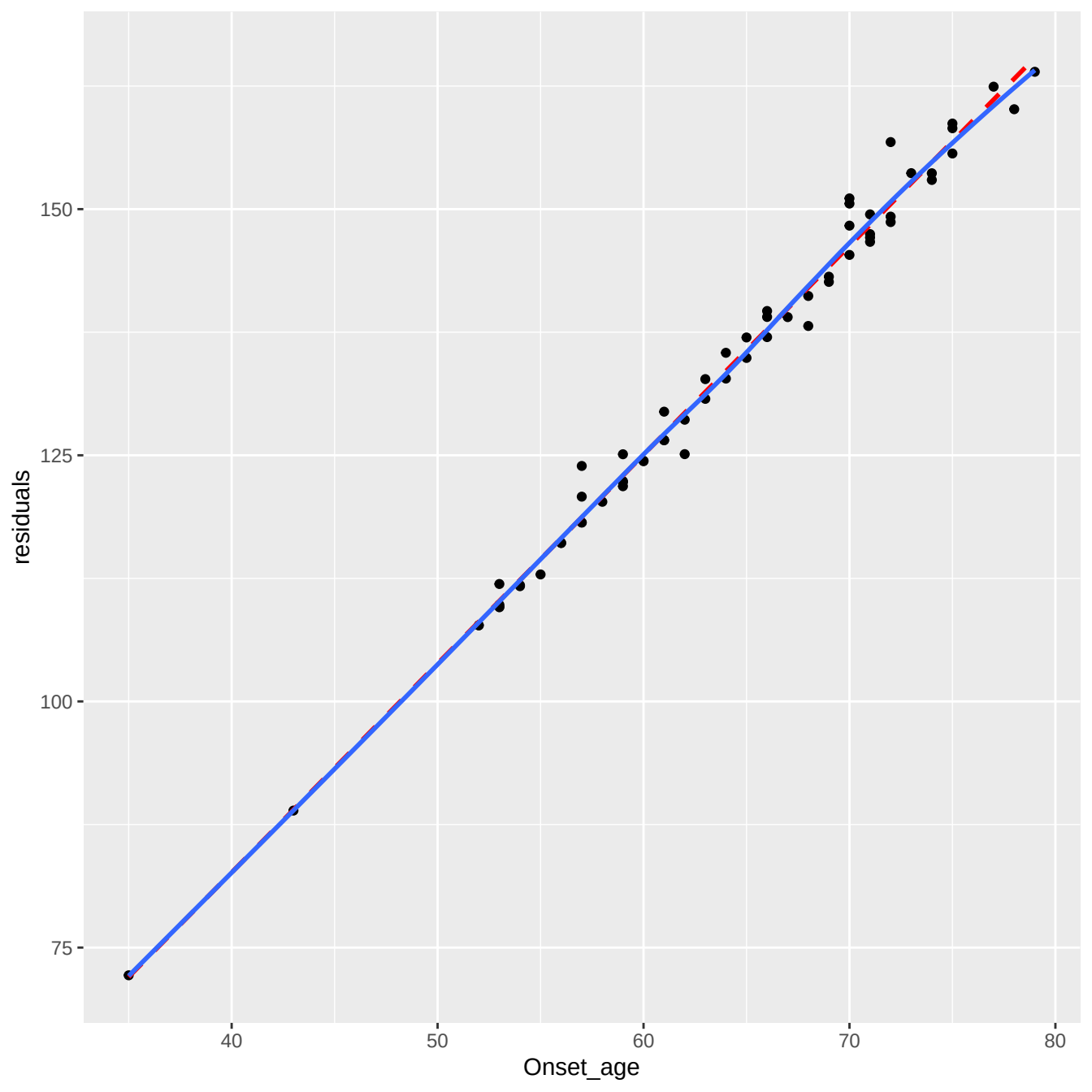


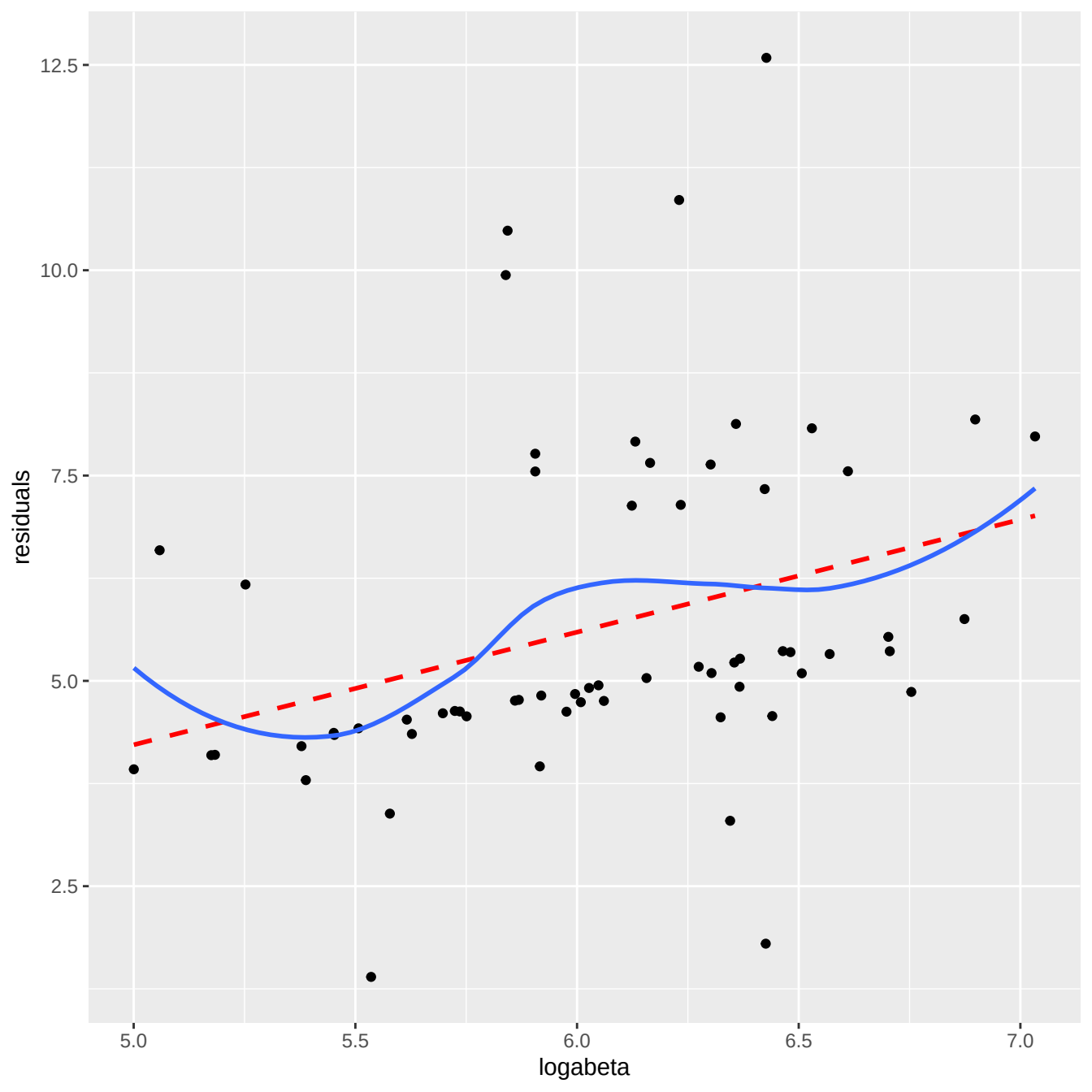


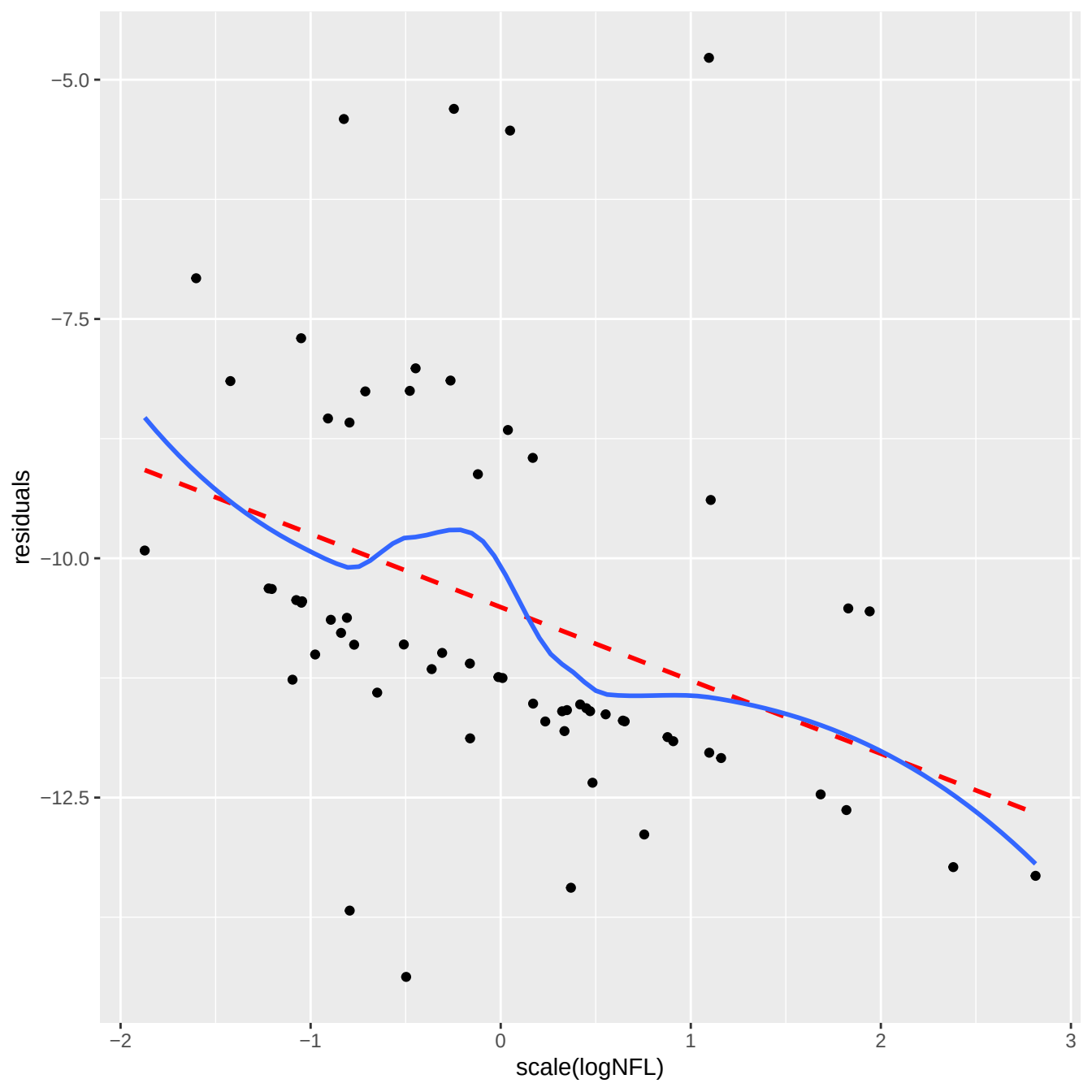

residuals
110
90
70
40
50
60
70
80
Onset_age

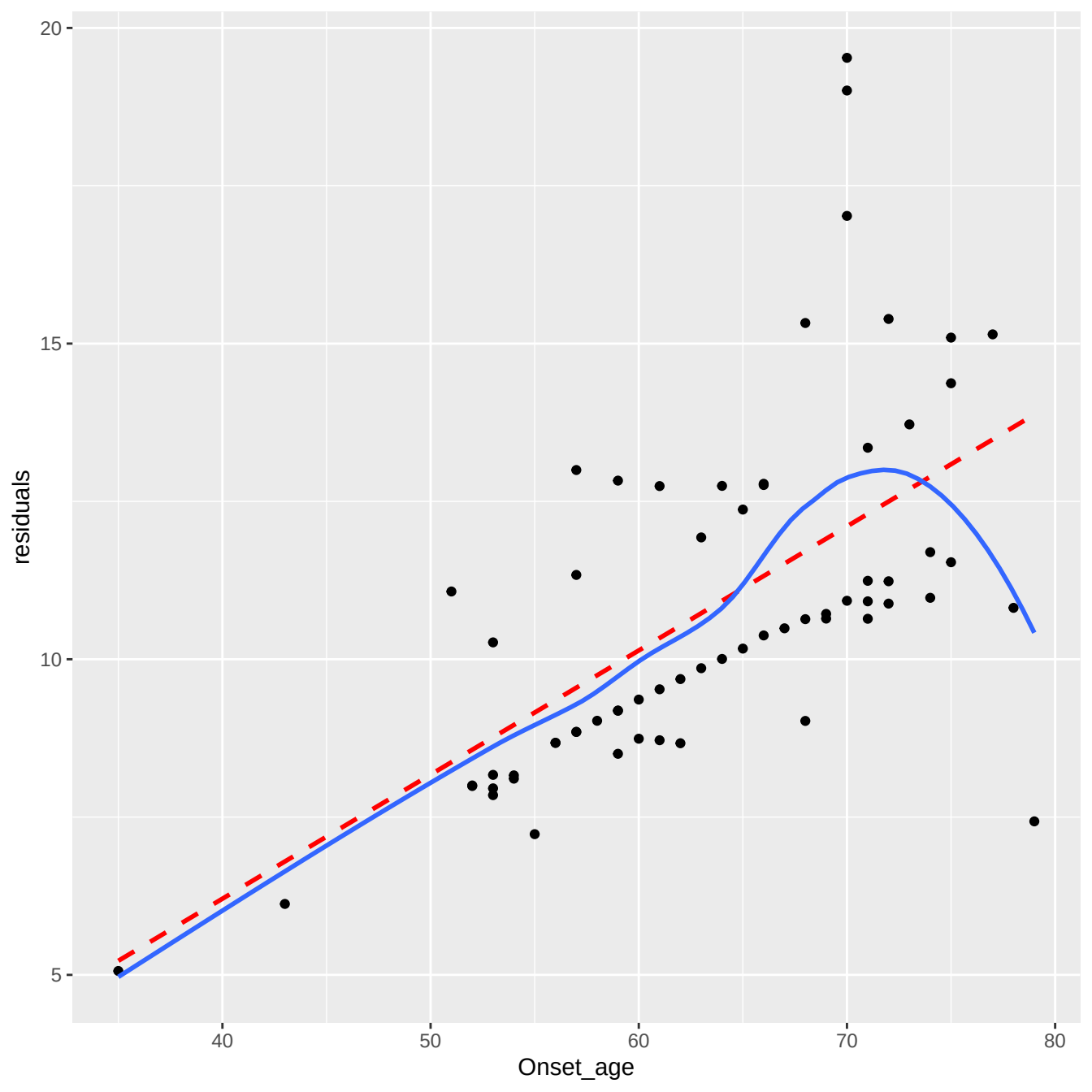

10.0
7.5
5.0
2.5
0.0
residuals
5.0
5.5
6.0
6.5
7.0
logabeta

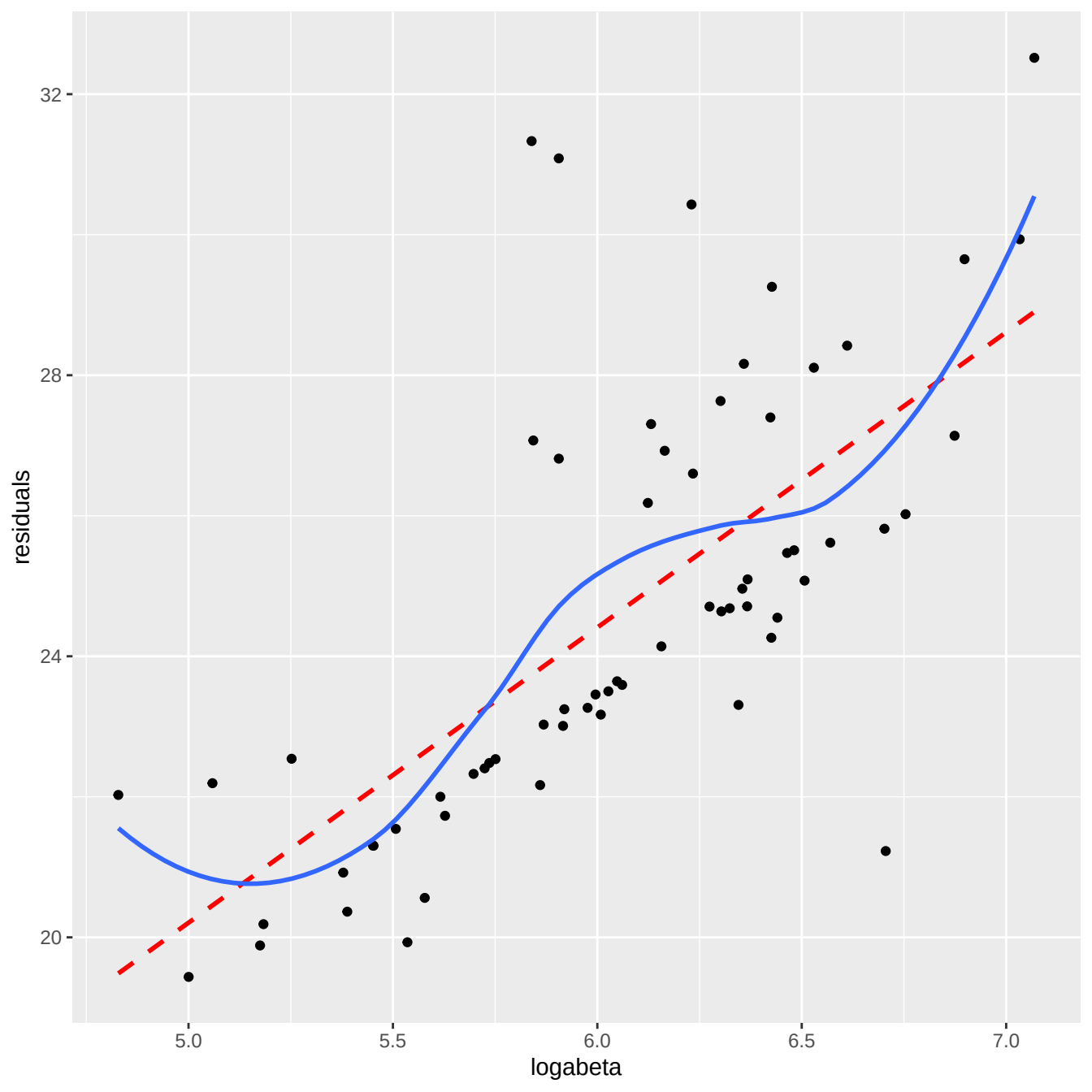

0.0
−2.5
−5.0
−7.5
−10.0
residuals
−2
−1
0
1
2
3
scale(logNFL)

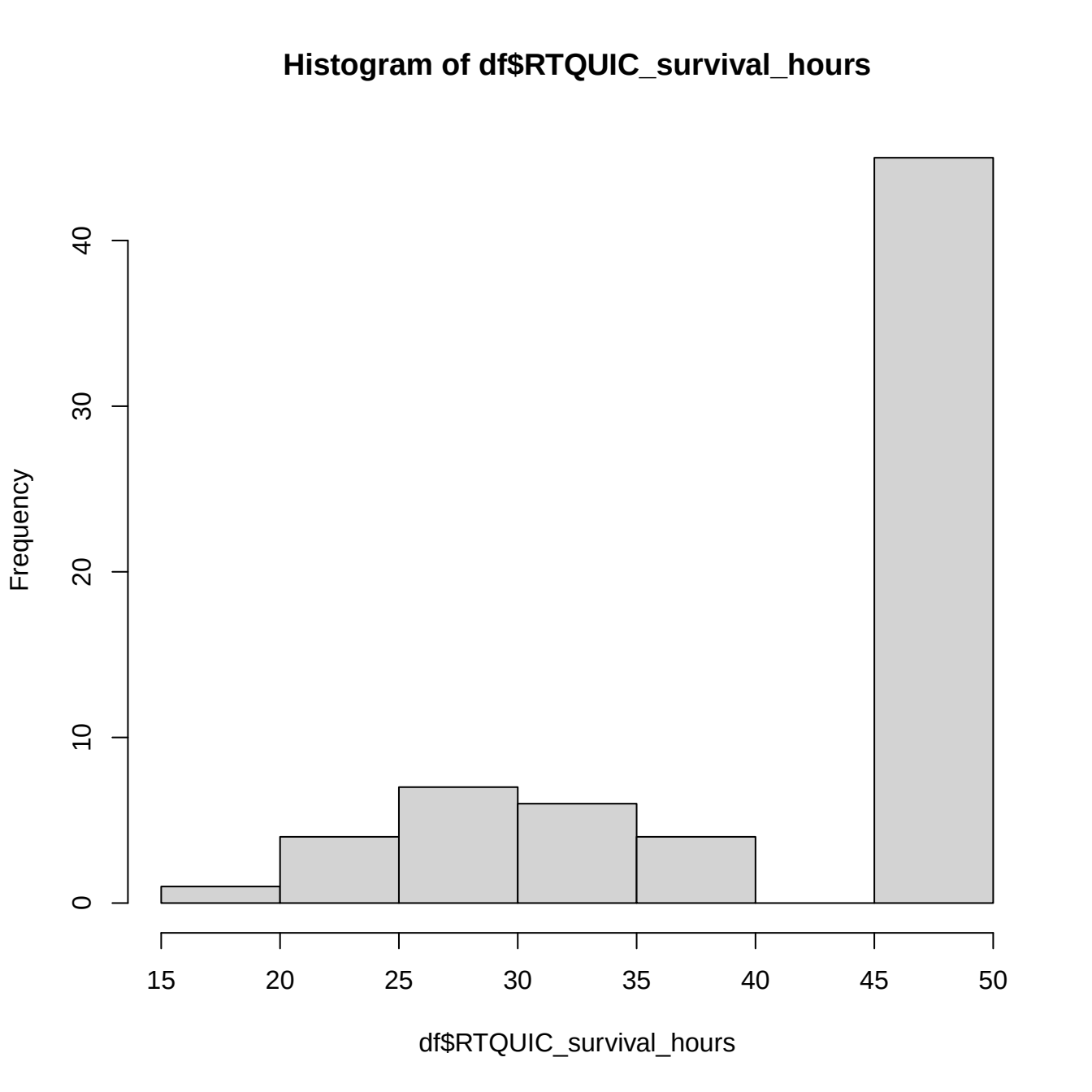

residuals
150
125
100
75
40
50
60
70
80
Onset_age

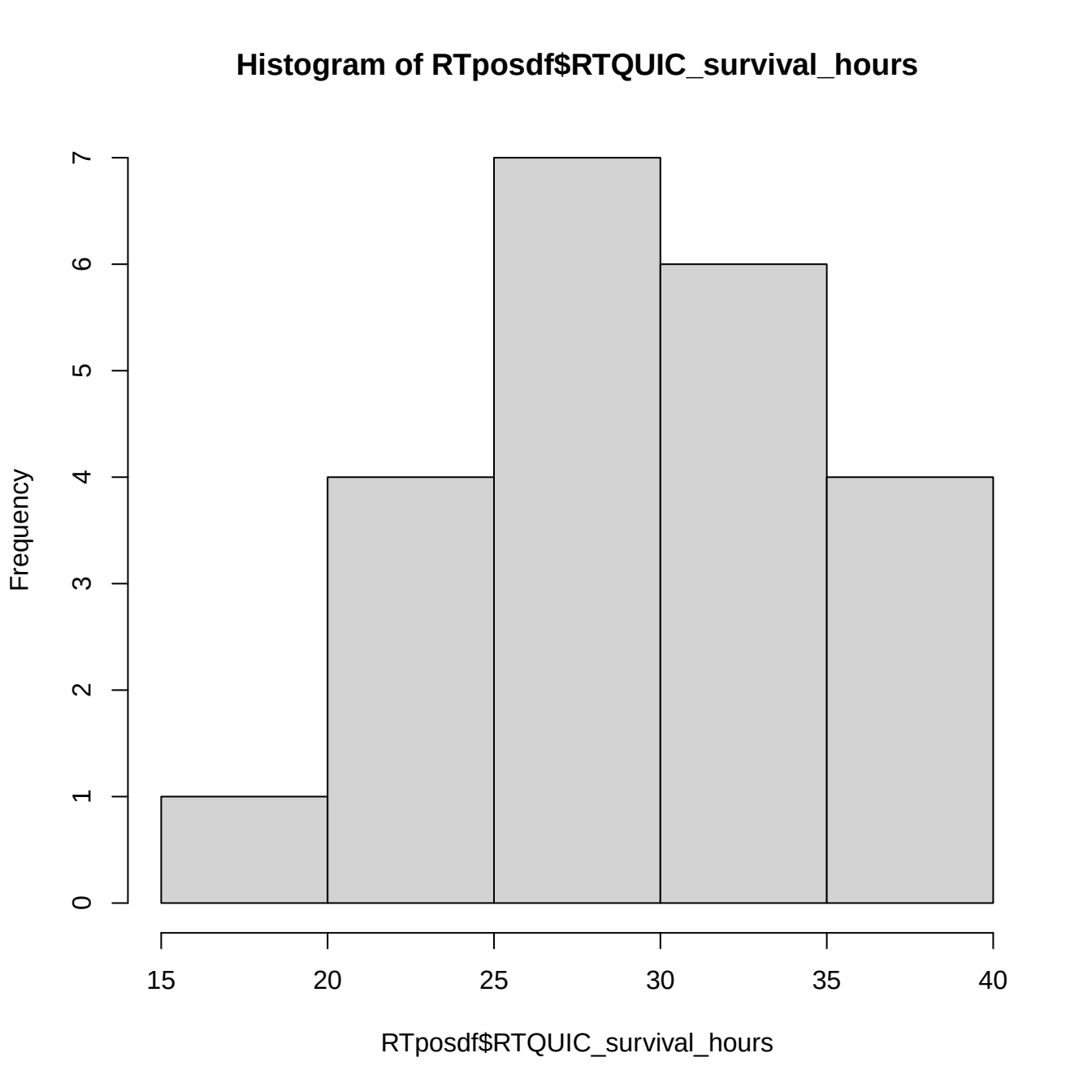

12.5
10.0
7.5
5.0
2.5
residuals
5.0
5.5
6.0
6.5
7.0
logabeta

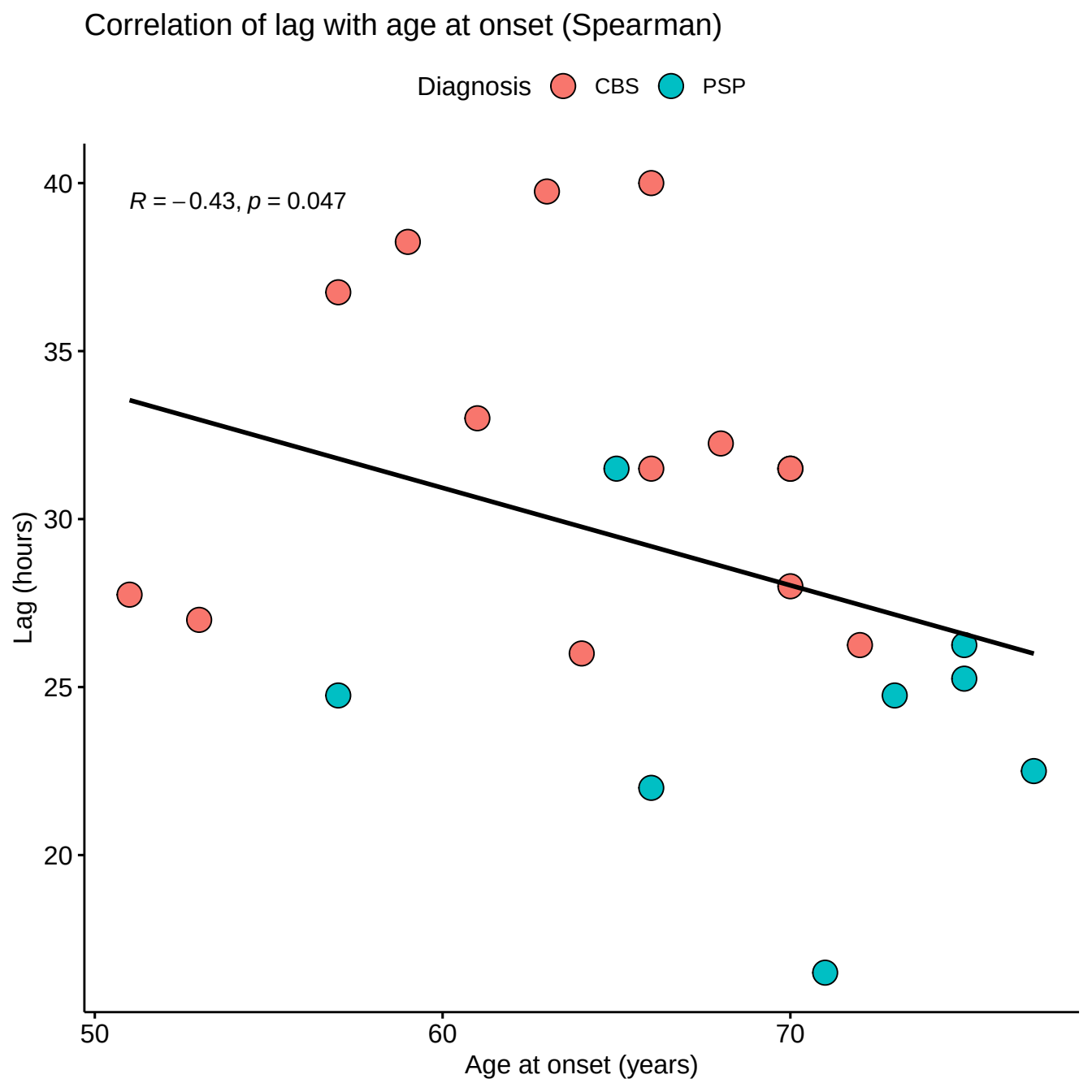

−5.0
−7.5
−10.0
−12.5
residuals
−2
−1
0
1
2
3
scale(logNFL)

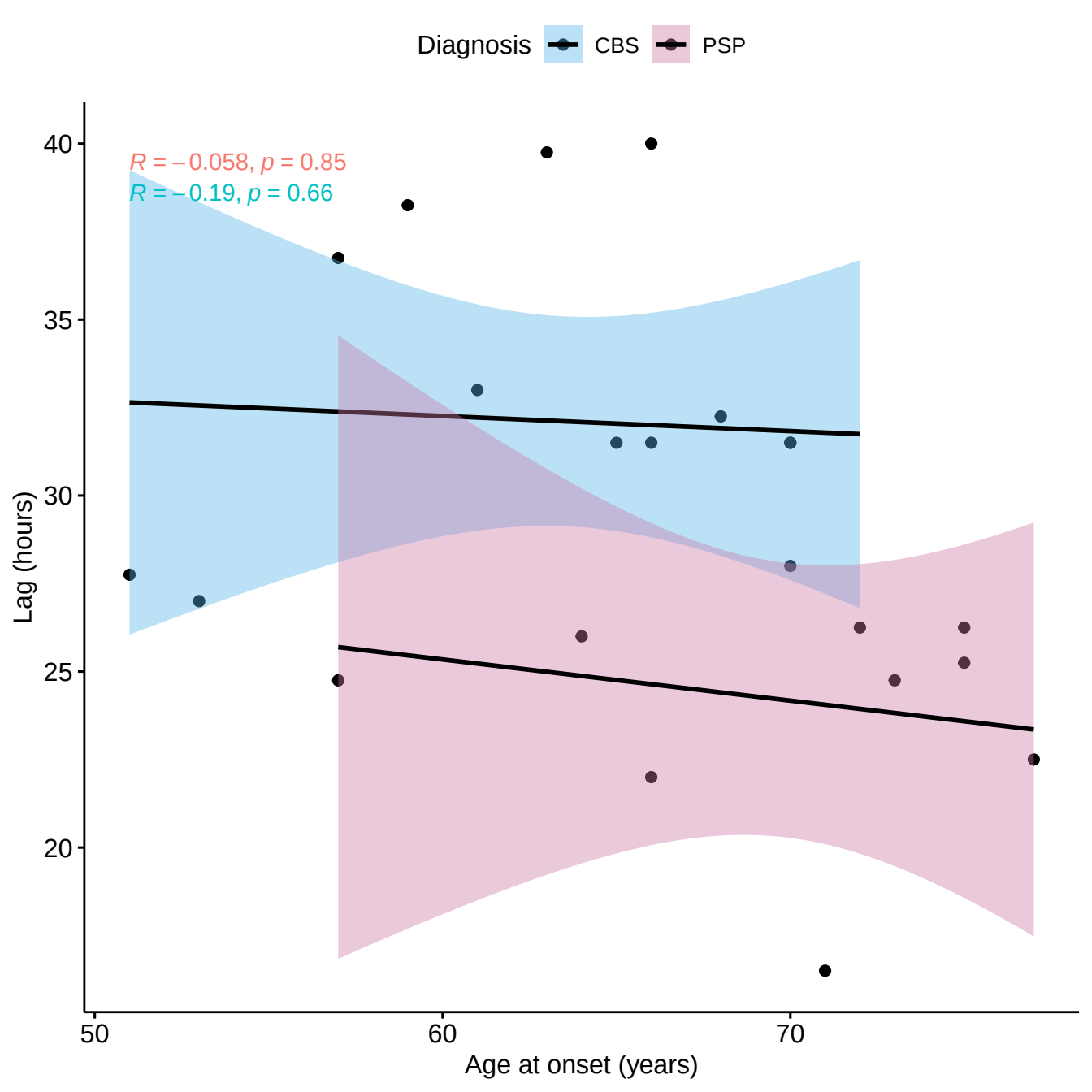

20
15
10
5
residuals
40
50
60
70
80
Onset_age

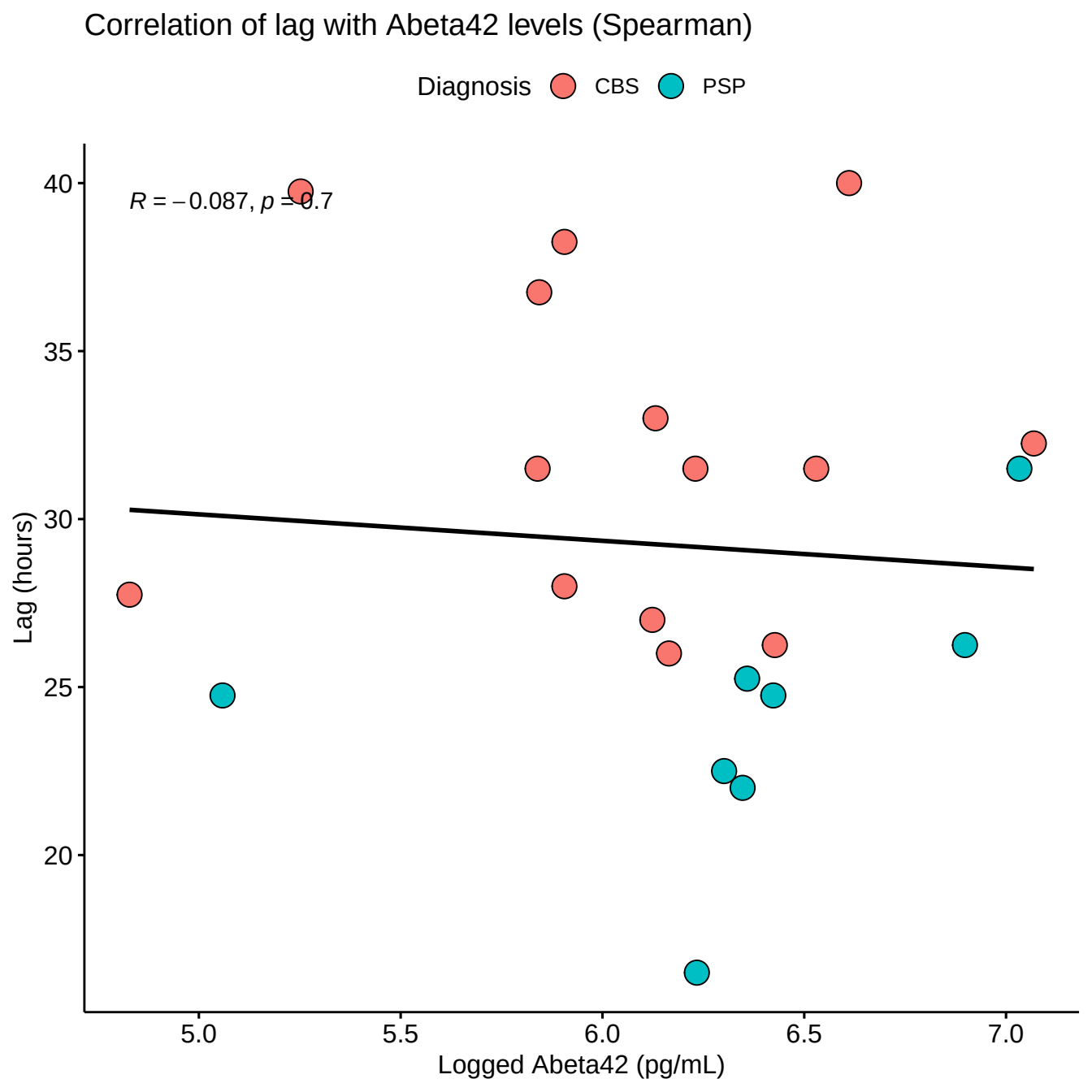

residuals
32
28
24
20
5.0
5.5
6.0
6.5
7.0
logabeta

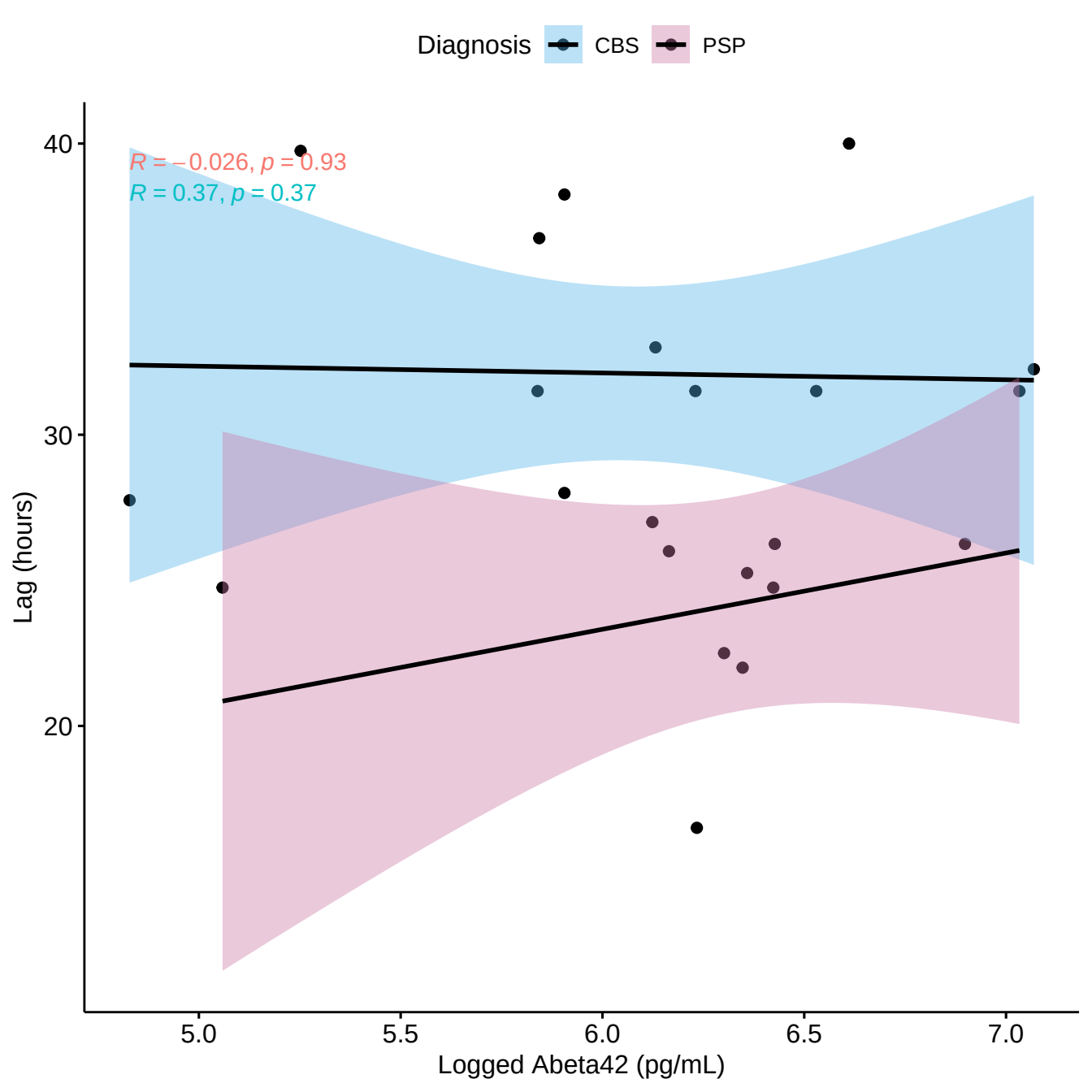

Histogram of df$RTQUIC_survival_hours
Frequency
0
10
20
30
40
15
20
25
30
35
40
45
50
df$RTQUIC_survival_hours

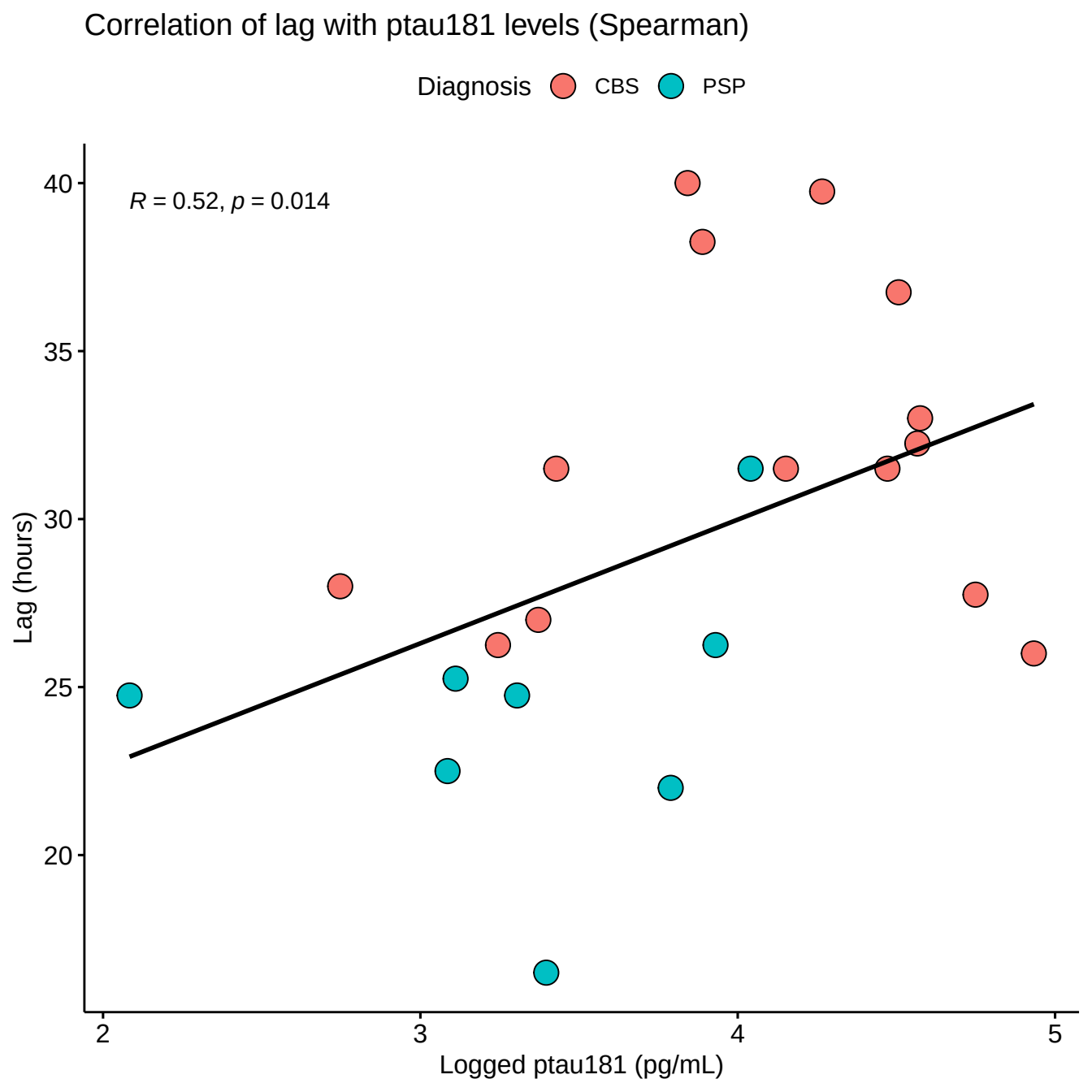

Histogram of RTposdf$RTQUIC_survival_hours
Frequency
0
1
2
3
4
5
6
7
15
20
25
30
35
40
RTposdf$RTQUIC_survival_hours

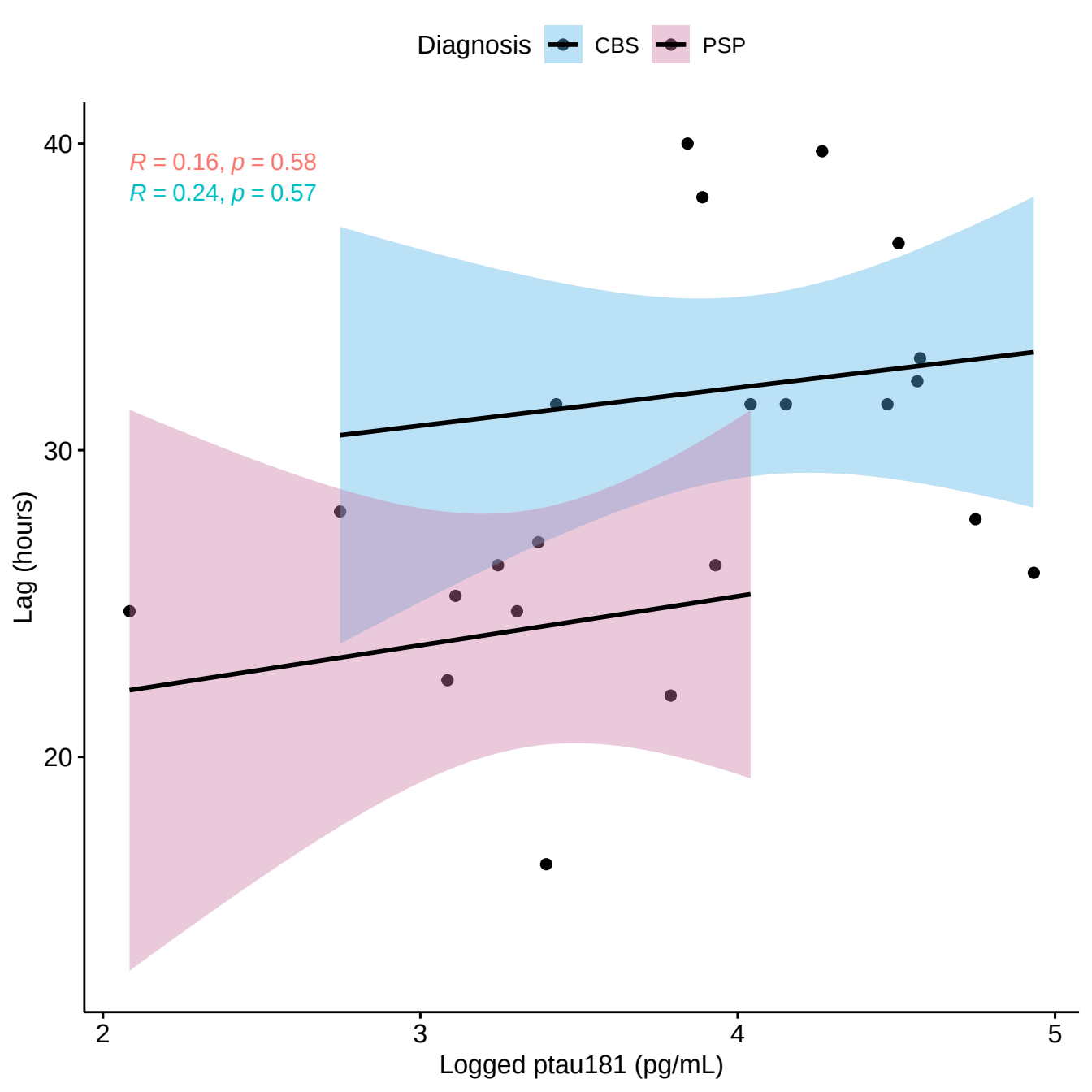

Correlation of lag with age at onset (Spearman)
Diagnosis
CBS
PSP
R = −0.43, p = 0.047
Lag (hours)
40
35
30
25
20
50
60
70
Age at onset (years)

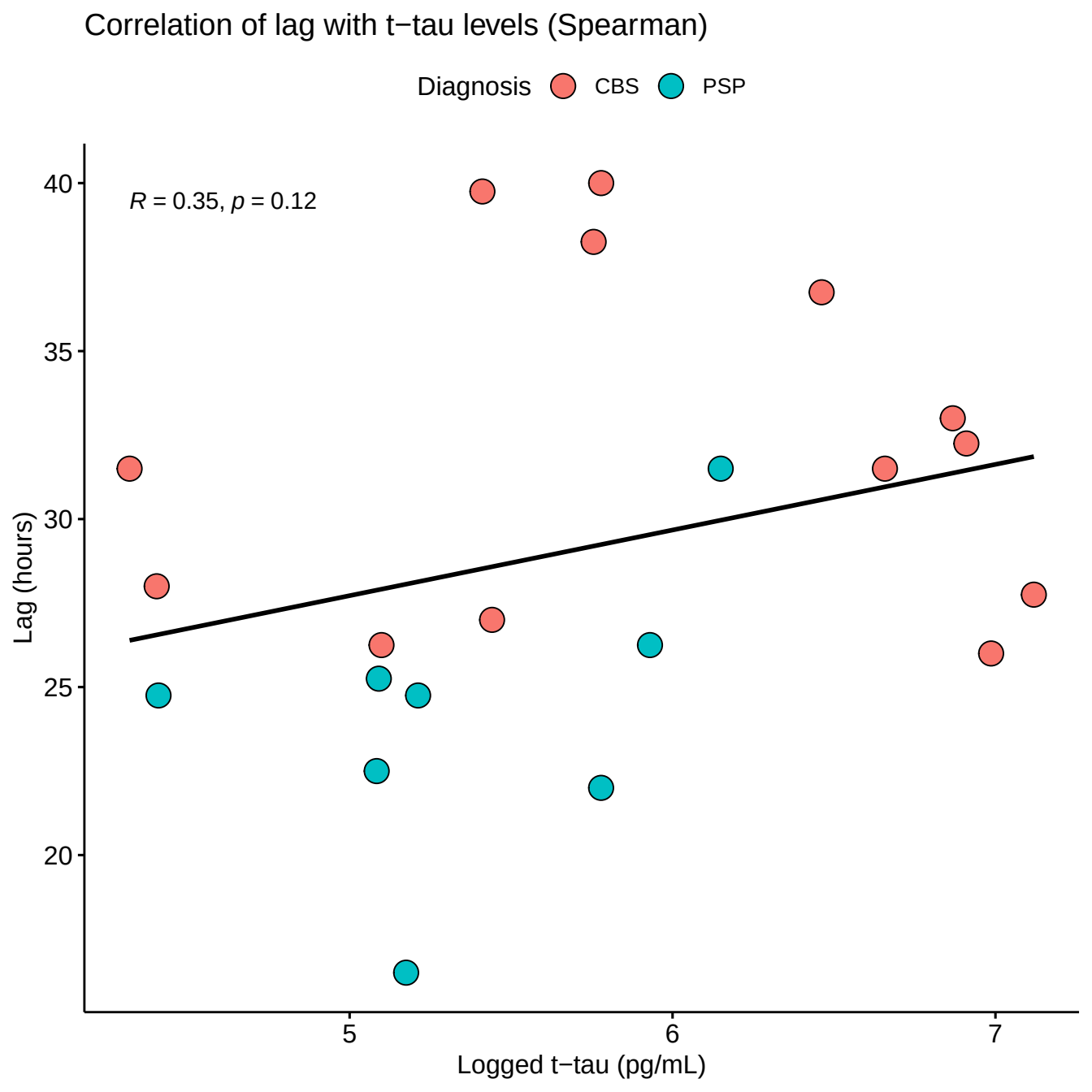

Diagnosis
CBS
PSP
R = −0.058, p = 0.85
R = −0.19, p = 0.66
40
35
30
25
20
Lag (hours)
50
60
70
Age at onset (years)

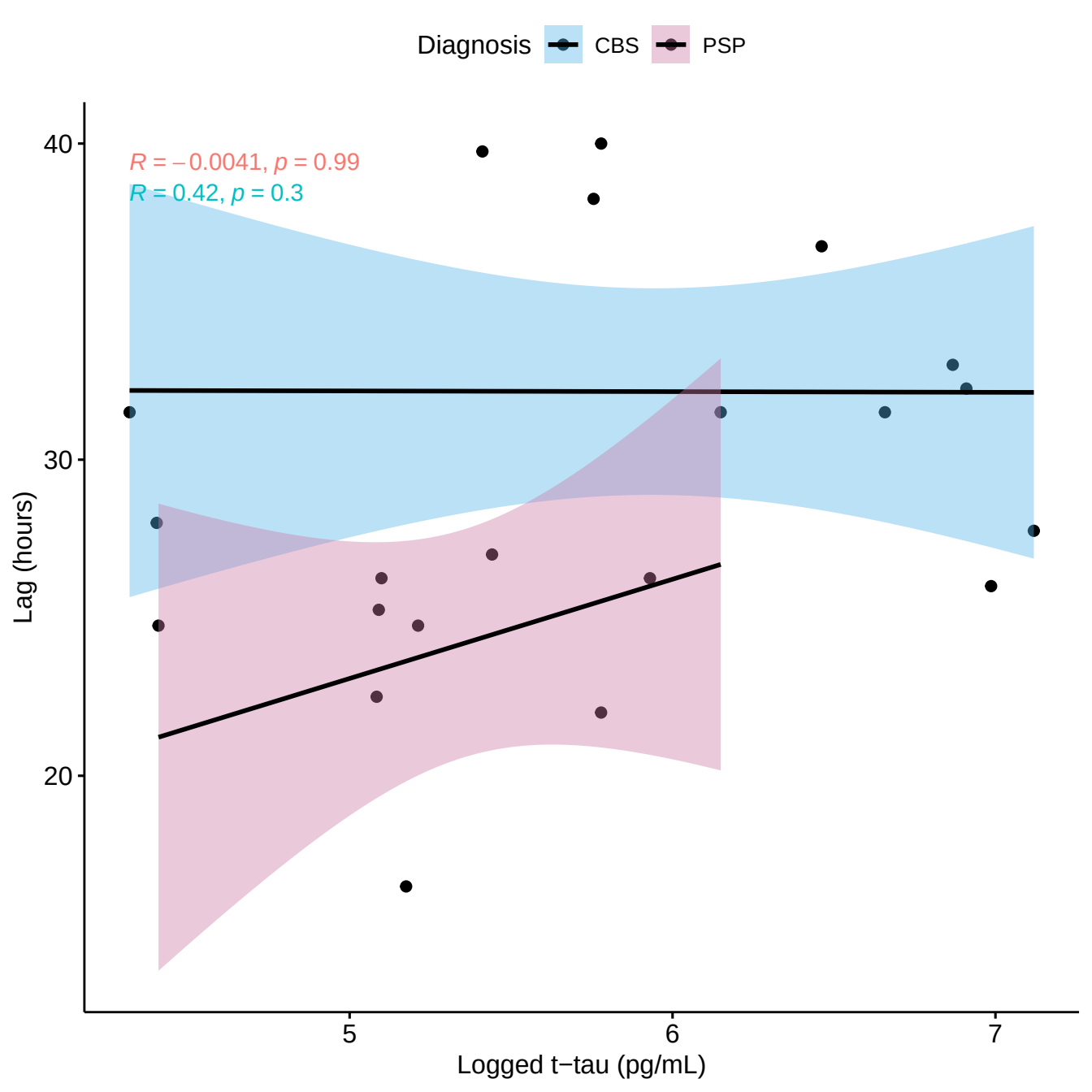

Correlation of lag with Abeta42 levels (Spearman)
Diagnosis
CBS
PSP
R = −0.087, p = 0.7
Lag (hours)
40
35
30
25
20
5.0
5.5
6.0
6.5
7.0
Logged Abeta42 (pg/mL)

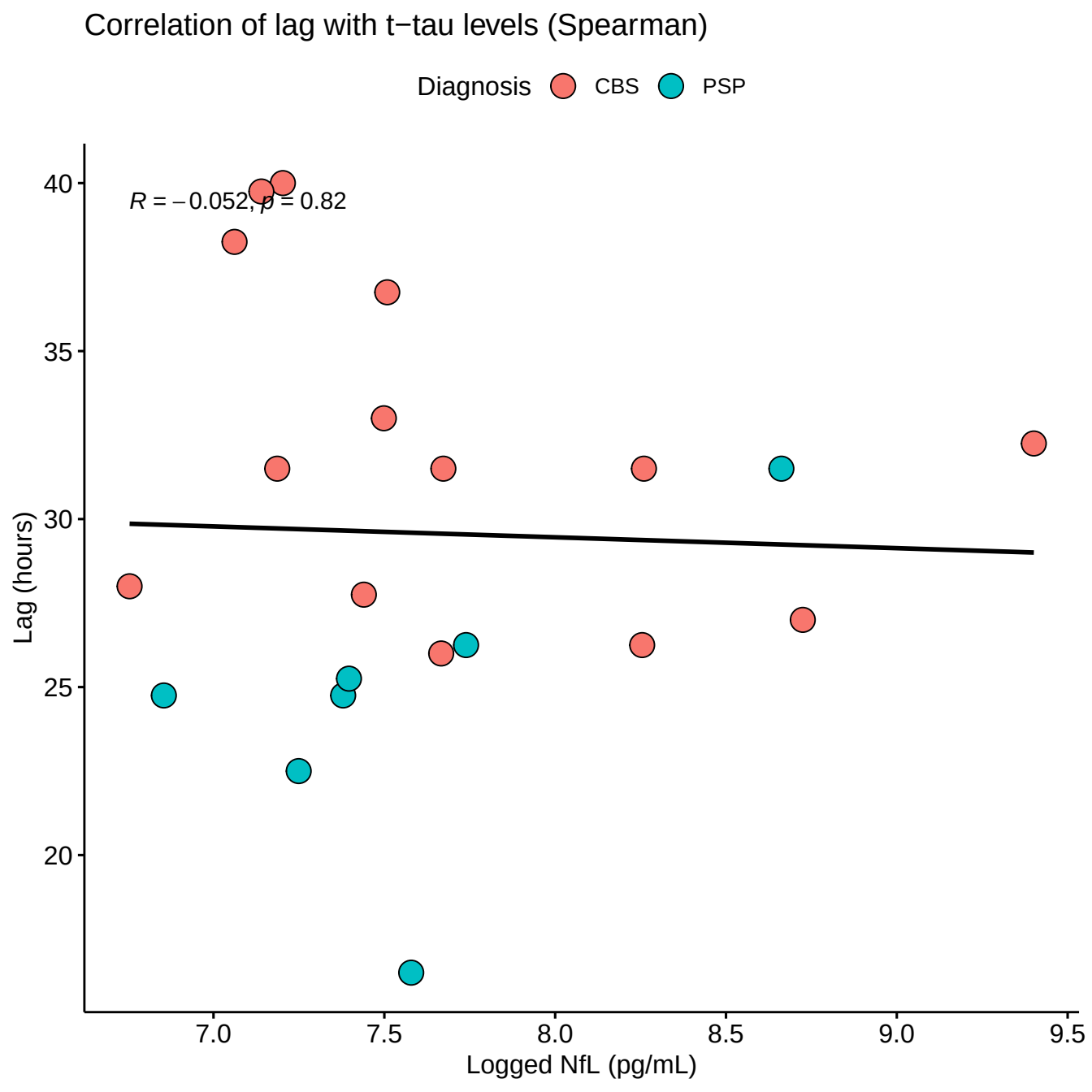

Diagnosis
CBS
PSP
R = −0.026, p = 0.93
R = 0.37, p = 0.37
40
30
20
Lag (hours)
5.0
5.5
6.0
6.5
7.0
Logged Abeta42 (pg/mL)

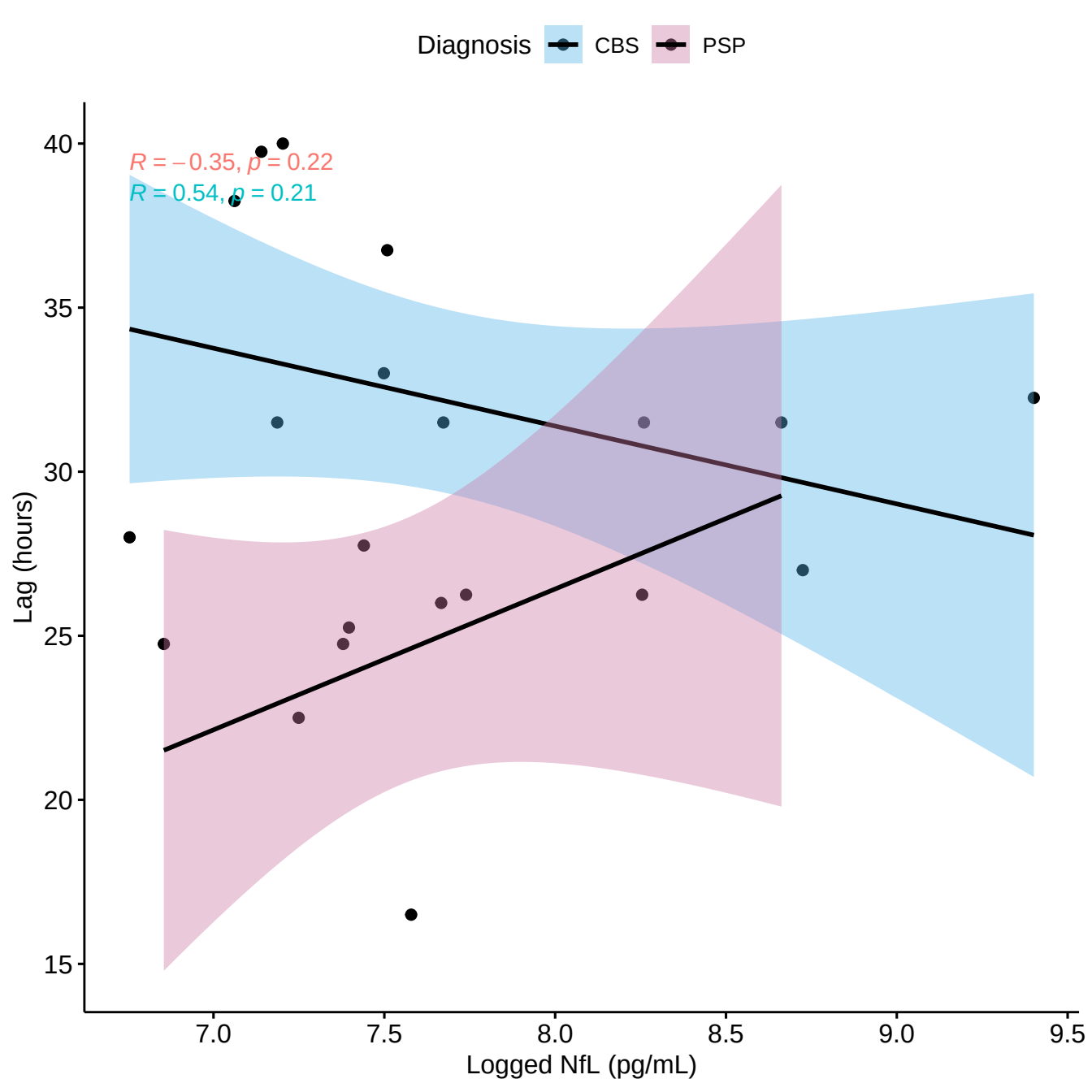

Correlation of lag with ptau181 levels (Spearman)
Diagnosis
CBS
PSP
R = 0.52, p = 0.014
Lag (hours)
40
35
30
25
20
2
3
4
5
Logged ptau181 (pg/mL)

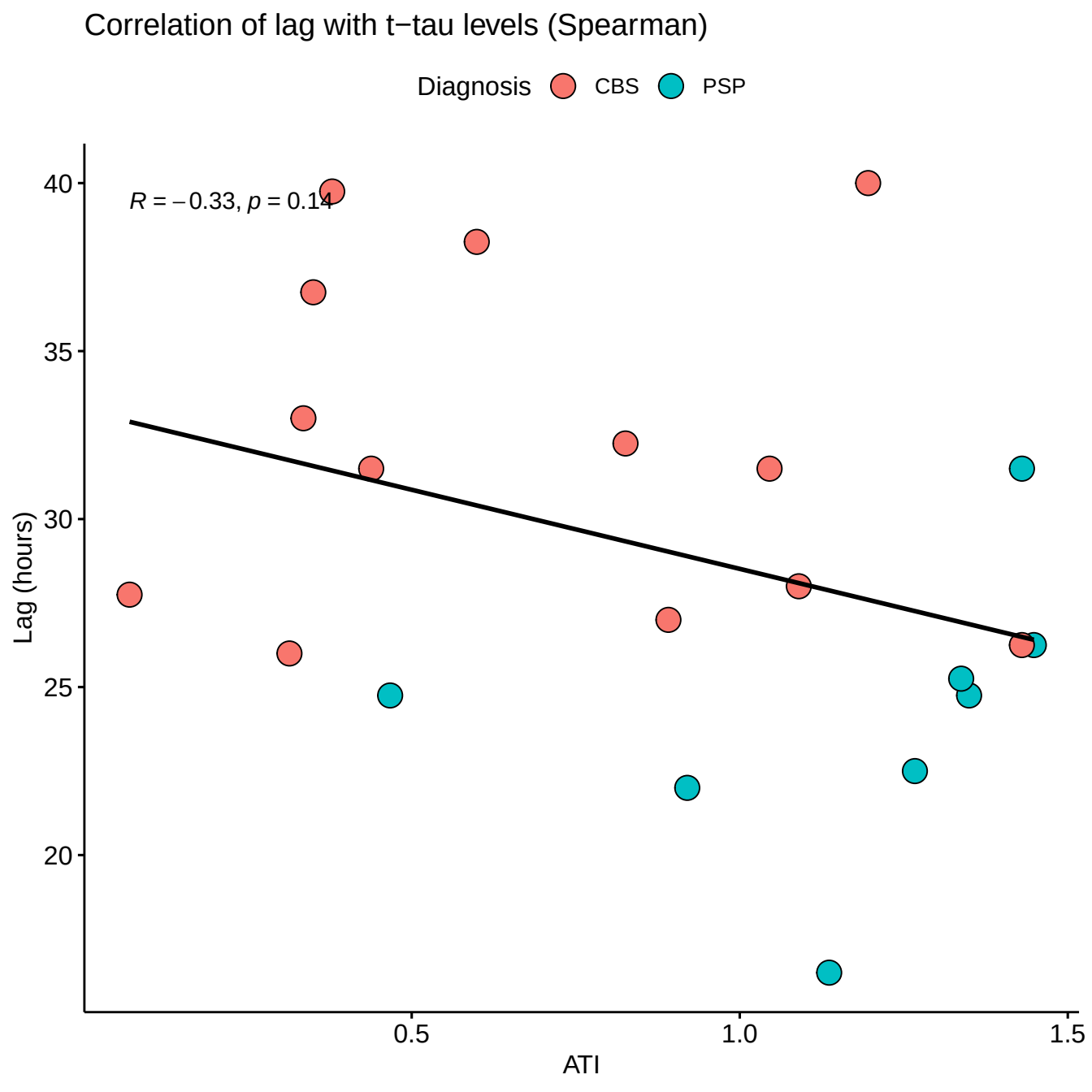

Diagnosis
CBS
PSP
R = 0.16, p = 0.58
R = 0.24, p = 0.57
40
30
20
Lag (hours)
2
3
4
5
Logged ptau181 (pg/mL)

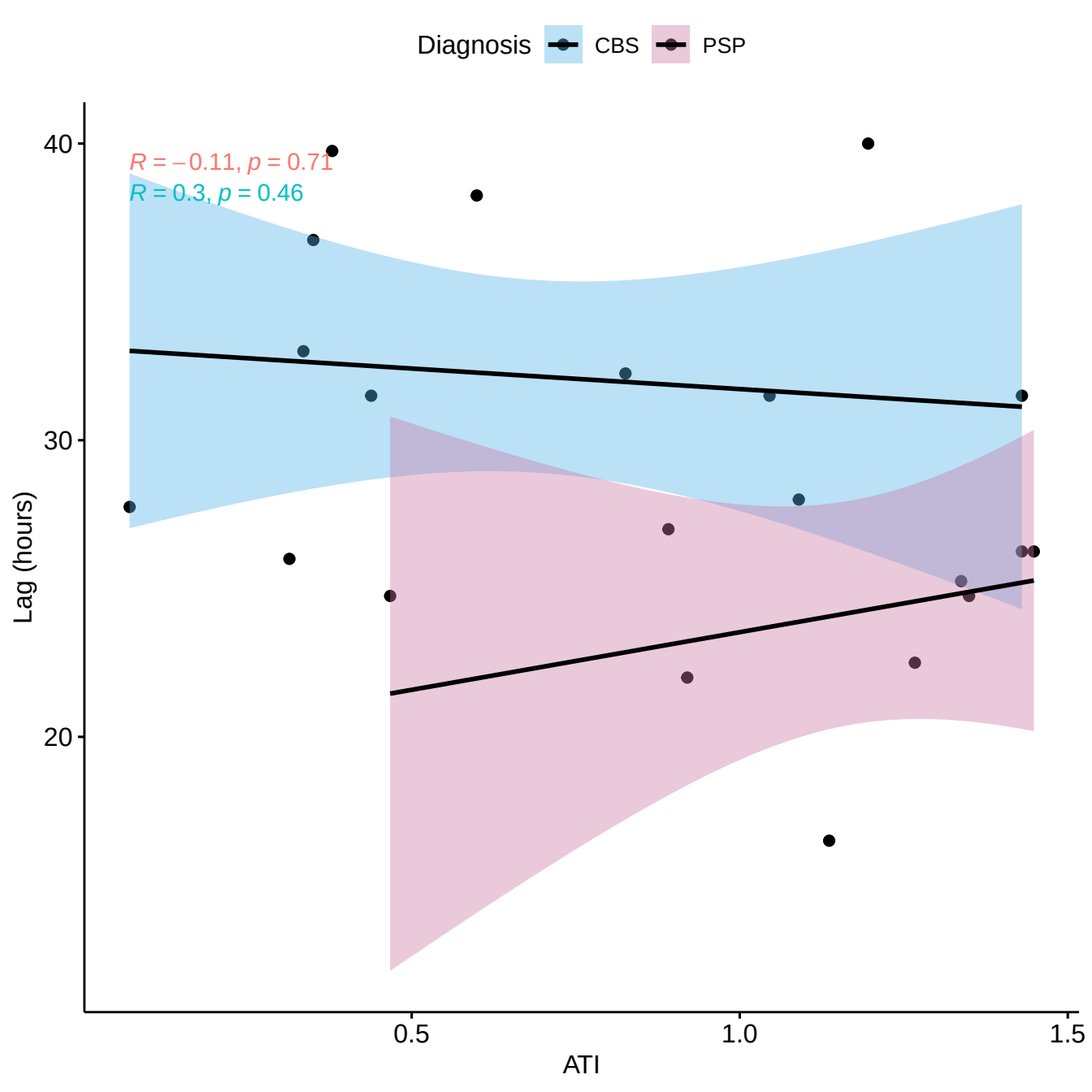

Correlation of lag with t−tau levels (Spearman)
Diagnosis
CBS
PSP
R = 0.35, p = 0.12
40
35
30
25
20
Lag (hours)
5
6
7
Logged t−tau (pg/mL)

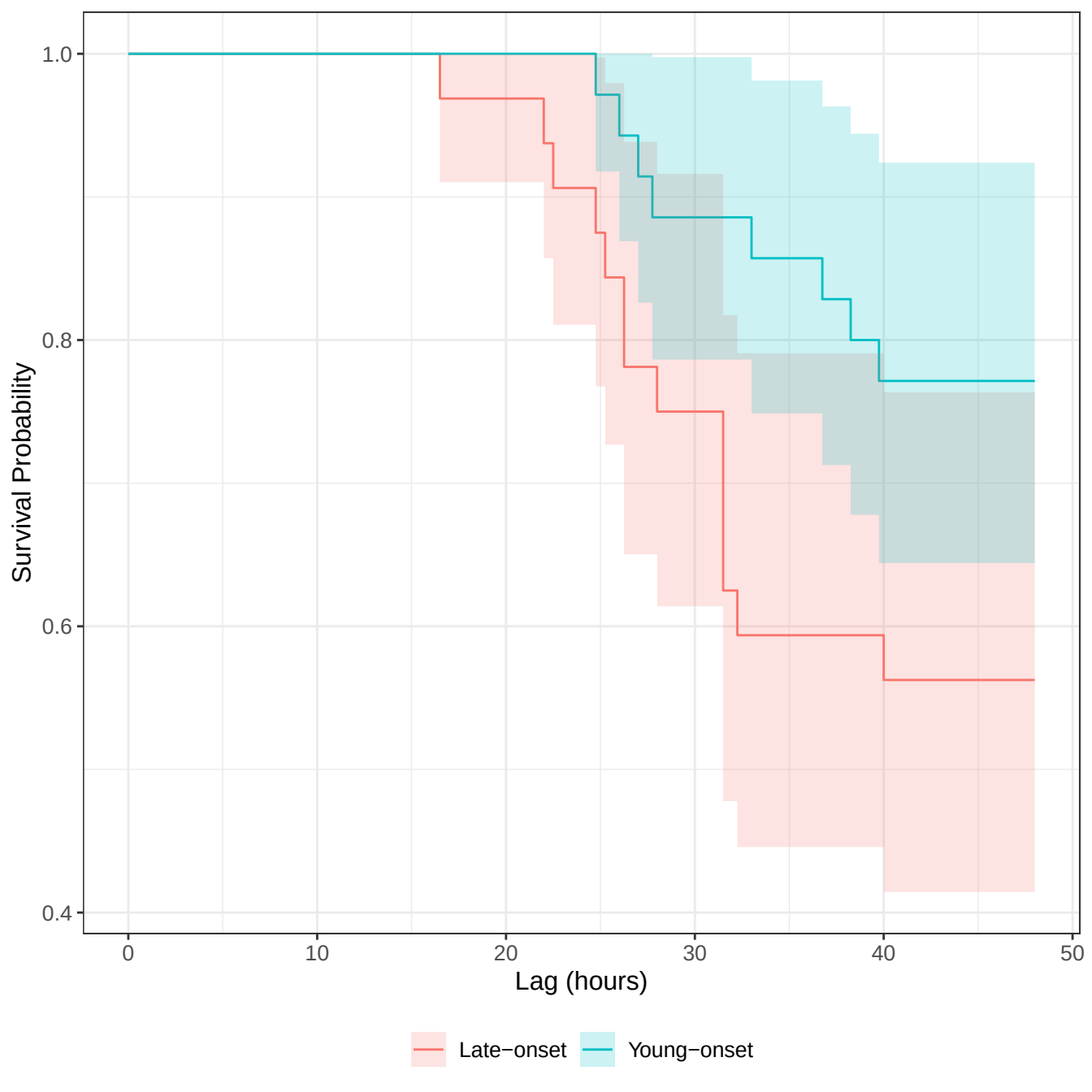

Diagnosis
CBS
PSP
R = −0.0041, p = 0.99
R = 0.42, p = 0.3
40
30
20
Lag (hours)
5
6
7
Logged t−tau (pg/mL)

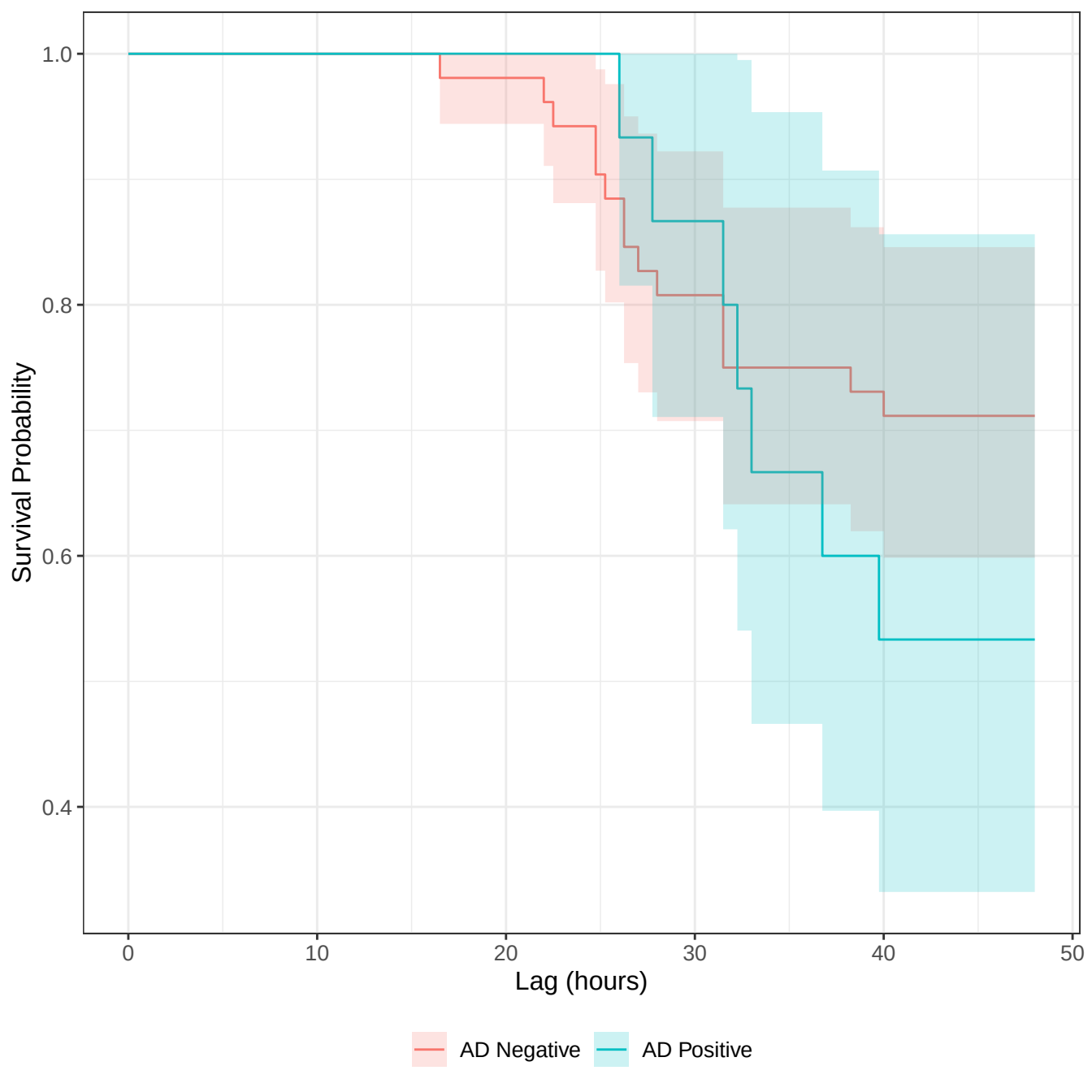

Correlation of lag with t−tau levels (Spearman)
Diagnosis
CBS
PSP
R = −0.052, p = 0.82
Lag (hours)
40
35
30
25
20
7.0
7.5
8.0
8.5
9.0
9.5
Logged NfL (pg/mL)

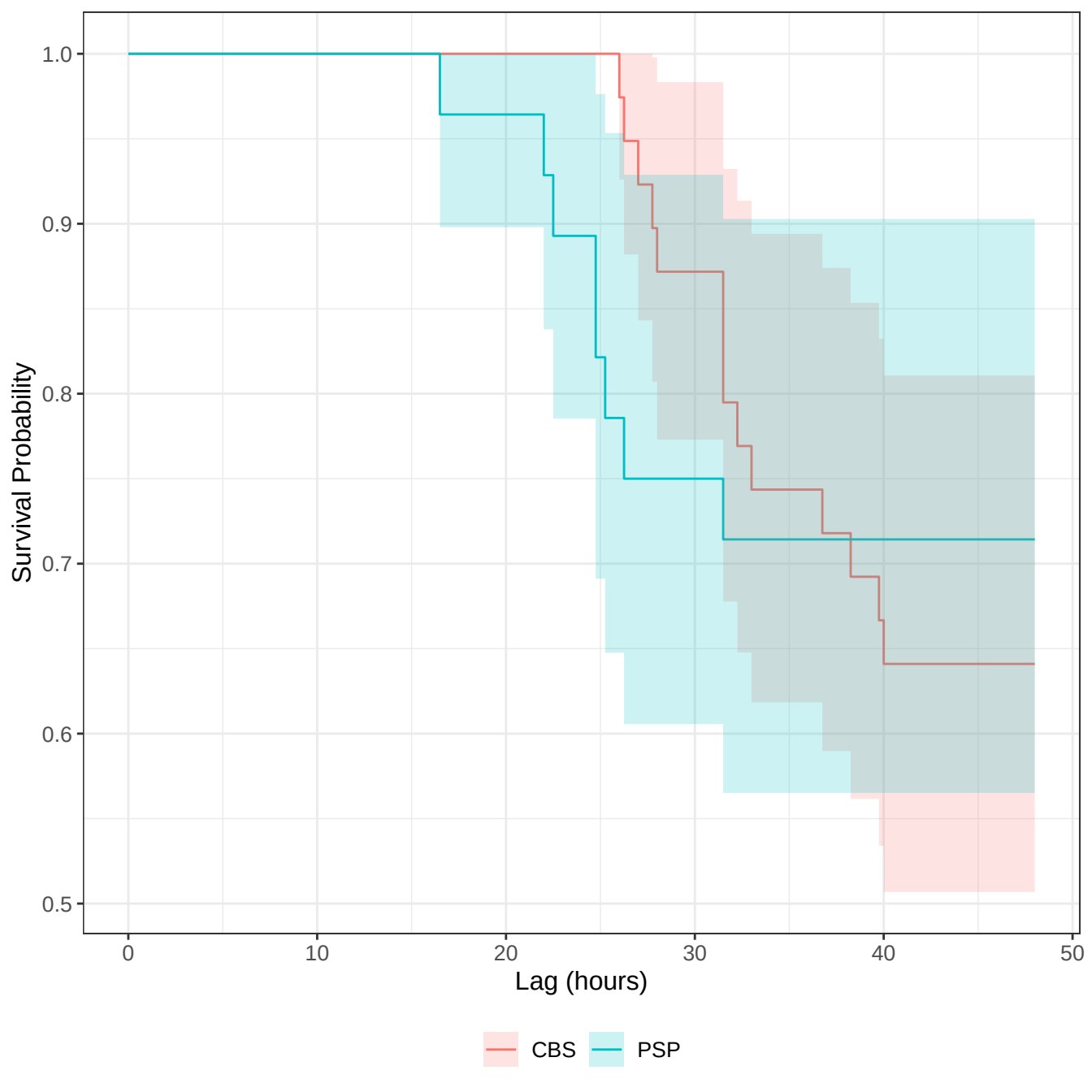

Diagnosis
CBS
PSP
R = −0.35, p = 0.22
R = 0.54, p = 0.21
40
35
30
25
20
15
Lag (hours)
7.0
7.5
8.0
8.5
9.0
9.5
Logged NfL (pg/mL)

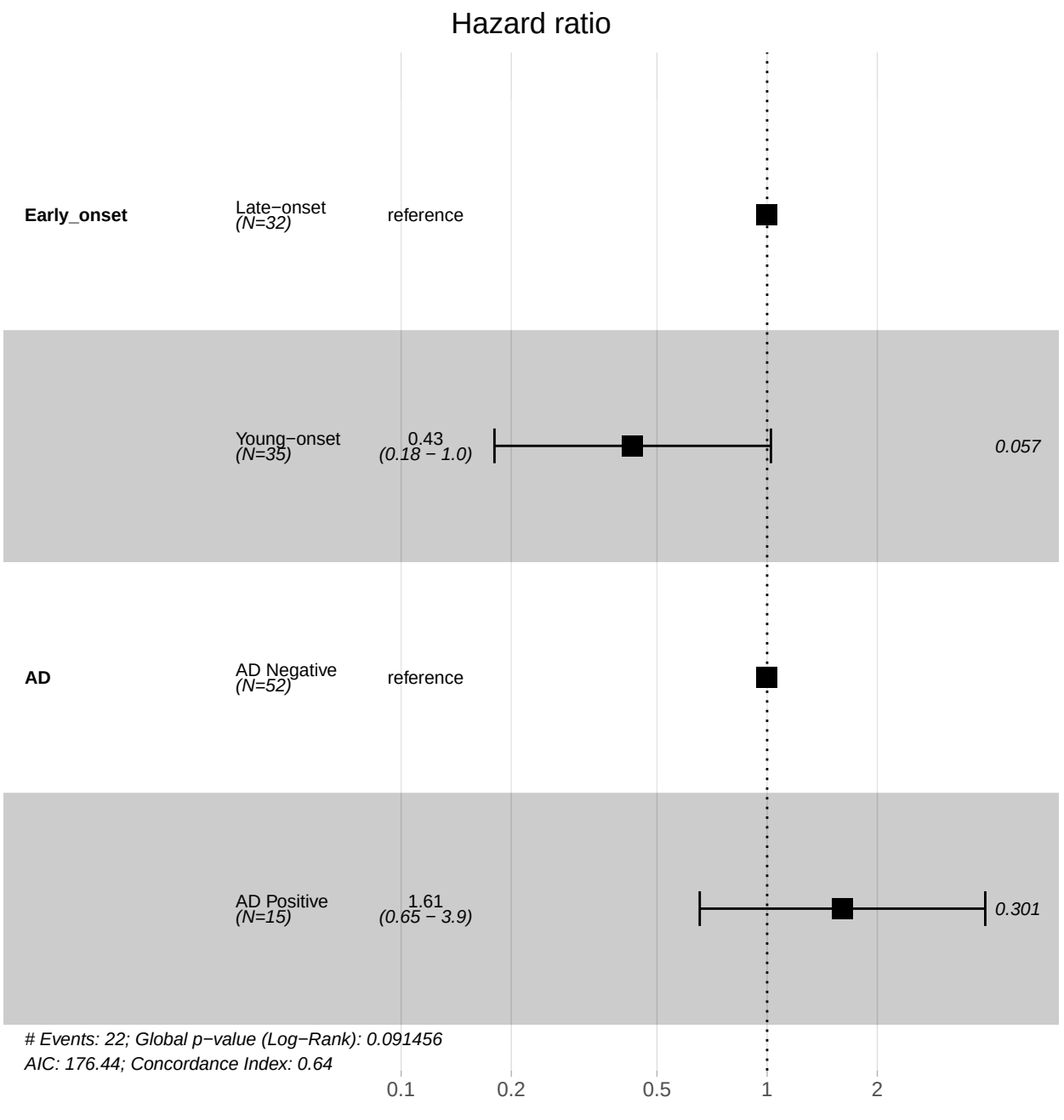

Correlation of lag with t−tau levels (Spearman)
Diagnosis
CBS
PSP
R = −0.33, p = 0.14
Lag (hours)
40
35
30
25
20
0.5
1.0
1.5
ATI

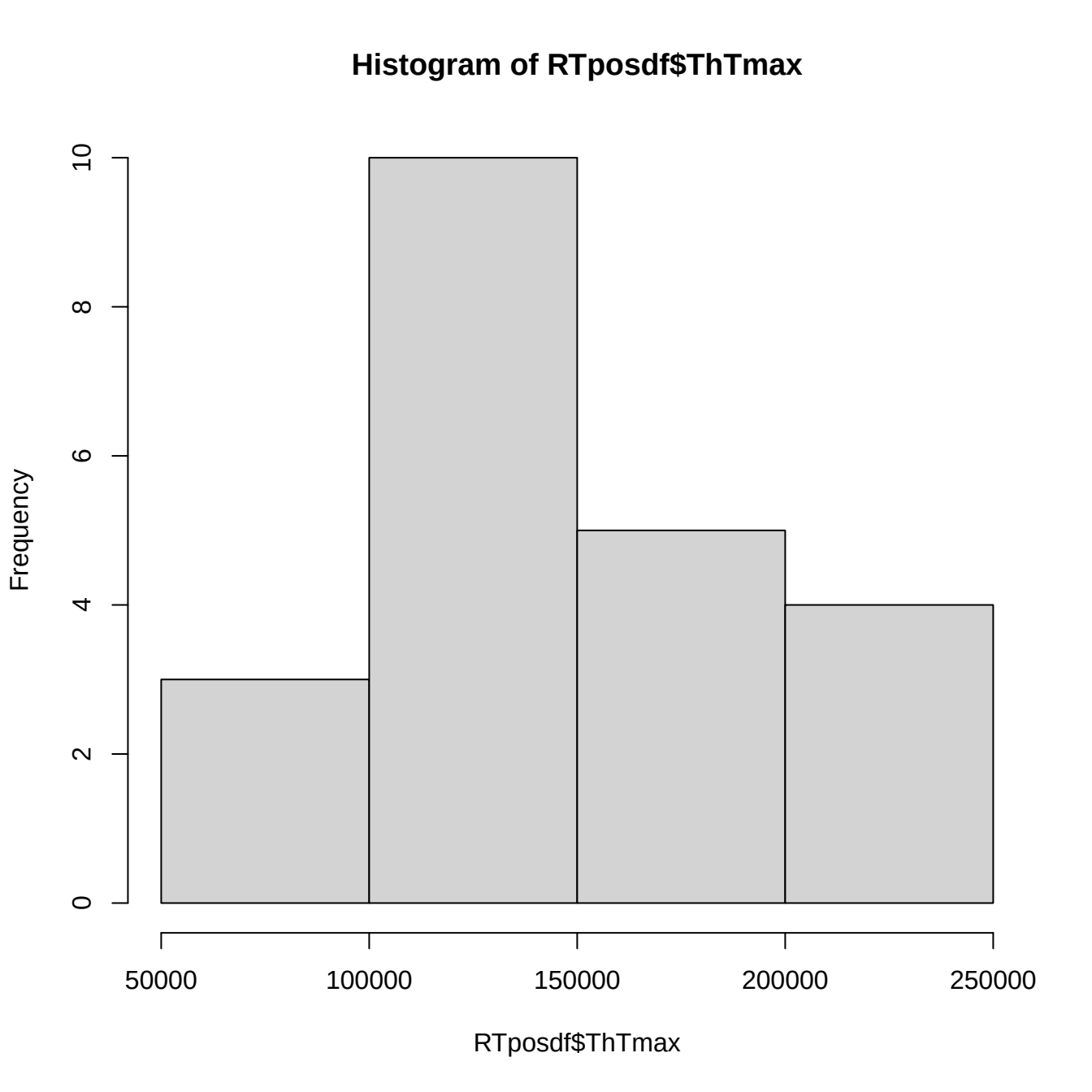

Diagnosis
CBS
PSP
R = −0.11, p = 0.71
R = 0.3, p = 0.46
40
30
20
Lag (hours)
0.5
1.0
1.5
ATI

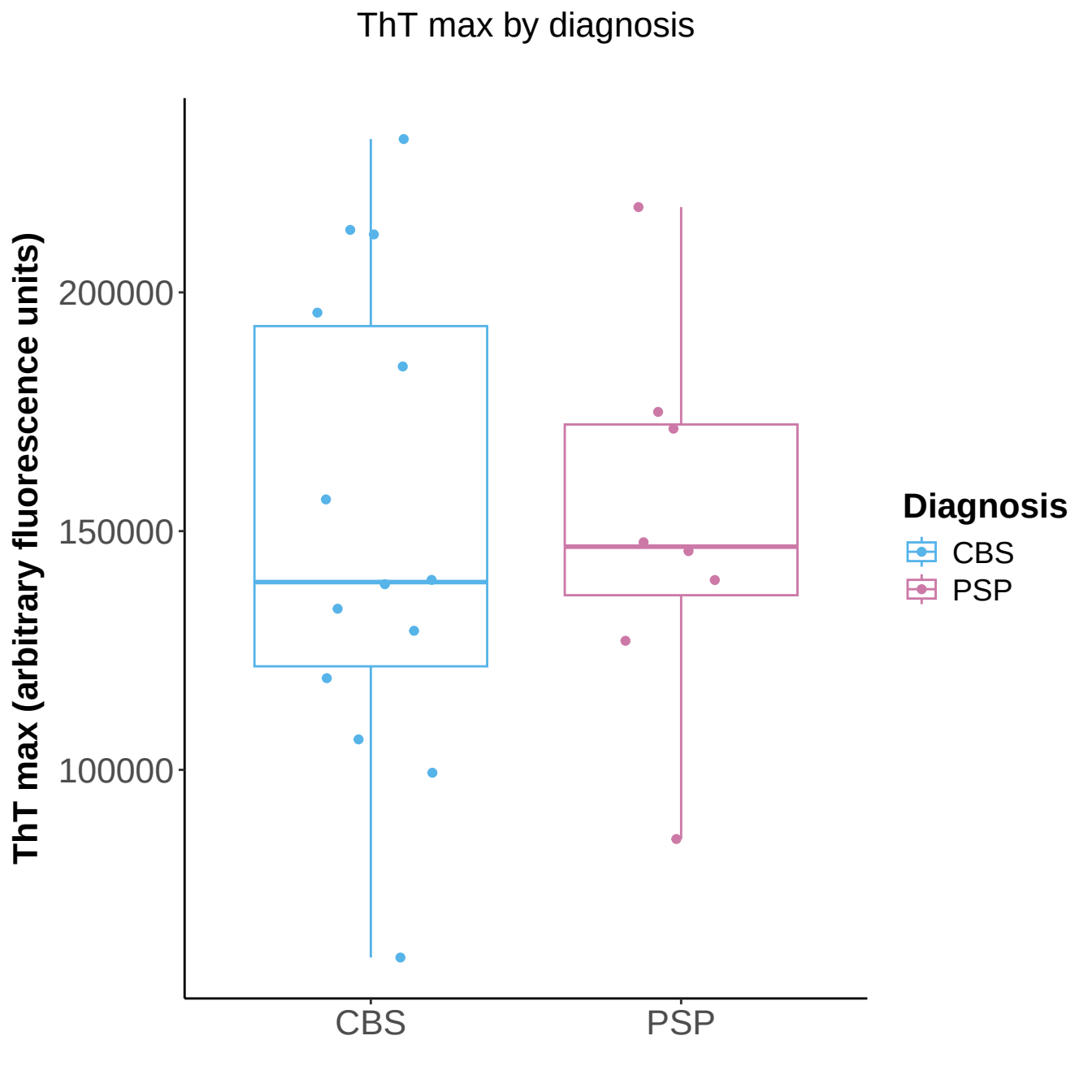

1.0
0.8
0.6
0.4
Survival Probability
0
10
20
30
40
50
Lag (hours)
Late−onset
Young−onset

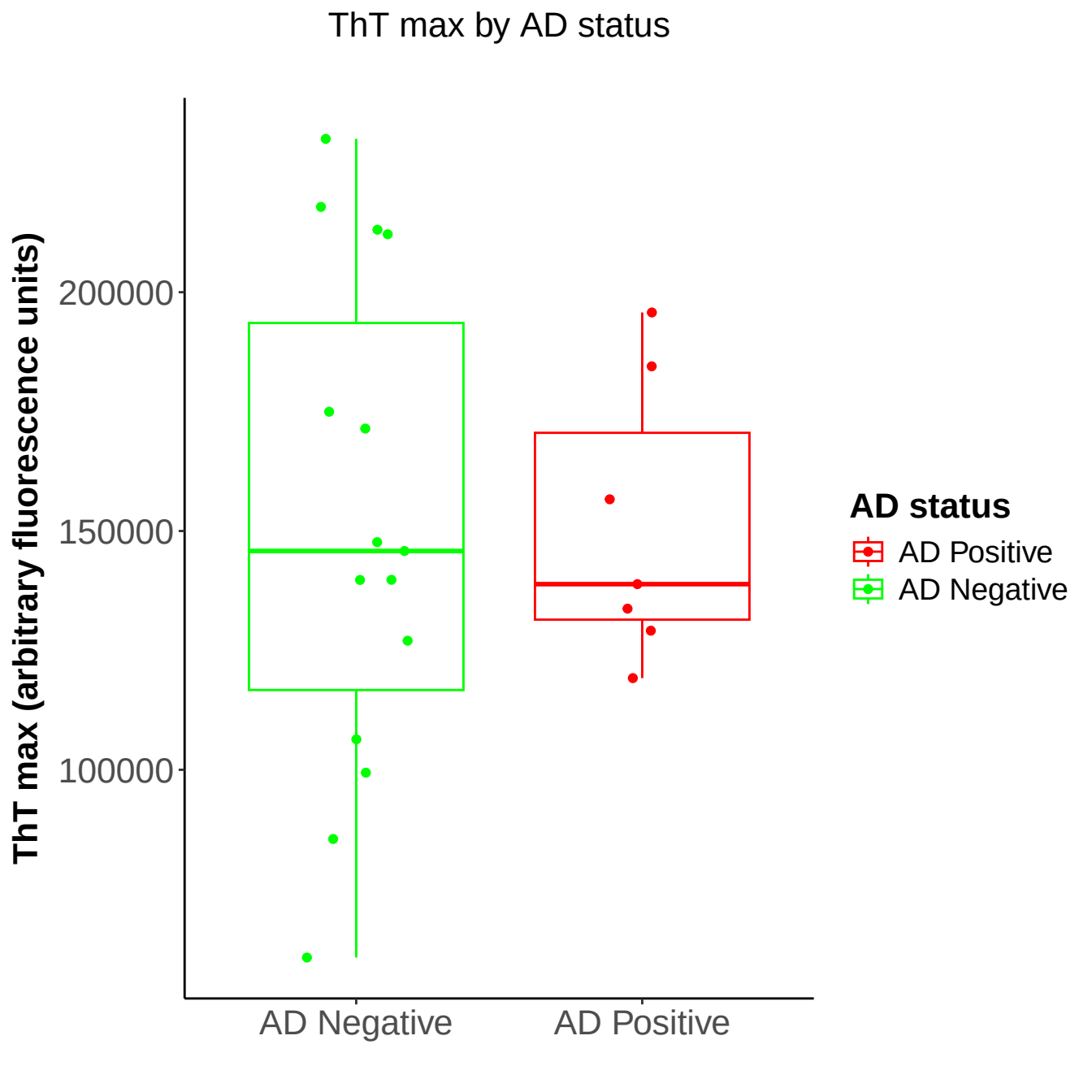

1.0
0.8
0.6
0.4
Survival Probability
0
10
20
30
40
50
Lag (hours)
AD Negative
AD Positive

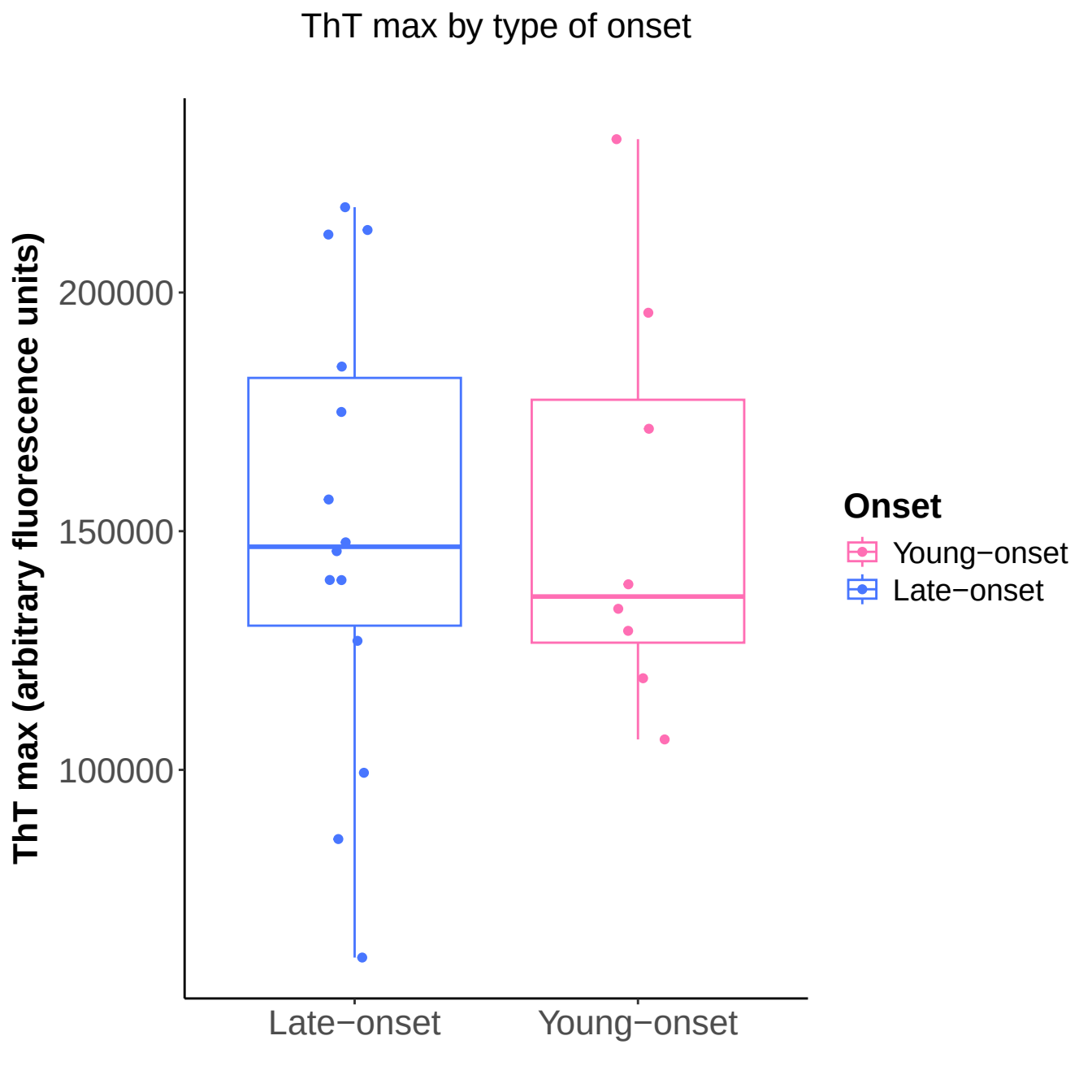

1.0
0.9
0.8
0.7
0.6
0.5
Survival Probability
0
10
20
30
40
50
Lag (hours)
CBS
PSP


Hazard ratio
Early_onset
Late−onset
(N=32)
reference
Young−onset
(N=35)
0.43
(0.18 − 1.0)
0.057
AD
AD Negative
(N=52)
reference
AD Positive
(N=15)
1.61
(0.65 − 3.9)
0.301
Events: 22; Global p−value (Log−Rank): 0.091456
AIC: 176.44; Concordance Index: 0.64
0.1
0.2
0.5
1
2


Histogram of RTposdf$ThTmax
Frequency
0
2
4
6
8
10
50000
100000
150000
200000
250000
RTposdf$ThTmax


ThT max by diagnosis
ThT max (arbitrary fluorescence units)
200000
150000
100000
CBS
PSP
Diagnosis
CBS
PSP


ThT max by AD status
ThT max (arbitrary fluorescence units)
200000
150000
100000
AD Negative
AD Positive
AD status
AD Positive
AD Negative


ThT max by type of onset
ThT max (arbitrary fluorescence units)
200000
150000
100000
Late−onset
Young−onset
Onset
Young−onset
Late−onset