HOI_LLK_Repeated_Measures_ANOVA

2024-10-09

```
library(tidyverse)
```

```
## ── Attaching core tidyverse packages ──────────────────────── tidyverse 2.0.0 ──
## ✔ dplyr     1.1.4     ✔ readr     2.1.5
## ✔ forcats   1.0.0     ✔ stringr   1.5.1
## ✔ ggplot2   3.5.1     ✔ tibble    3.2.1
## ✔ lubridate 1.9.3     ✔ tidyr     1.3.1
## ✔ purrr     1.0.2
## ── Conflicts ────────────────────────────────────────── tidyverse_conflicts() ──
## ✖ dplyr::filter() masks stats::filter()
## ✖ dplyr::lag()    masks stats::lag()
## ℹ Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
library(ggplot2)
library(sjPlot)
library(broom)
library(effectsize)
library(afex)
```

```
## Loading required package: lme4
## Loading required package: Matrix
##
## Attaching package: 'Matrix'
##
## The following objects are masked from 'package:tidyr':
##
##     expand, pack, unpack
##
## ************
## Welcome to afex. For support visit: http://afex.singmann.science/
## - Functions for ANOVAs: aov_car(), aov_ez(), and aov_4()
## - Methods for calculating p-values with mixed(): 'S', 'KR', 'LRT', and 'PB'
## - 'afex_aov' and 'mixed' objects can be passed to emmeans() for follow-up tests
## - Get and set global package options with: afex_options()
## - Set sum-to-zero contrasts globally: set_sum_contrasts()
## - For example analyses see: browseVignettes("afex")
## ************
##
## Attaching package: 'afex'
##
## The following object is masked from 'package:lme4':
##
##     lmer
```

```
library(emmeans)
```

```
## Welcome to emmeans.
## Caution: You lose important information if you filter this package's results.
## See '? untidy'
```

```
library(ggpubr)
library(rstatix)
```

```
##
## Attaching package: 'rstatix'
##
## The following objects are masked from 'package:effectsize':
##
##     cohens_d, eta_squared
##
## The following object is masked from 'package:stats':
##
##     filter
```

```
#rm(list = ls())
```

```
#Load the dataframes
features_1H_raw<- read_csv("Features_1H.csv")
```

```
## New names:
## Rows: 30 Columns: 27
## ── Column specification
## ──────────────────────────────────────────────────────── Delimiter: "," chr
## (2): subject_id, Group dbl (25): ...1, Alpha_DTC, Alpha_O, Alpha_S, Alpha_TC,
## Beta_DTC, Beta_O, Bet...
## ℹ Use `spec()` to retrieve the full column specification for this data. ℹ
## Specify the column types or set `show_col_types = FALSE` to quiet this message.
## • `` -> `...1`
```

```
features_24H_raw<- read_csv("Features_24H.csv")
```

```
## New names:
## Rows: 30 Columns: 27
## ── Column specification
## ──────────────────────────────────────────────────────── Delimiter: "," chr
## (2): subject_id, Group dbl (25): ...1, Alpha_DTC, Alpha_O, Alpha_S, Alpha_TC,
## Beta_DTC, Beta_O, Bet...
## ℹ Use `spec()` to retrieve the full column specification for this data. ℹ
## Specify the column types or set `show_col_types = FALSE` to quiet this message.
## • `` -> `...1`
```

```
features_Day7_raw<- read_csv("Features_Day7.csv")
```

```
## New names:
## Rows: 30 Columns: 27
## ── Column specification
## ──────────────────────────────────────────────────────── Delimiter: "," chr
## (2): subject_id, Group dbl (25): ...1, Alpha_DTC, Alpha_O, Alpha_S, Alpha_TC,
## Beta_DTC, Beta_O, Bet...
## ℹ Use `spec()` to retrieve the full column specification for this data. ℹ
## Specify the column types or set `show_col_types = FALSE` to quiet this message.
## • `` -> `...1`
```

Data Wrangling

Converting into binary factors and imputing missing data

```
#Convert the group into a binary factor variables for all 3 datasets
features_1H_raw<-features_1H_raw%>%
  mutate(Group= factor(ifelse(Group == "Ketamine", 1, 0)))
features_24H_raw<-features_24H_raw%>%
  mutate(Group= factor(ifelse(Group == "Ketamine", 1, 0)))
features_Day7_raw<-features_Day7_raw%>%
  mutate(Group= factor(ifelse(Group == "Ketamine", 1, 0)))


#Impute missing data by calculating mean for the rest of the column
#1H
features_1H_imputed <- features_1H_raw %>%
  mutate(across(-all_of("Group"), ~ ifelse(is.na(.), mean(., na.rm = TRUE), .)))
#24H
#RS_024 in 24H data has bad data; replace all values with NA and then impute
features_24H_raw <- features_24H_raw %>%
  mutate(across(-c(1:3), ~ ifelse(subject_id == "RS_024_deltas", NA, .)))
#Impute
features_24H_imputed <- features_24H_raw %>%
  mutate(across(-all_of("Group"), ~ ifelse(is.na(.), mean(., na.rm = TRUE), .)))
#Day 7
features_Day7_imputed <- features_Day7_raw %>%
  mutate(across(-all_of("Group"), ~ ifelse(is.na(.), mean(., na.rm = TRUE), .)))
```

Converting into one long dataframe

```
# Combine timepoint datasets into one long format
features_combined <- bind_rows(
  mutate(features_1H_imputed, timepoint = "1H"),
  mutate(features_24H_imputed, timepoint = "24H"),
  mutate(features_Day7_imputed, timepoint = "Day7")
)

# Gather measures and frequency bands
features_long <- features_combined %>%
  pivot_longer(
    cols = -c(subject_id, Group, timepoint, ...1),  # Keep 'subject' and 'timepoint' columns
    names_to = c("frequency_band", "measure"),  # Separate column names into 'frequency_band' and 'measure'
    names_pattern = "([A-Za-z]+)_([A-Z]+)",
    values_to = "value"  # The new column for the values
  )

#Make subject_id into a factor

features_long<-features_long%>%
  mutate(subject_id=as.factor(subject_id))

#Turn features_long from a tibble to a dataframe
features_long <- as.data.frame(features_long)


# View the structure of the long-format dataset
str(features_long)
```

```
## 'data.frame':    2160 obs. of  7 variables:
##  $ ...1          : num  0 0 0 0 0 0 0 0 0 0 ...
##  $ subject_id    : Factor w/ 30 levels "RS_004_deltas",..: 2 2 2 2 2 2 2 2 2 2 ...
##  $ Group         : Factor w/ 2 levels "0","1": 2 2 2 2 2 2 2 2 2 2 ...
##  $ timepoint     : chr  "1H" "1H" "1H" "1H" ...
##  $ frequency_band: chr  "Alpha" "Alpha" "Alpha" "Alpha" ...
##  $ measure       : chr  "DTC" "O" "S" "TC" ...
##  $ value         : num  -0.226 0.131 -0.418 0.566 0.104 ...
```

```
# Preview the first few rows
head(features_long)
```

```
##   ...1    subject_id Group timepoint frequency_band measure        value
## 1    0 RS_006_deltas     1        1H          Alpha     DTC -0.225868035
## 2    0 RS_006_deltas     1        1H          Alpha       O  0.130845761
## 3    0 RS_006_deltas     1        1H          Alpha       S -0.417924547
## 4    0 RS_006_deltas     1        1H          Alpha      TC  0.566395986
## 5    0 RS_006_deltas     1        1H           Beta     DTC  0.103792239
## 6    0 RS_006_deltas     1        1H           Beta       O -0.001016274
```

Separate the frequency bands and measures and loop through a list of models

```
# Define frequency bands and measures
frequency_bands <- unique(features_long$frequency_band)
measures <- unique(features_long$measure)

# Loop through frequency bands and measures
for (band in frequency_bands) {
  for (measure in measures) {

    # Filter data for the specific frequency band and measure
    data_subset <- features_long %>%
      filter(frequency_band == band, measure == measure)

    # Fit the repeated measures ANOVA model with subject as random effect
    model <- aov_car(value ~ Group * timepoint + Error(subject_id/(timepoint)), data = data_subset)

    # Print ANOVA summary
    cat(paste("ANOVA for Frequency Band:", band, "and Measure:", measure, "\n"))
    print(summary(model))

    # Estimated marginal means (similar to SPSS output)
    emm <- emmeans(model, ~ Group * timepoint)
    print(emm)

    # Plot estimated marginal means with confidence intervals
    emm_plot <- ggplot(as.data.frame(emm), aes(x = timepoint, y = emmean, color = Group, group = Group)) +
      geom_line() +
      geom_point() +
      geom_errorbar(aes(ymin = emmean - SE, ymax = emmean + SE), width = 0.2) +
      labs(title = paste("Estimated Marginal Means for", band, "and", measure),
           x = "Timepoint", y = "Estimated Mean") +
      theme_minimal()

    print(emm_plot)

    # Descriptive statistics
    descriptive_stats <- data_subset %>%
      group_by(Group, timepoint) %>%
```

```
      summarise(mean_value = mean(value, na.rm = TRUE),
                sd_value = sd(value, na.rm = TRUE),
                N = n(), .groups = 'drop')

    print(descriptive_stats)

    # Studentized residuals from the linear model inside the aov_car
    residuals <- rstudent(model$lm)
  }
}
```

```
## Warning: More than one observation per design cell, aggregating data using `fun_aggregate = mean`.
## To turn off this warning, pass `fun_aggregate = mean` explicitly.
```

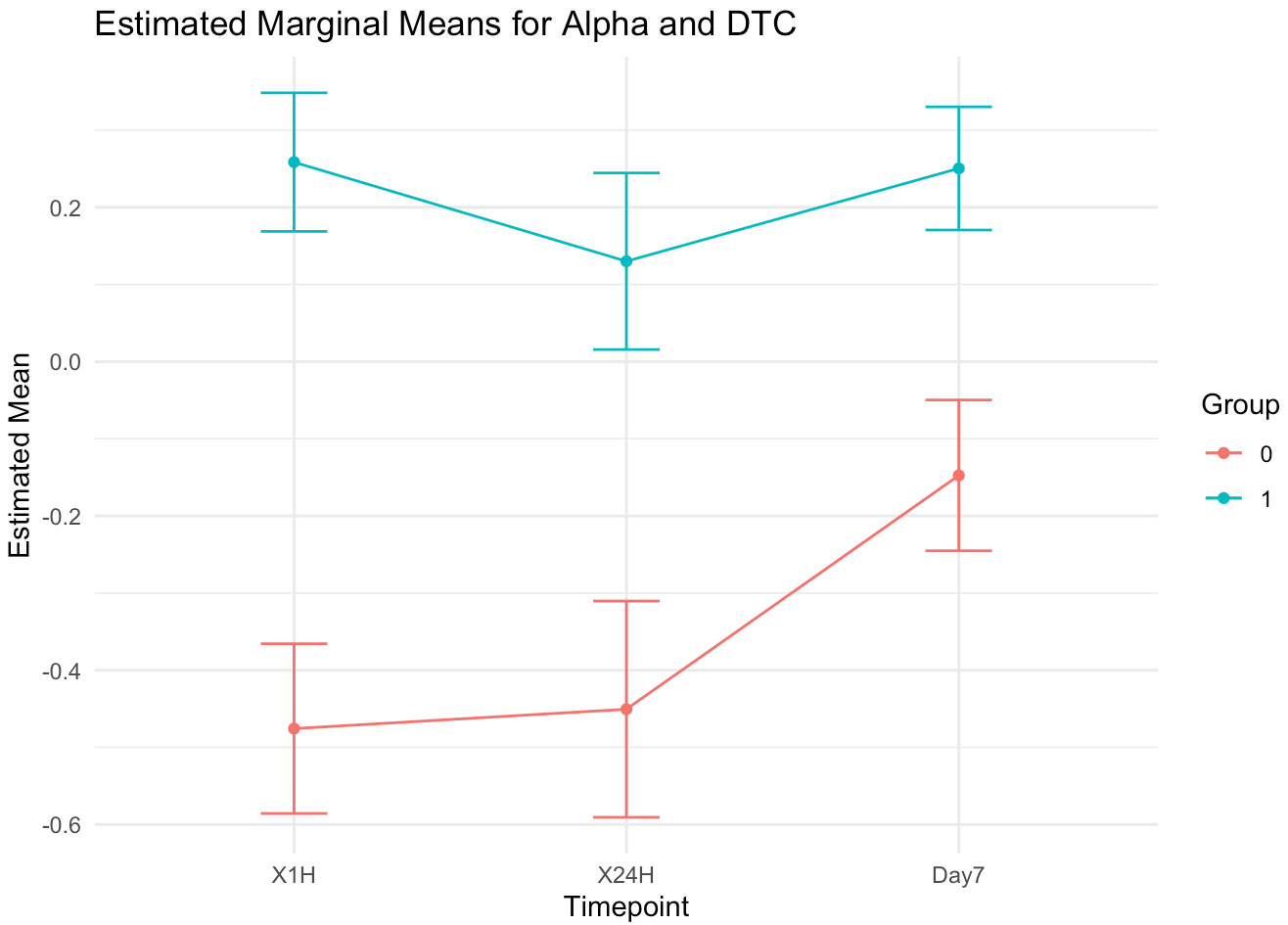
```
## Contrasts set to contr.sum for the following variables: Group
```

```
## ANOVA for Frequency Band: Alpha and Measure: DTC
```

```
## Warning in summary.Anova.mlm(object$Anova, multivariate = FALSE): HF eps > 1
## treated as 1
```

```
##
## Univariate Type III Repeated-Measures ANOVA Assuming Sphericity
##
##                 Sum Sq num Df Error SS den Df F value    Pr(>F)
## (Intercept)     0.4537      1   6.0572     28  2.0971   0.15868
## Group           7.0414      1   6.0572     28 32.5494 4.057e-06 ***
## timepoint       0.7018      2   7.8245     56  2.5114   0.09026 .
## Group:timepoint 0.4084      2   7.8245     56  1.4615   0.24060
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Mauchly Tests for Sphericity
##
##                 Test statistic p-value
## timepoint              0.95798 0.56014
## Group:timepoint        0.95798 0.56014
##
##
## Greenhouse-Geisser and Huynh-Feldt Corrections
##  for Departure from Sphericity
##
##                  GG eps Pr(>F[GG])
## timepoint       0.95967    0.09276 .
## Group:timepoint 0.95967    0.24108
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##                   HF eps Pr(>F[HF])
## timepoint       1.028751 0.09025585
## Group:timepoint 1.028751 0.24060241
##  Group timepoint emmean     SE df lower.CL upper.CL
##  0     X1H       -0.476 0.1100 28  -0.7011  -0.2504
##  1     X1H        0.259 0.0898 28   0.0746   0.4426
##  0     X24H      -0.451 0.1402 28  -0.7377  -0.1634
##  1     X24H       0.130 0.1145 28  -0.1044   0.3645
##  0     Day7      -0.148 0.0978 28  -0.3478   0.0528
##  1     Day7       0.250 0.0798 28   0.0869   0.4139
```

```
##
## Confidence level used: 0.95
```




```
## # A tibble: 6 × 5
##   Group timepoint mean_value sd_value     N
##   <fct> <chr>          <dbl>    <dbl> <int>
## 1 0     1H            -0.476    0.497    48
## 2 0     24H           -0.451    0.894    48
## 3 0     Day7          -0.148    0.420    48
## 4 1     1H             0.259    0.488    72
## 5 1     24H            0.130    0.576    72
## 6 1     Day7           0.250    0.580    72
```

```
## Warning: More than one observation per design cell, aggregating data using `fun_aggregate = mean`.
## To turn off this warning, pass `fun_aggregate = mean` explicitly.
```

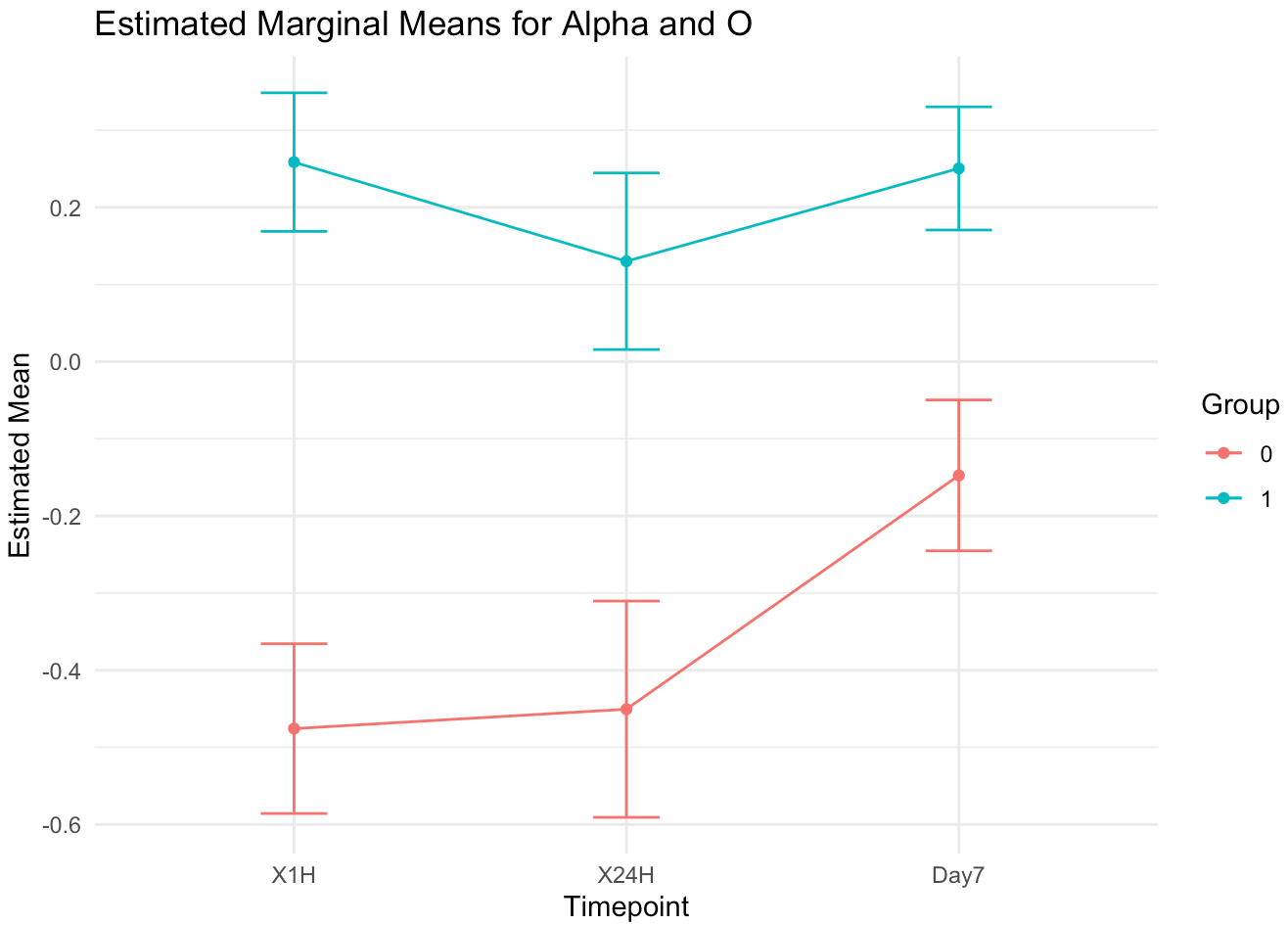
```
## Contrasts set to contr.sum for the following variables: Group
```

```
## ANOVA for Frequency Band: Alpha and Measure: O
```

```
## Warning in summary.Anova.mlm(object$Anova, multivariate = FALSE): HF eps > 1
## treated as 1
```

```
##
## Univariate Type III Repeated-Measures ANOVA Assuming Sphericity
##
##                 Sum Sq num Df Error SS den Df F value    Pr(>F)
## (Intercept)     0.4537      1   6.0572     28  2.0971   0.15868
## Group           7.0414      1   6.0572     28 32.5494 4.057e-06 ***
## timepoint       0.7018      2   7.8245     56  2.5114   0.09026 .
## Group:timepoint 0.4084      2   7.8245     56  1.4615   0.24060
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Mauchly Tests for Sphericity
##
##                 Test statistic p-value
## timepoint              0.95798 0.56014
## Group:timepoint        0.95798 0.56014
##
##
## Greenhouse-Geisser and Huynh-Feldt Corrections
##  for Departure from Sphericity
##
##                  GG eps Pr(>F[GG])
## timepoint       0.95967    0.09276 .
## Group:timepoint 0.95967    0.24108
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##                   HF eps Pr(>F[HF])
## timepoint       1.028751 0.09025585
## Group:timepoint 1.028751 0.24060241
##  Group timepoint emmean     SE df lower.CL upper.CL
##  0     X1H       -0.476 0.1100 28  -0.7011  -0.2504
##  1     X1H        0.259 0.0898 28   0.0746   0.4426
##  0     X24H      -0.451 0.1402 28  -0.7377  -0.1634
##  1     X24H       0.130 0.1145 28  -0.1044   0.3645
##  0     Day7      -0.148 0.0978 28  -0.3478   0.0528
##  1     Day7       0.250 0.0798 28   0.0869   0.4139
```

```
##
## Confidence level used: 0.95
```




```
## # A tibble: 6 × 5
##   Group timepoint mean_value sd_value     N
##   <fct> <chr>          <dbl>    <dbl> <int>
## 1 0     1H            -0.476    0.497    48
## 2 0     24H           -0.451    0.894    48
## 3 0     Day7          -0.148    0.420    48
## 4 1     1H             0.259    0.488    72
## 5 1     24H            0.130    0.576    72
## 6 1     Day7           0.250    0.580    72
```

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## Warning: More than one observation per design cell, aggregating data using `fun_aggregate = mean`.
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```

```
## Contrasts set to contr.sum for the following variables: Group
```

```
## ANOVA for Frequency Band: Alpha and Measure: S
```

```
## Warning in summary.Anova.mlm(object$Anova, multivariate = FALSE): HF eps > 1
## treated as 1
```

```
##
## Univariate Type III Repeated-Measures ANOVA Assuming Sphericity
##
##                 Sum Sq num Df Error SS den Df F value    Pr(>F)
## (Intercept)     0.4537      1   6.0572     28  2.0971   0.15868
## Group           7.0414      1   6.0572     28 32.5494 4.057e-06 ***
## timepoint       0.7018      2   7.8245     56  2.5114   0.09026 .
## Group:timepoint 0.4084      2   7.8245     56  1.4615   0.24060
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Mauchly Tests for Sphericity
##
##                 Test statistic p-value
## timepoint              0.95798 0.56014
## Group:timepoint        0.95798 0.56014
##
##
## Greenhouse-Geisser and Huynh-Feldt Corrections
##  for Departure from Sphericity
##
##                  GG eps Pr(>F[GG])
## timepoint       0.95967    0.09276 .
## Group:timepoint 0.95967    0.24108
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##                   HF eps Pr(>F[HF])
## timepoint       1.028751 0.09025585
## Group:timepoint 1.028751 0.24060241
##  Group timepoint emmean     SE df lower.CL upper.CL
##  0     X1H       -0.476 0.1100 28  -0.7011  -0.2504
##  1     X1H        0.259 0.0898 28   0.0746   0.4426
##  0     X24H      -0.451 0.1402 28  -0.7377  -0.1634
##  1     X24H       0.130 0.1145 28  -0.1044   0.3645
##  0     Day7      -0.148 0.0978 28  -0.3478   0.0528
##  1     Day7       0.250 0.0798 28   0.0869   0.4139
```

```
##
## Confidence level used: 0.95
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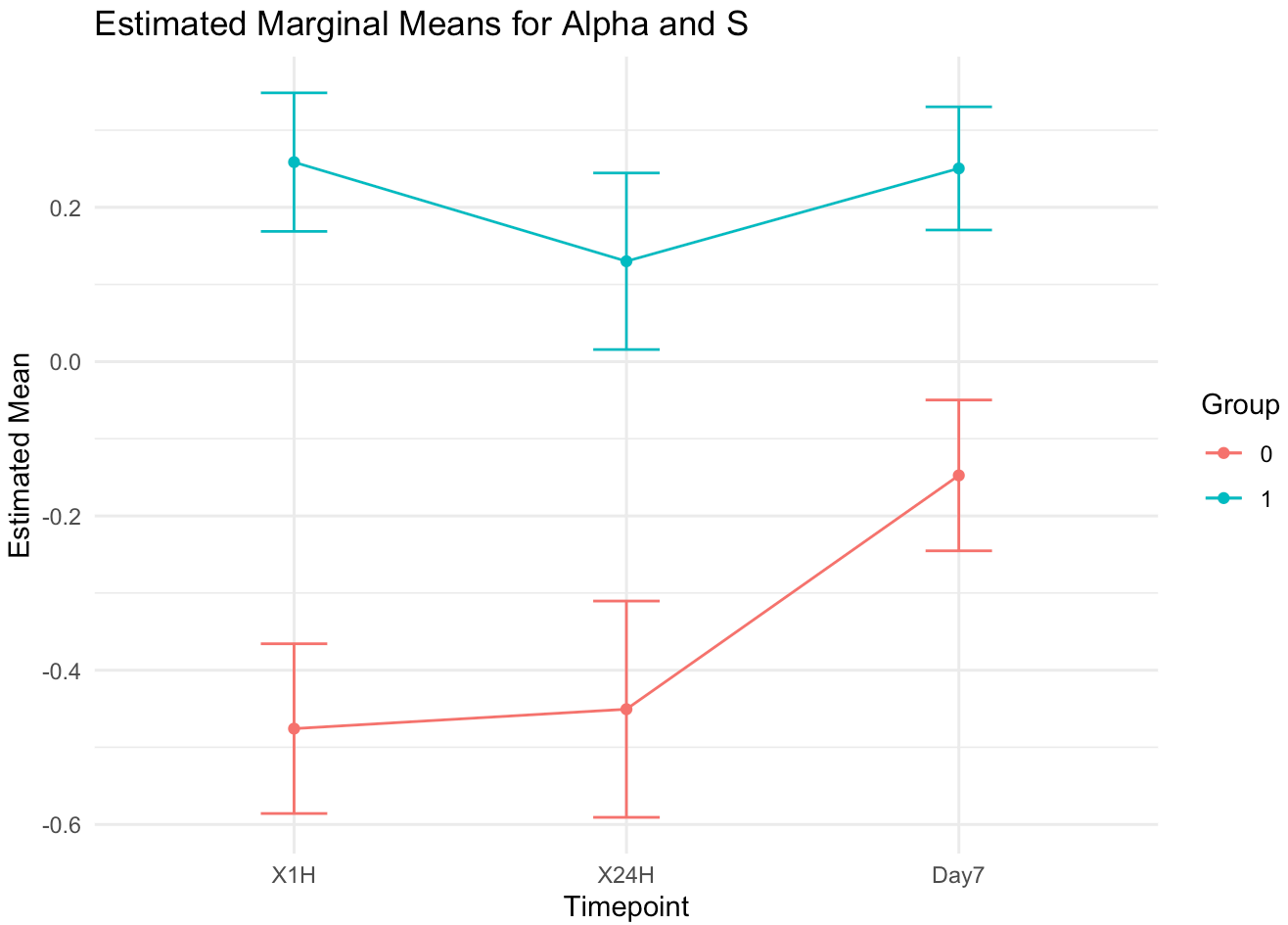


```
## # A tibble: 6 × 5
##   Group timepoint mean_value sd_value     N
##   <fct> <chr>          <dbl>    <dbl> <int>
## 1 0     1H            -0.476    0.497    48
## 2 0     24H           -0.451    0.894    48
## 3 0     Day7          -0.148    0.420    48
## 4 1     1H             0.259    0.488    72
## 5 1     24H            0.130    0.576    72
## 6 1     Day7           0.250    0.580    72
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## Warning: More than one observation per design cell, aggregating data using `fun_aggregate = mean`.
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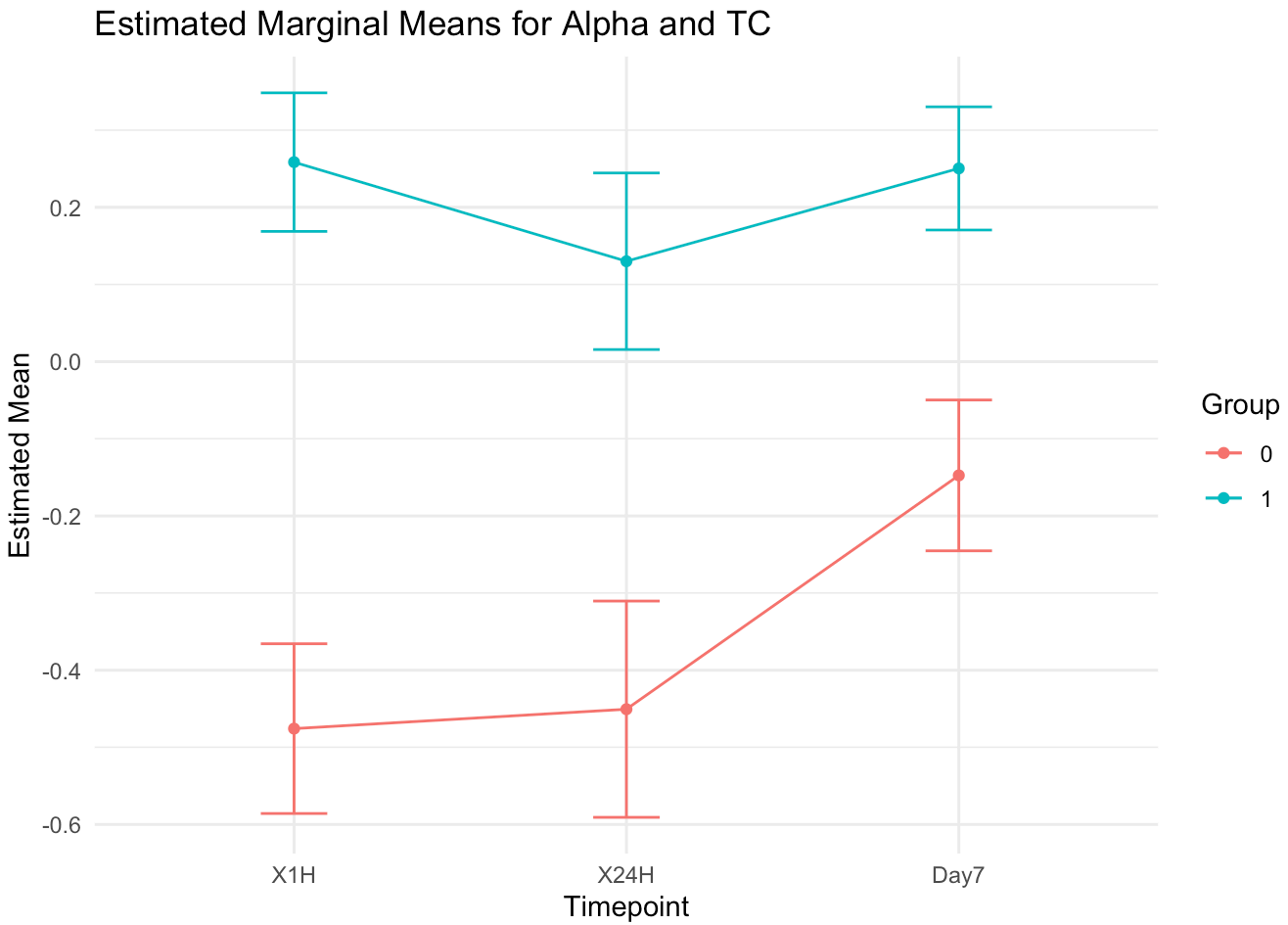
```
## Contrasts set to contr.sum for the following variables: Group
```

```
## ANOVA for Frequency Band: Alpha and Measure: TC
```

```
## Warning in summary.Anova.mlm(object$Anova, multivariate = FALSE): HF eps > 1
## treated as 1
```

```
##
## Univariate Type III Repeated-Measures ANOVA Assuming Sphericity
##
##                 Sum Sq num Df Error SS den Df F value    Pr(>F)
## (Intercept)     0.4537      1   6.0572     28  2.0971   0.15868
## Group           7.0414      1   6.0572     28 32.5494 4.057e-06 ***
## timepoint       0.7018      2   7.8245     56  2.5114   0.09026 .
## Group:timepoint 0.4084      2   7.8245     56  1.4615   0.24060
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Mauchly Tests for Sphericity
##
##                 Test statistic p-value
## timepoint              0.95798 0.56014
## Group:timepoint        0.95798 0.56014
##
##
## Greenhouse-Geisser and Huynh-Feldt Corrections
##  for Departure from Sphericity
##
##                  GG eps Pr(>F[GG])
## timepoint       0.95967    0.09276 .
## Group:timepoint 0.95967    0.24108
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##                   HF eps Pr(>F[HF])
## timepoint       1.028751 0.09025585
## Group:timepoint 1.028751 0.24060241
##  Group timepoint emmean     SE df lower.CL upper.CL
##  0     X1H       -0.476 0.1100 28  -0.7011  -0.2504
##  1     X1H        0.259 0.0898 28   0.0746   0.4426
##  0     X24H      -0.451 0.1402 28  -0.7377  -0.1634
##  1     X24H       0.130 0.1145 28  -0.1044   0.3645
##  0     Day7      -0.148 0.0978 28  -0.3478   0.0528
##  1     Day7       0.250 0.0798 28   0.0869   0.4139
```

```
##
## Confidence level used: 0.95
```



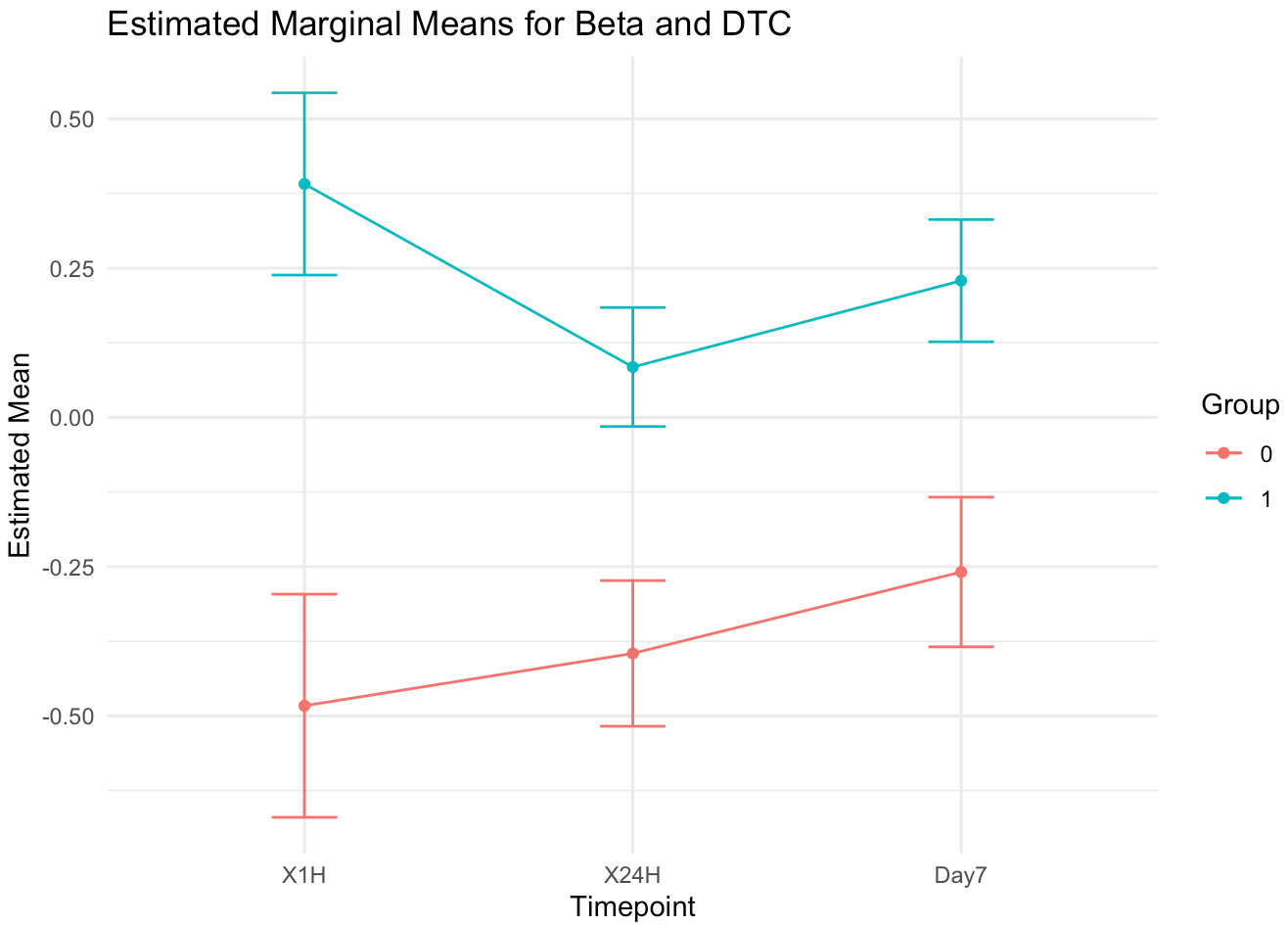

```
## # A tibble: 6 × 5
##   Group timepoint mean_value sd_value     N
##   <fct> <chr>          <dbl>    <dbl> <int>
## 1 0     1H            -0.476    0.497    48
## 2 0     24H           -0.451    0.894    48
## 3 0     Day7          -0.148    0.420    48
## 4 1     1H             0.259    0.488    72
## 5 1     24H            0.130    0.576    72
## 6 1     Day7           0.250    0.580    72
```

```
## Warning: More than one observation per design cell, aggregating data using `fun_aggregate = mean`.
## To turn off this warning, pass `fun_aggregate = mean` explicitly.
```

```
## Contrasts set to contr.sum for the following variables: Group
```

```
## ANOVA for Frequency Band: Beta and Measure: DTC
##
## Univariate Type III Repeated-Measures ANOVA Assuming Sphericity
##
##                 Sum Sq num Df Error SS den Df F value    Pr(>F)
## (Intercept)     0.4500      1   8.5554     28  1.4727    0.2351
## Group           8.1388      1   8.5554     28 26.6367 1.786e-05 ***
## timepoint       0.3136      2  13.4606     56  0.6524    0.5247
## Group:timepoint 0.7310      2  13.4606     56  1.5206    0.2275
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Mauchly Tests for Sphericity
##
##                 Test statistic p-value
## timepoint              0.87241 0.15838
## Group:timepoint        0.87241 0.15838
##
##
## Greenhouse-Geisser and Huynh-Feldt Corrections
##  for Departure from Sphericity
##
##                  GG eps Pr(>F[GG])
## timepoint       0.88684     0.5074
## Group:timepoint 0.88684     0.2294
##
##                    HF eps Pr(>F[HF])
## timepoint       0.9425061  0.5161807
## Group:timepoint 0.9425061  0.2285137
##  Group timepoint  emmean     SE df lower.CL upper.CL
##  0     X1H       -0.4830 0.1869 28  -0.8659 -0.10013
##  1     X1H        0.3910 0.1526 28   0.0784  0.70357
##  0     X24H      -0.3953 0.1220 28  -0.6452 -0.14541
##  1     X24H       0.0844 0.0996 28  -0.1197  0.28839
##  0     Day7      -0.2590 0.1253 28  -0.5157 -0.00225
##  1     Day7       0.2289 0.1023 28   0.0193  0.43854
```

```
##
## Confidence level used: 0.95
```



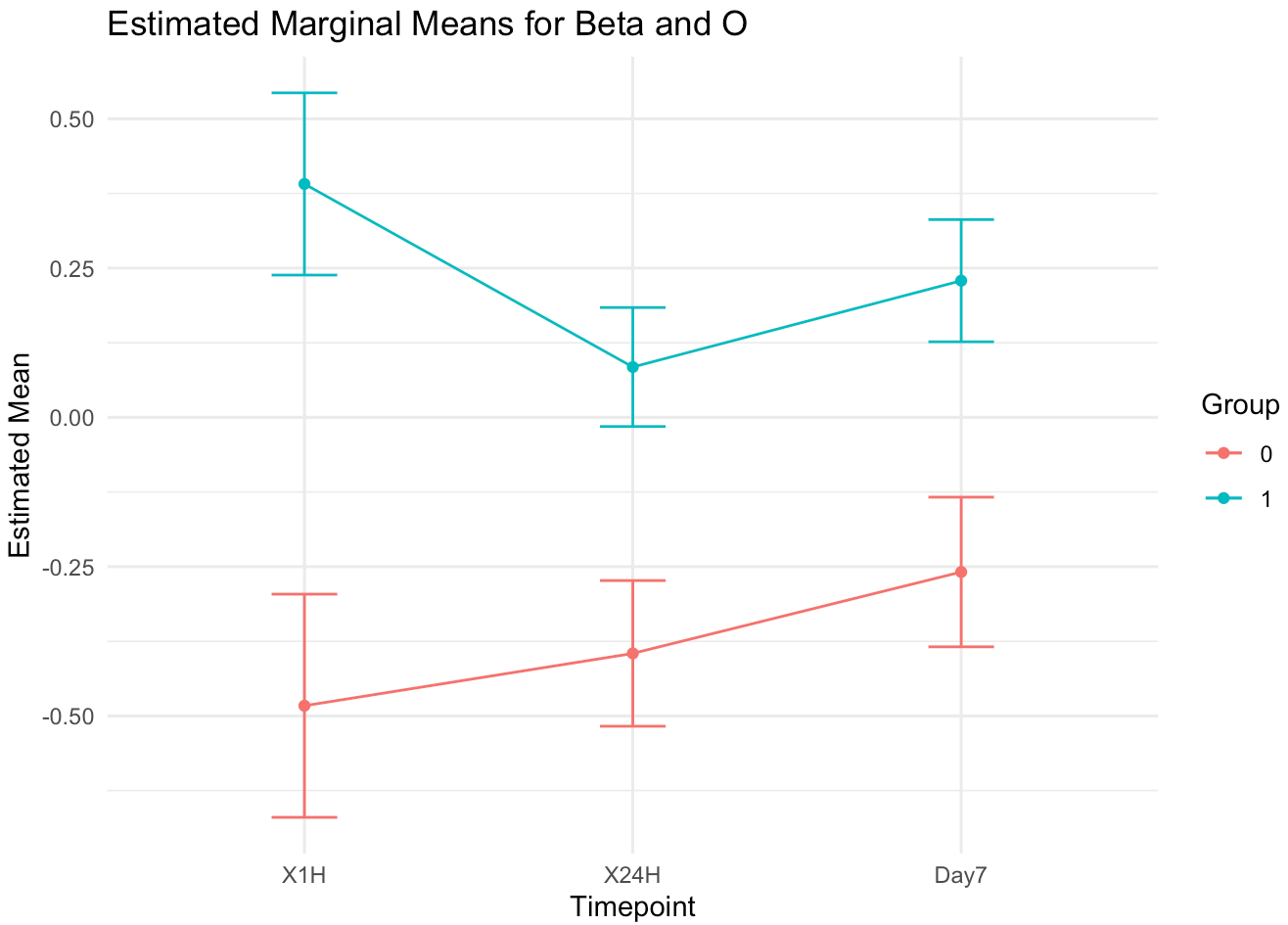

```
## # A tibble: 6 × 5
##   Group timepoint mean_value sd_value     N
##   <fct> <chr>          <dbl>    <dbl> <int>
## 1 0     1H           -0.483     0.742    48
## 2 0     24H          -0.395     0.743    48
## 3 0     Day7         -0.259     0.419    48
## 4 1     1H            0.391     0.733    72
## 5 1     24H           0.0844    0.613    72
## 6 1     Day7          0.229     0.592    72
```

```
## Warning: More than one observation per design cell, aggregating data using `fun_aggregate = mean`.
## To turn off this warning, pass `fun_aggregate = mean` explicitly.
```

```
## Contrasts set to contr.sum for the following variables: Group
```

```
## ANOVA for Frequency Band: Beta and Measure: O
##
## Univariate Type III Repeated-Measures ANOVA Assuming Sphericity
##
##                 Sum Sq num Df Error SS den Df F value    Pr(>F)
## (Intercept)     0.4500      1   8.5554     28  1.4727    0.2351
## Group           8.1388      1   8.5554     28 26.6367 1.786e-05 ***
## timepoint       0.3136      2  13.4606     56  0.6524    0.5247
## Group:timepoint 0.7310      2  13.4606     56  1.5206    0.2275
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Mauchly Tests for Sphericity
##
##                 Test statistic p-value
## timepoint              0.87241 0.15838
## Group:timepoint        0.87241 0.15838
##
##
## Greenhouse-Geisser and Huynh-Feldt Corrections
##  for Departure from Sphericity
##
##                  GG eps Pr(>F[GG])
## timepoint       0.88684     0.5074
## Group:timepoint 0.88684     0.2294
##
##                    HF eps Pr(>F[HF])
## timepoint       0.9425061  0.5161807
## Group:timepoint 0.9425061  0.2285137
##  Group timepoint  emmean     SE df lower.CL upper.CL
##  0     X1H       -0.4830 0.1869 28  -0.8659 -0.10013
##  1     X1H        0.3910 0.1526 28   0.0784  0.70357
##  0     X24H      -0.3953 0.1220 28  -0.6452 -0.14541
##  1     X24H       0.0844 0.0996 28  -0.1197  0.28839
##  0     Day7      -0.2590 0.1253 28  -0.5157 -0.00225
##  1     Day7       0.2289 0.1023 28   0.0193  0.43854
```

```
##
## Confidence level used: 0.95
```



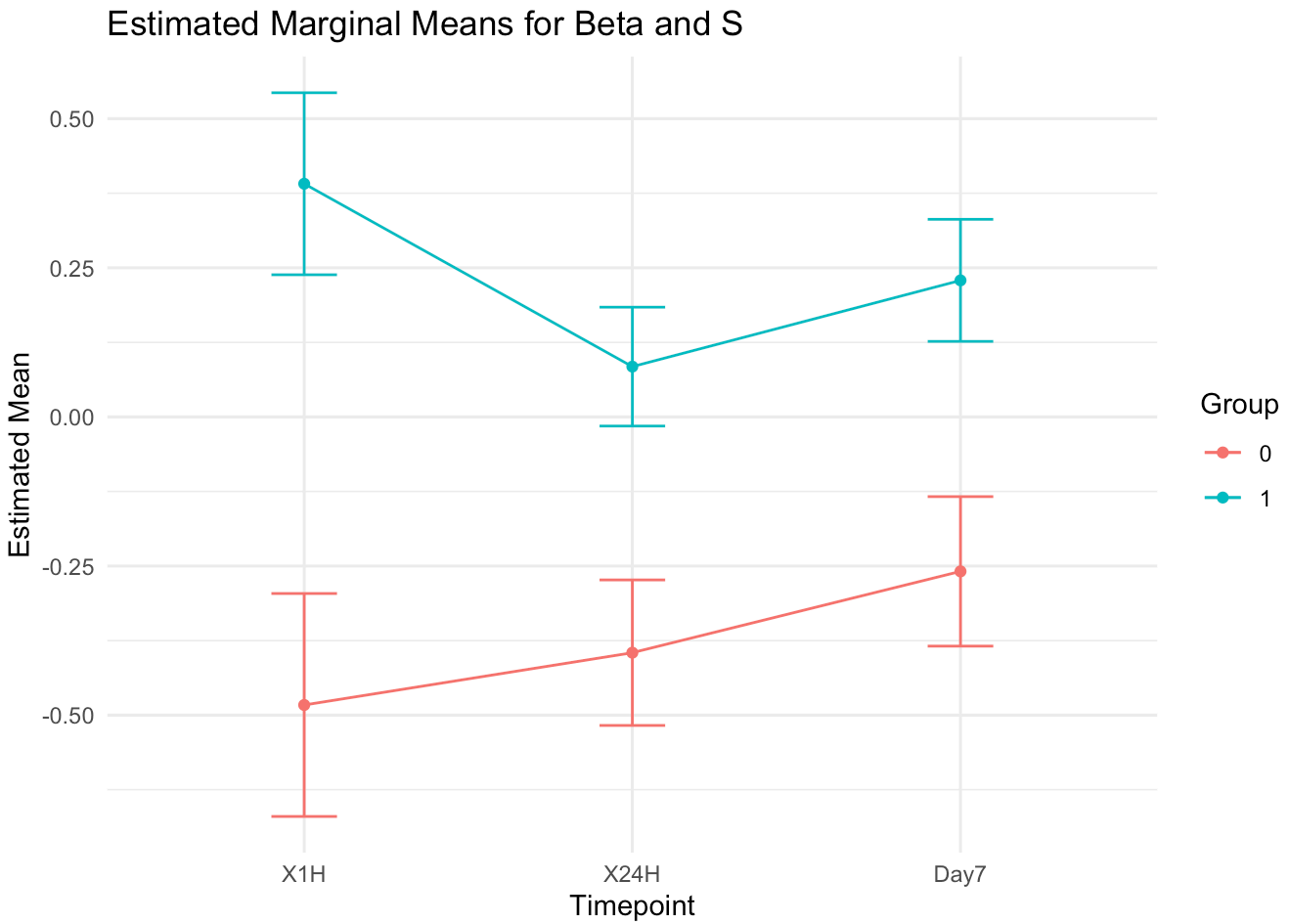

```
## # A tibble: 6 × 5
##   Group timepoint mean_value sd_value     N
##   <fct> <chr>          <dbl>    <dbl> <int>
## 1 0     1H           -0.483     0.742    48
## 2 0     24H          -0.395     0.743    48
## 3 0     Day7         -0.259     0.419    48
## 4 1     1H            0.391     0.733    72
## 5 1     24H           0.0844    0.613    72
## 6 1     Day7          0.229     0.592    72
```

```
## Warning: More than one observation per design cell, aggregating data using `fun_aggregate = mean`.
## To turn off this warning, pass `fun_aggregate = mean` explicitly.
```

```
## Contrasts set to contr.sum for the following variables: Group
```

```
## ANOVA for Frequency Band: Beta and Measure: S
##
## Univariate Type III Repeated-Measures ANOVA Assuming Sphericity
##
##                 Sum Sq num Df Error SS den Df F value    Pr(>F)
## (Intercept)     0.4500      1   8.5554     28  1.4727    0.2351
## Group           8.1388      1   8.5554     28 26.6367 1.786e-05 ***
## timepoint       0.3136      2  13.4606     56  0.6524    0.5247
## Group:timepoint 0.7310      2  13.4606     56  1.5206    0.2275
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Mauchly Tests for Sphericity
##
##                 Test statistic p-value
## timepoint              0.87241 0.15838
## Group:timepoint        0.87241 0.15838
##
##
## Greenhouse-Geisser and Huynh-Feldt Corrections
##  for Departure from Sphericity
##
##                  GG eps Pr(>F[GG])
## timepoint       0.88684     0.5074
## Group:timepoint 0.88684     0.2294
##
##                    HF eps Pr(>F[HF])
## timepoint       0.9425061  0.5161807
## Group:timepoint 0.9425061  0.2285137
##  Group timepoint  emmean     SE df lower.CL upper.CL
##  0     X1H       -0.4830 0.1869 28  -0.8659 -0.10013
##  1     X1H        0.3910 0.1526 28   0.0784  0.70357
##  0     X24H      -0.3953 0.1220 28  -0.6452 -0.14541
##  1     X24H       0.0844 0.0996 28  -0.1197  0.28839
##  0     Day7      -0.2590 0.1253 28  -0.5157 -0.00225
##  1     Day7       0.2289 0.1023 28   0.0193  0.43854
```

```
##
## Confidence level used: 0.95
```



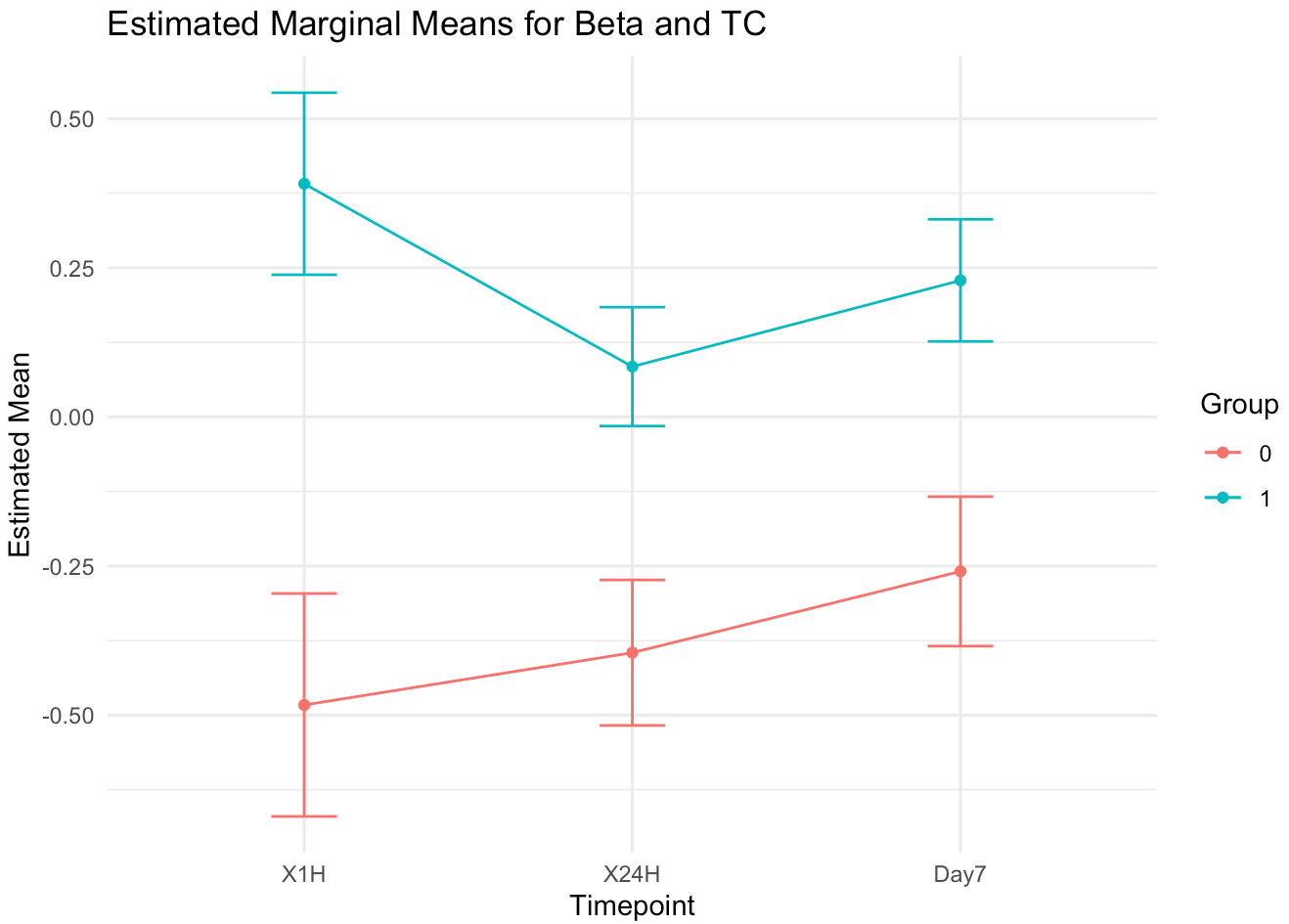

```
## # A tibble: 6 × 5
##   Group timepoint mean_value sd_value     N
##   <fct> <chr>          <dbl>    <dbl> <int>
## 1 0     1H           -0.483     0.742    48
## 2 0     24H          -0.395     0.743    48
## 3 0     Day7         -0.259     0.419    48
## 4 1     1H            0.391     0.733    72
## 5 1     24H           0.0844    0.613    72
## 6 1     Day7          0.229     0.592    72
```

```
## Warning: More than one observation per design cell, aggregating data using `fun_aggregate = mean`.
## To turn off this warning, pass `fun_aggregate = mean` explicitly.
```

```
## Contrasts set to contr.sum for the following variables: Group
```

```
## ANOVA for Frequency Band: Beta and Measure: TC
##
## Univariate Type III Repeated-Measures ANOVA Assuming Sphericity
##
##                 Sum Sq num Df Error SS den Df F value    Pr(>F)
## (Intercept)     0.4500      1   8.5554     28  1.4727    0.2351
## Group           8.1388      1   8.5554     28 26.6367 1.786e-05 ***
## timepoint       0.3136      2  13.4606     56  0.6524    0.5247
## Group:timepoint 0.7310      2  13.4606     56  1.5206    0.2275
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Mauchly Tests for Sphericity
##
##                 Test statistic p-value
## timepoint              0.87241 0.15838
## Group:timepoint        0.87241 0.15838
##
##
## Greenhouse-Geisser and Huynh-Feldt Corrections
##  for Departure from Sphericity
##
##                  GG eps Pr(>F[GG])
## timepoint       0.88684     0.5074
## Group:timepoint 0.88684     0.2294
##
##                    HF eps Pr(>F[HF])
## timepoint       0.9425061  0.5161807
## Group:timepoint 0.9425061  0.2285137
##  Group timepoint  emmean     SE df lower.CL upper.CL
##  0     X1H       -0.4830 0.1869 28  -0.8659 -0.10013
##  1     X1H        0.3910 0.1526 28   0.0784  0.70357
##  0     X24H      -0.3953 0.1220 28  -0.6452 -0.14541
##  1     X24H       0.0844 0.0996 28  -0.1197  0.28839
##  0     Day7      -0.2590 0.1253 28  -0.5157 -0.00225
##  1     Day7       0.2289 0.1023 28   0.0193  0.43854
```

```
##
## Confidence level used: 0.95
```



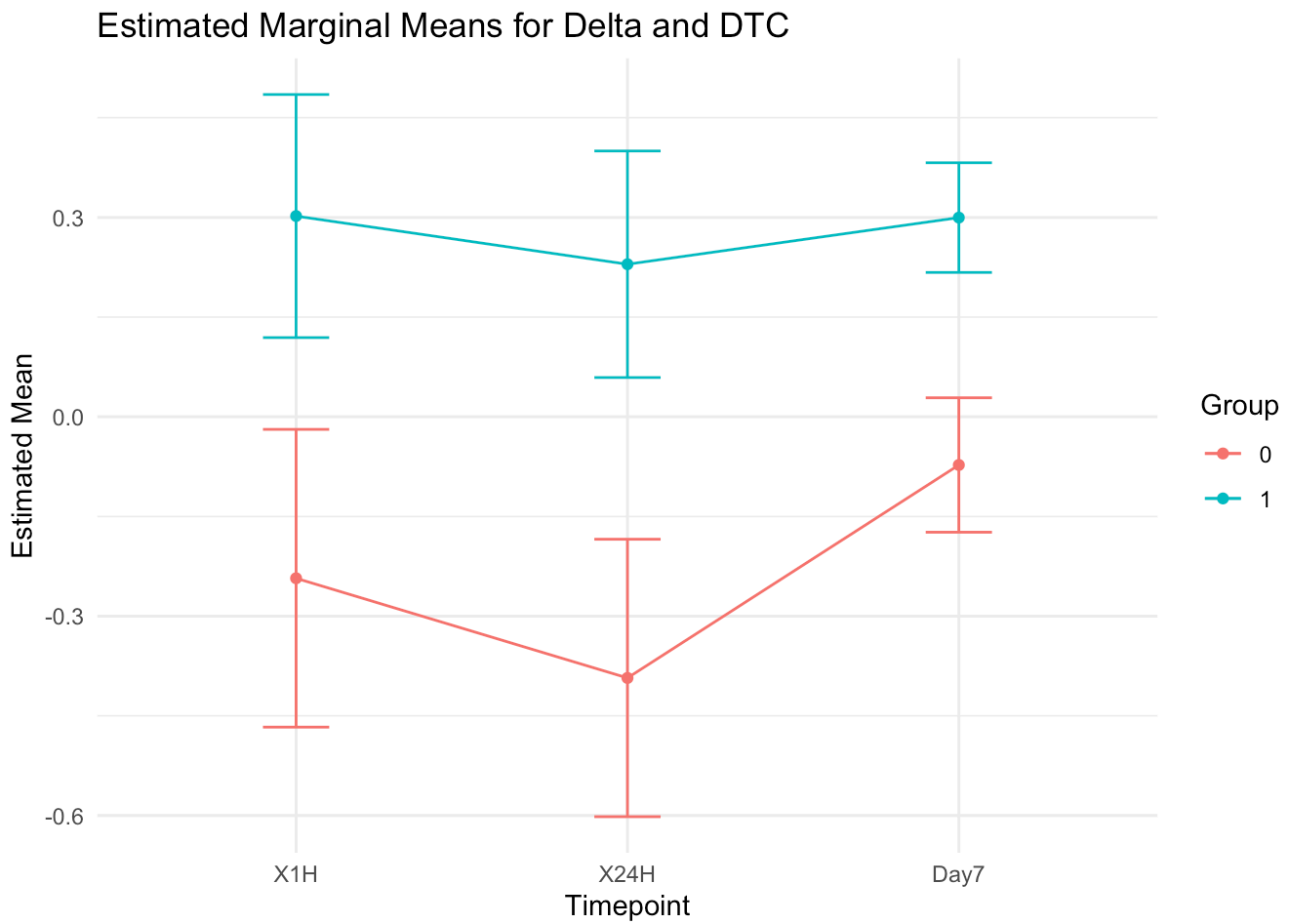

```
## # A tibble: 6 × 5
##   Group timepoint mean_value sd_value     N
##   <fct> <chr>          <dbl>    <dbl> <int>
## 1 0     1H           -0.483     0.742    48
## 2 0     24H          -0.395     0.743    48
## 3 0     Day7         -0.259     0.419    48
## 4 1     1H            0.391     0.733    72
## 5 1     24H           0.0844    0.613    72
## 6 1     Day7          0.229     0.592    72
```

```
## Warning: More than one observation per design cell, aggregating data using `fun_aggregate = mean`.
## To turn off this warning, pass `fun_aggregate = mean` explicitly.
```

```
## Contrasts set to contr.sum for the following variables: Group
```

```
## ANOVA for Frequency Band: Delta and Measure: DTC
##
## Univariate Type III Repeated-Measures ANOVA Assuming Sphericity
##
##                 Sum Sq num Df Error SS den Df F value   Pr(>F)
## (Intercept)     0.0362      1   16.282     28  0.0623 0.804789
## Group           5.6916      1   16.282     28  9.7876 0.004077 **
## timepoint       0.5530      2   18.666     56  0.8295 0.441551
## Group:timepoint 0.2364      2   18.666     56  0.3547 0.702972
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Mauchly Tests for Sphericity
##
##                 Test statistic p-value
## timepoint              0.85324 0.11734
## Group:timepoint        0.85324 0.11734
##
##
## Greenhouse-Geisser and Huynh-Feldt Corrections
##  for Departure from Sphericity
##
##                  GG eps Pr(>F[GG])
## timepoint       0.87202     0.4278
## Group:timepoint 0.87202     0.6741
##
##                    HF eps Pr(>F[HF])
## timepoint       0.9250688  0.4337727
## Group:timepoint 0.9250688  0.6865800
##  Group timepoint  emmean     SE df lower.CL upper.CL
##  0     X1H       -0.2430 0.2240 28  -0.7019   0.2159
##  1     X1H        0.3021 0.1829 28  -0.0726   0.6768
##  0     X24H      -0.3930 0.2088 28  -0.8207   0.0346
##  1     X24H       0.2296 0.1705 28  -0.1196   0.5787
##  0     Day7      -0.0725 0.1012 28  -0.2798   0.1347
##  1     Day7       0.2997 0.0826 28   0.1306   0.4689
```

```
##
## Confidence level used: 0.95
```



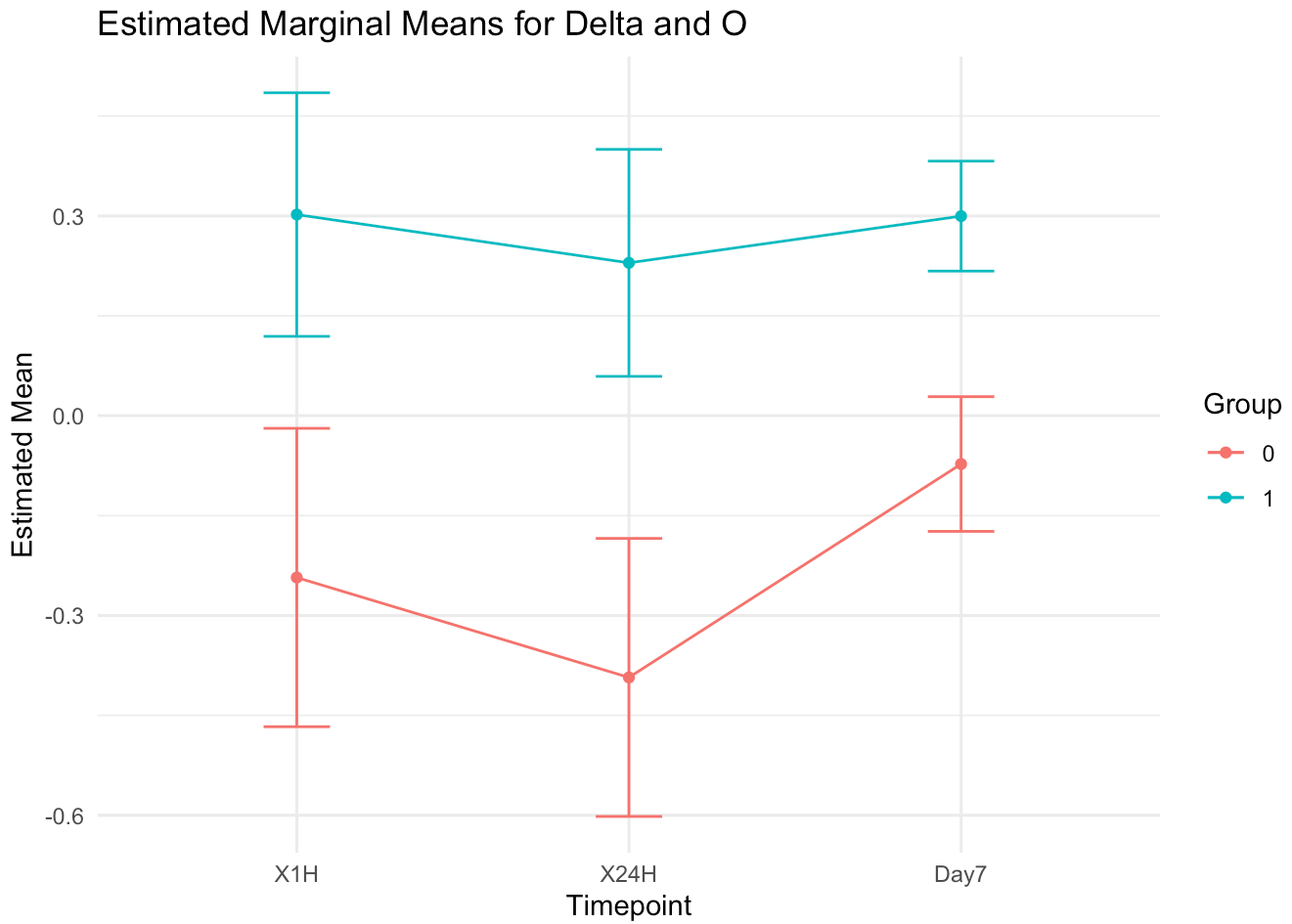

```
## # A tibble: 6 × 5
##   Group timepoint mean_value sd_value     N
##   <fct> <chr>          <dbl>    <dbl> <int>
## 1 0     1H           -0.243     0.998    48
## 2 0     24H          -0.393     0.854    48
## 3 0     Day7         -0.0725    0.361    48
## 4 1     1H            0.302     0.871    72
## 5 1     24H           0.230     0.922    72
## 6 1     Day7          0.300     0.460    72
```

```
## Warning: More than one observation per design cell, aggregating data using `fun_aggregate = mean`.
## To turn off this warning, pass `fun_aggregate = mean` explicitly.
```

```
## Contrasts set to contr.sum for the following variables: Group
```

```
## ANOVA for Frequency Band: Delta and Measure: O
##
## Univariate Type III Repeated-Measures ANOVA Assuming Sphericity
##
##                 Sum Sq num Df Error SS den Df F value   Pr(>F)
## (Intercept)     0.0362      1   16.282     28  0.0623 0.804789
## Group           5.6916      1   16.282     28  9.7876 0.004077 **
## timepoint       0.5530      2   18.666     56  0.8295 0.441551
## Group:timepoint 0.2364      2   18.666     56  0.3547 0.702972
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Mauchly Tests for Sphericity
##
##                 Test statistic p-value
## timepoint              0.85324 0.11734
## Group:timepoint        0.85324 0.11734
##
##
## Greenhouse-Geisser and Huynh-Feldt Corrections
##  for Departure from Sphericity
##
##                  GG eps Pr(>F[GG])
## timepoint       0.87202     0.4278
## Group:timepoint 0.87202     0.6741
##
##                    HF eps Pr(>F[HF])
## timepoint       0.9250688  0.4337727
## Group:timepoint 0.9250688  0.6865800
##  Group timepoint  emmean     SE df lower.CL upper.CL
##  0     X1H       -0.2430 0.2240 28  -0.7019   0.2159
##  1     X1H        0.3021 0.1829 28  -0.0726   0.6768
##  0     X24H      -0.3930 0.2088 28  -0.8207   0.0346
##  1     X24H       0.2296 0.1705 28  -0.1196   0.5787
##  0     Day7      -0.0725 0.1012 28  -0.2798   0.1347
##  1     Day7       0.2997 0.0826 28   0.1306   0.4689
```

```
##
## Confidence level used: 0.95
```



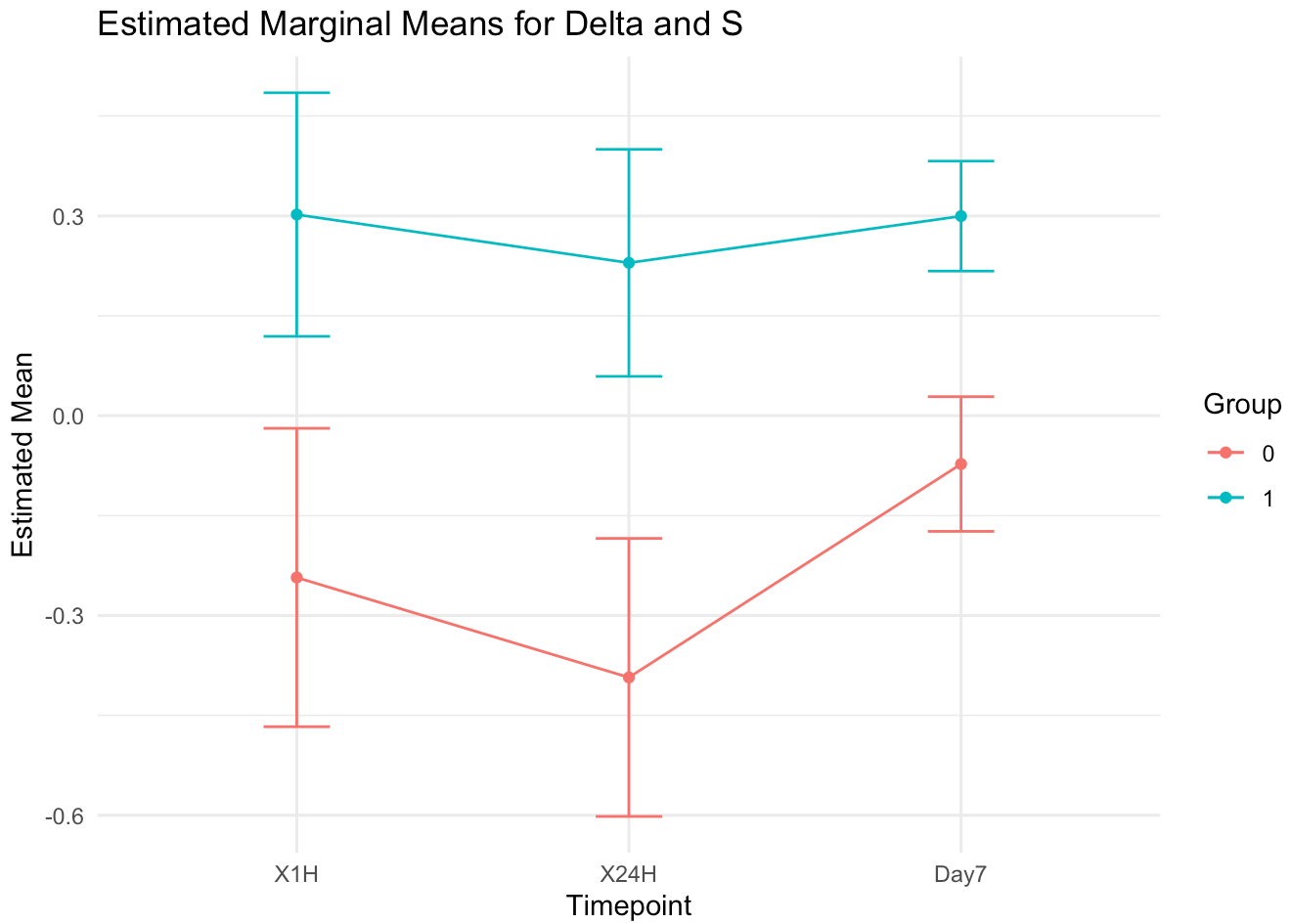

```
## # A tibble: 6 × 5
##   Group timepoint mean_value sd_value     N
##   <fct> <chr>          <dbl>    <dbl> <int>
## 1 0     1H           -0.243     0.998    48
## 2 0     24H          -0.393     0.854    48
## 3 0     Day7         -0.0725    0.361    48
## 4 1     1H            0.302     0.871    72
## 5 1     24H           0.230     0.922    72
## 6 1     Day7          0.300     0.460    72
```

```
## Warning: More than one observation per design cell, aggregating data using `fun_aggregate = mean`.
## To turn off this warning, pass `fun_aggregate = mean` explicitly.
```

```
## Contrasts set to contr.sum for the following variables: Group
```

```
## ANOVA for Frequency Band: Delta and Measure: S
##
## Univariate Type III Repeated-Measures ANOVA Assuming Sphericity
##
##                 Sum Sq num Df Error SS den Df F value   Pr(>F)
## (Intercept)     0.0362      1   16.282     28  0.0623 0.804789
## Group           5.6916      1   16.282     28  9.7876 0.004077 **
## timepoint       0.5530      2   18.666     56  0.8295 0.441551
## Group:timepoint 0.2364      2   18.666     56  0.3547 0.702972
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Mauchly Tests for Sphericity
##
##                 Test statistic p-value
## timepoint              0.85324 0.11734
## Group:timepoint        0.85324 0.11734
##
##
## Greenhouse-Geisser and Huynh-Feldt Corrections
##  for Departure from Sphericity
##
##                  GG eps Pr(>F[GG])
## timepoint       0.87202     0.4278
## Group:timepoint 0.87202     0.6741
##
##                    HF eps Pr(>F[HF])
## timepoint       0.9250688  0.4337727
## Group:timepoint 0.9250688  0.6865800
##  Group timepoint  emmean     SE df lower.CL upper.CL
##  0     X1H       -0.2430 0.2240 28  -0.7019   0.2159
##  1     X1H        0.3021 0.1829 28  -0.0726   0.6768
##  0     X24H      -0.3930 0.2088 28  -0.8207   0.0346
##  1     X24H       0.2296 0.1705 28  -0.1196   0.5787
##  0     Day7      -0.0725 0.1012 28  -0.2798   0.1347
##  1     Day7       0.2997 0.0826 28   0.1306   0.4689
```

```
##
## Confidence level used: 0.95
```



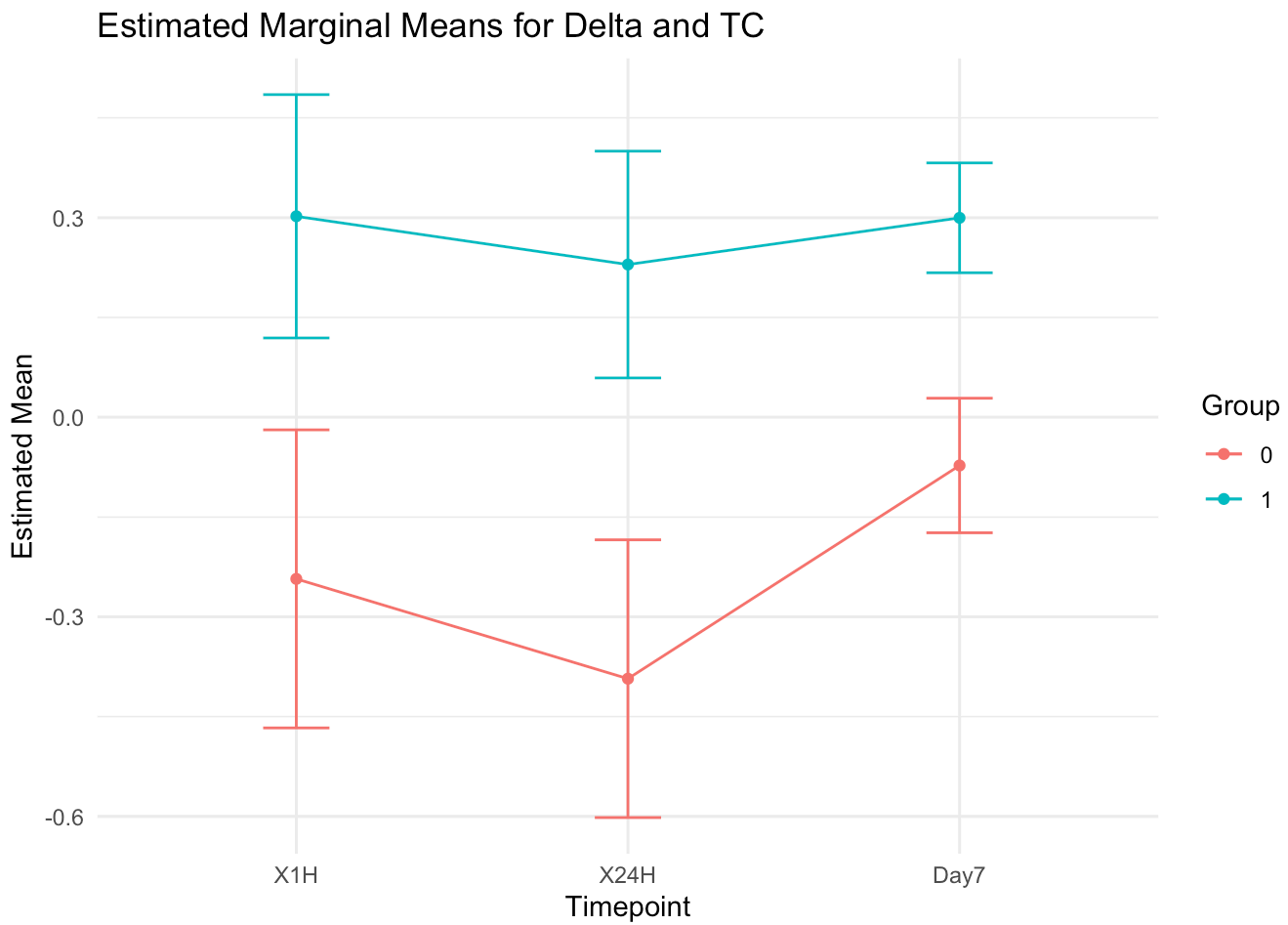

```
## # A tibble: 6 × 5
##   Group timepoint mean_value sd_value     N
##   <fct> <chr>          <dbl>    <dbl> <int>
## 1 0     1H           -0.243     0.998    48
## 2 0     24H          -0.393     0.854    48
## 3 0     Day7         -0.0725    0.361    48
## 4 1     1H            0.302     0.871    72
## 5 1     24H           0.230     0.922    72
## 6 1     Day7          0.300     0.460    72
```

```
## Warning: More than one observation per design cell, aggregating data using `fun_aggregate = mean`.
## To turn off this warning, pass `fun_aggregate = mean` explicitly.
```

```
## Contrasts set to contr.sum for the following variables: Group
```

```
## ANOVA for Frequency Band: Delta and Measure: TC
##
## Univariate Type III Repeated-Measures ANOVA Assuming Sphericity
##
##                 Sum Sq num Df Error SS den Df F value   Pr(>F)
## (Intercept)     0.0362      1   16.282     28  0.0623 0.804789
## Group           5.6916      1   16.282     28  9.7876 0.004077 **
## timepoint       0.5530      2   18.666     56  0.8295 0.441551
## Group:timepoint 0.2364      2   18.666     56  0.3547 0.702972
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Mauchly Tests for Sphericity
##
##                 Test statistic p-value
## timepoint              0.85324 0.11734
## Group:timepoint        0.85324 0.11734
##
##
## Greenhouse-Geisser and Huynh-Feldt Corrections
##  for Departure from Sphericity
##
##                  GG eps Pr(>F[GG])
## timepoint       0.87202     0.4278
## Group:timepoint 0.87202     0.6741
##
##                    HF eps Pr(>F[HF])
## timepoint       0.9250688  0.4337727
## Group:timepoint 0.9250688  0.6865800
##  Group timepoint  emmean     SE df lower.CL upper.CL
##  0     X1H       -0.2430 0.2240 28  -0.7019   0.2159
##  1     X1H        0.3021 0.1829 28  -0.0726   0.6768
##  0     X24H      -0.3930 0.2088 28  -0.8207   0.0346
##  1     X24H       0.2296 0.1705 28  -0.1196   0.5787
##  0     Day7      -0.0725 0.1012 28  -0.2798   0.1347
##  1     Day7       0.2997 0.0826 28   0.1306   0.4689
```

```
##
## Confidence level used: 0.95
```




```
## # A tibble: 6 × 5
##   Group timepoint mean_value sd_value     N
##   <fct> <chr>          <dbl>    <dbl> <int>
## 1 0     1H           -0.243     0.998    48
## 2 0     24H          -0.393     0.854    48
## 3 0     Day7         -0.0725    0.361    48
## 4 1     1H            0.302     0.871    72
## 5 1     24H           0.230     0.922    72
## 6 1     Day7          0.300     0.460    72
```

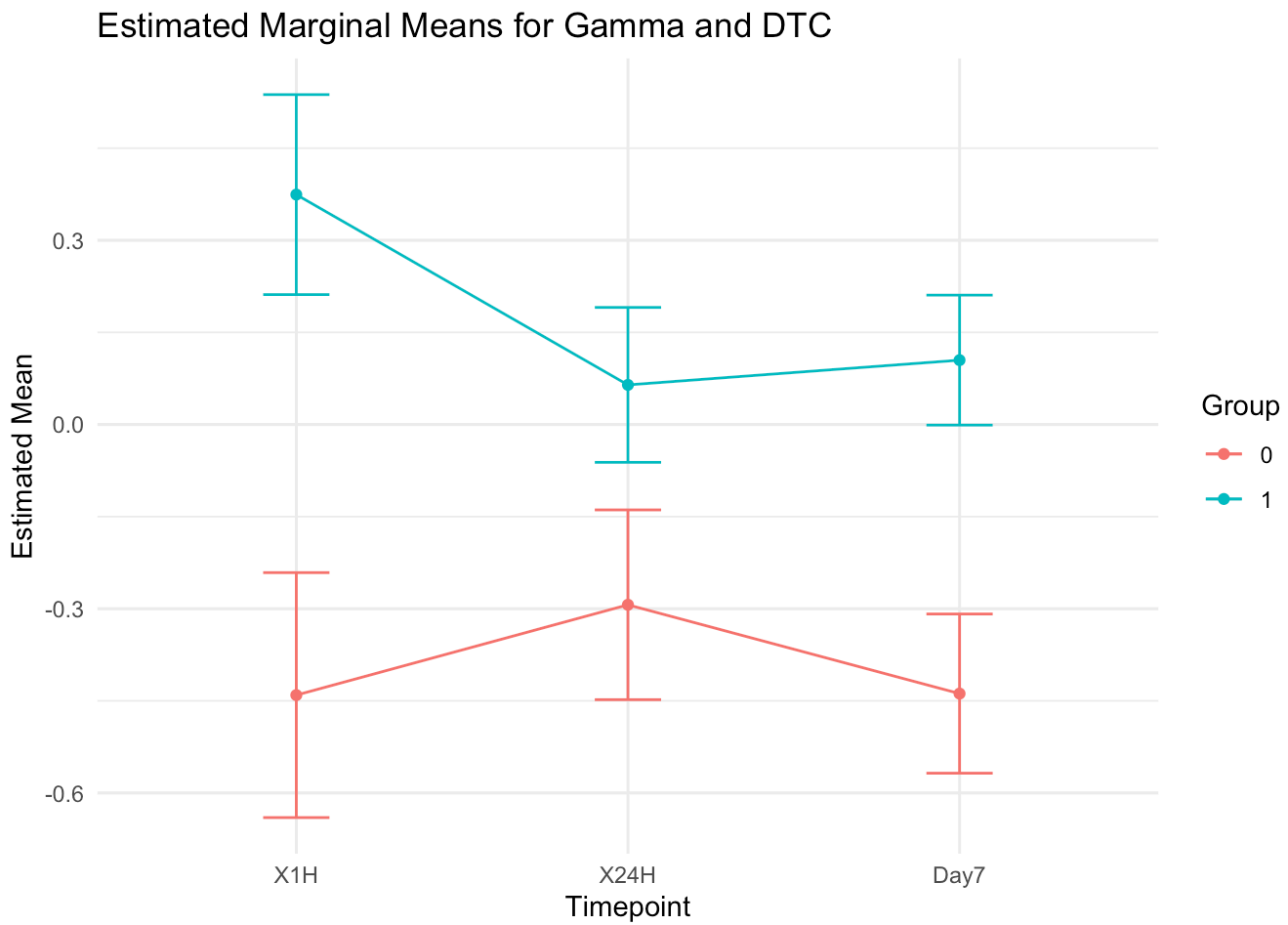
```
## Warning: More than one observation per design cell, aggregating data using `fun_aggregate = mean`.
## To turn off this warning, pass `fun_aggregate = mean` explicitly.
```

```
## Contrasts set to contr.sum for the following variables: Group
```

```
## ANOVA for Frequency Band: Gamma and Measure: DTC
```

```
## Warning in summary.Anova.mlm(object$Anova, multivariate = FALSE): HF eps > 1
## treated as 1
```

```
##
## Univariate Type III Repeated-Measures ANOVA Assuming Sphericity
##
##                 Sum Sq num Df Error SS den Df F value    Pr(>F)
## (Intercept)     0.9487      1   11.176     28  2.3769 0.1343714
## Group           7.0691      1   11.176     28 17.7102 0.0002398 ***
## timepoint       0.2610      2   15.858     56  0.4608 0.6331324
## Group:timepoint 0.7610      2   15.858     56  1.3436 0.2691876
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Mauchly Tests for Sphericity
##
##                 Test statistic p-value
## timepoint              0.94782 0.48508
## Group:timepoint        0.94782 0.48508
##
##
## Greenhouse-Geisser and Huynh-Feldt Corrections
##  for Departure from Sphericity
##
##                  GG eps Pr(>F[GG])
## timepoint       0.95041     0.6234
## Group:timepoint 0.95041     0.2690
##
##                   HF eps Pr(>F[HF])
## timepoint       1.017729  0.6331324
## Group:timepoint 1.017729  0.2691876
##  Group timepoint  emmean    SE df lower.CL upper.CL
##  0     X1H       -0.4407 0.199 28  -0.8492  -0.0322
##  1     X1H        0.3744 0.163 28   0.0409   0.7080
##  0     X24H      -0.2936 0.155 28  -0.6102   0.0230
##  1     X24H       0.0645 0.126 28  -0.1940   0.3230
##  0     Day7      -0.4382 0.130 28  -0.7037  -0.1727
##  1     Day7       0.1048 0.106 28  -0.1120   0.3216
##
## Confidence level used: 0.95
```




```
## # A tibble: 6 × 5
##   Group timepoint mean_value sd_value     N
##   <fct> <chr>          <dbl>    <dbl> <int>
## 1 0     1H           -0.441     0.952    48
## 2 0     24H          -0.294     0.703    48
## 3 0     Day7         -0.438     0.566    48
## 4 1     1H            0.374     0.669    72
## 5 1     24H           0.0645    0.874    72
## 6 1     Day7          0.105     0.649    72
```

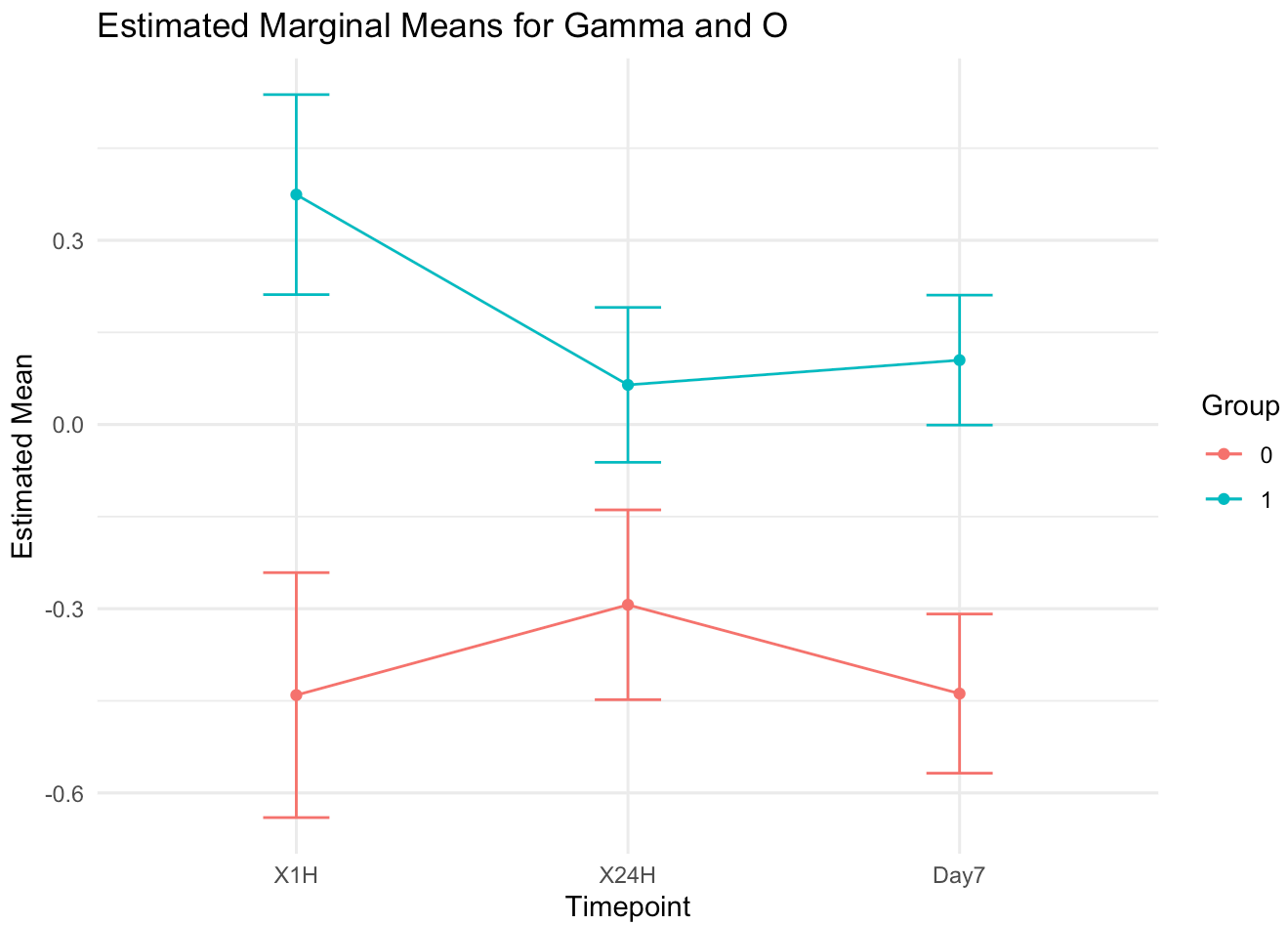
```
## Warning: More than one observation per design cell, aggregating data using `fun_aggregate = mean`.
## To turn off this warning, pass `fun_aggregate = mean` explicitly.
```

```
## Contrasts set to contr.sum for the following variables: Group
```

```
## ANOVA for Frequency Band: Gamma and Measure: O
```

```
## Warning in summary.Anova.mlm(object$Anova, multivariate = FALSE): HF eps > 1
## treated as 1
```

```
##
## Univariate Type III Repeated-Measures ANOVA Assuming Sphericity
##
##                 Sum Sq num Df Error SS den Df F value    Pr(>F)
## (Intercept)     0.9487      1   11.176     28  2.3769 0.1343714
## Group           7.0691      1   11.176     28 17.7102 0.0002398 ***
## timepoint       0.2610      2   15.858     56  0.4608 0.6331324
## Group:timepoint 0.7610      2   15.858     56  1.3436 0.2691876
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Mauchly Tests for Sphericity
##
##                 Test statistic p-value
## timepoint              0.94782 0.48508
## Group:timepoint        0.94782 0.48508
##
##
## Greenhouse-Geisser and Huynh-Feldt Corrections
##  for Departure from Sphericity
##
##                  GG eps Pr(>F[GG])
## timepoint       0.95041     0.6234
## Group:timepoint 0.95041     0.2690
##
##                   HF eps Pr(>F[HF])
## timepoint       1.017729  0.6331324
## Group:timepoint 1.017729  0.2691876
##  Group timepoint  emmean    SE df lower.CL upper.CL
##  0     X1H       -0.4407 0.199 28  -0.8492  -0.0322
##  1     X1H        0.3744 0.163 28   0.0409   0.7080
##  0     X24H      -0.2936 0.155 28  -0.6102   0.0230
##  1     X24H       0.0645 0.126 28  -0.1940   0.3230
##  0     Day7      -0.4382 0.130 28  -0.7037  -0.1727
##  1     Day7       0.1048 0.106 28  -0.1120   0.3216
##
## Confidence level used: 0.95
```




```
## # A tibble: 6 × 5
##   Group timepoint mean_value sd_value     N
##   <fct> <chr>          <dbl>    <dbl> <int>
## 1 0     1H           -0.441     0.952    48
## 2 0     24H          -0.294     0.703    48
## 3 0     Day7         -0.438     0.566    48
## 4 1     1H            0.374     0.669    72
## 5 1     24H           0.0645    0.874    72
## 6 1     Day7          0.105     0.649    72
```

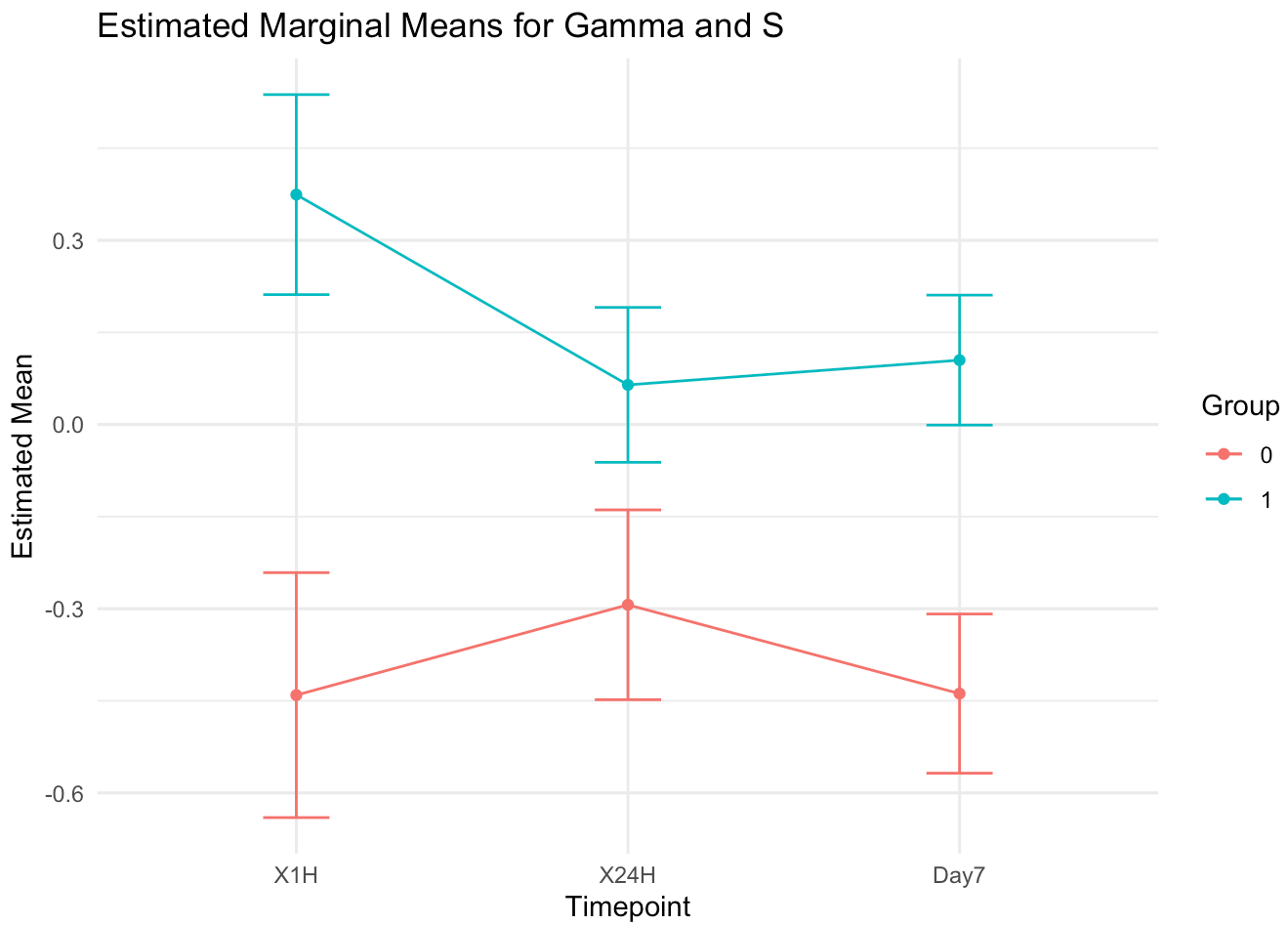
```
## Warning: More than one observation per design cell, aggregating data using `fun_aggregate = mean`.
## To turn off this warning, pass `fun_aggregate = mean` explicitly.
```

```
## Contrasts set to contr.sum for the following variables: Group
```

```
## ANOVA for Frequency Band: Gamma and Measure: S
```

```
## Warning in summary.Anova.mlm(object$Anova, multivariate = FALSE): HF eps > 1
## treated as 1
```

```
##
## Univariate Type III Repeated-Measures ANOVA Assuming Sphericity
##
##                 Sum Sq num Df Error SS den Df F value    Pr(>F)
## (Intercept)     0.9487      1   11.176     28  2.3769 0.1343714
## Group           7.0691      1   11.176     28 17.7102 0.0002398 ***
## timepoint       0.2610      2   15.858     56  0.4608 0.6331324
## Group:timepoint 0.7610      2   15.858     56  1.3436 0.2691876
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Mauchly Tests for Sphericity
##
##                 Test statistic p-value
## timepoint              0.94782 0.48508
## Group:timepoint        0.94782 0.48508
##
##
## Greenhouse-Geisser and Huynh-Feldt Corrections
##  for Departure from Sphericity
##
##                  GG eps Pr(>F[GG])
## timepoint       0.95041     0.6234
## Group:timepoint 0.95041     0.2690
##
##                    HF eps Pr(>F[HF])
## timepoint       1.017729  0.6331324
## Group:timepoint 1.017729  0.2691876
##  Group timepoint  emmean    SE df lower.CL upper.CL
##  0     X1H       -0.4407 0.199 28  -0.8492  -0.0322
##  1     X1H        0.3744 0.163 28   0.0409   0.7080
##  0     X24H      -0.2936 0.155 28  -0.6102   0.0230
##  1     X24H       0.0645 0.126 28  -0.1940   0.3230
##  0     Day7      -0.4382 0.130 28  -0.7037  -0.1727
##  1     Day7       0.1048 0.106 28  -0.1120   0.3216
##
## Confidence level used: 0.95
```




```
## # A tibble: 6 × 5
##   Group timepoint mean_value sd_value     N
##   <fct> <chr>          <dbl>    <dbl> <int>
## 1 0     1H           -0.441     0.952    48
## 2 0     24H          -0.294     0.703    48
## 3 0     Day7         -0.438     0.566    48
## 4 1     1H            0.374     0.669    72
## 5 1     24H           0.0645    0.874    72
## 6 1     Day7          0.105     0.649    72
```

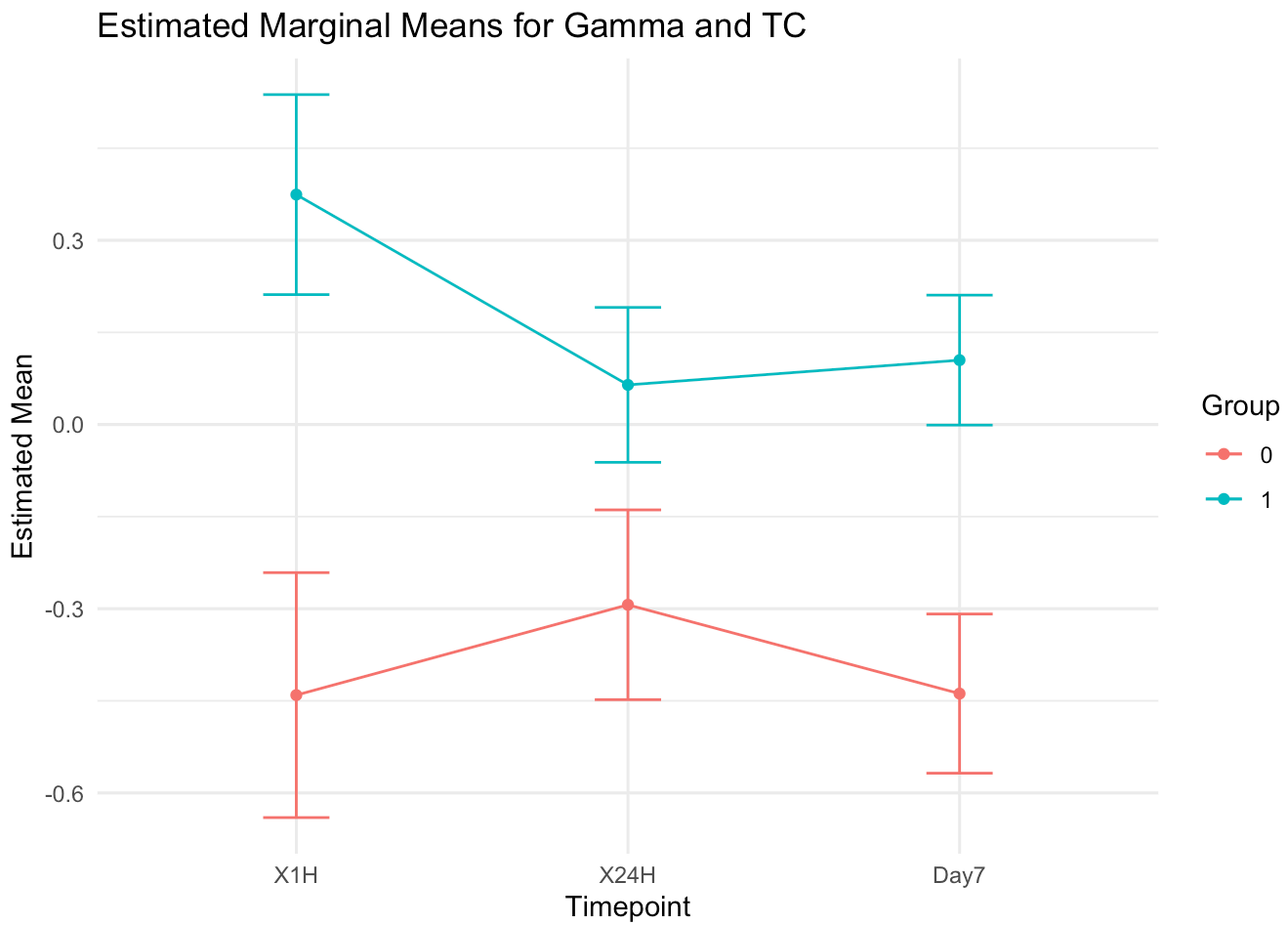
```
## Warning: More than one observation per design cell, aggregating data using `fun_aggregate = mean`.
## To turn off this warning, pass `fun_aggregate = mean` explicitly.
```

```
## Contrasts set to contr.sum for the following variables: Group
```

```
## ANOVA for Frequency Band: Gamma and Measure: TC
```

```
## Warning in summary.Anova.mlm(object$Anova, multivariate = FALSE): HF eps > 1
## treated as 1
```

```
##
## Univariate Type III Repeated-Measures ANOVA Assuming Sphericity
##
##                 Sum Sq num Df Error SS den Df F value    Pr(>F)
## (Intercept)     0.9487      1   11.176     28  2.3769 0.1343714
## Group           7.0691      1   11.176     28 17.7102 0.0002398 ***
## timepoint       0.2610      2   15.858     56  0.4608 0.6331324
## Group:timepoint 0.7610      2   15.858     56  1.3436 0.2691876
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Mauchly Tests for Sphericity
##
##                 Test statistic p-value
## timepoint              0.94782 0.48508
## Group:timepoint        0.94782 0.48508
##
##
## Greenhouse-Geisser and Huynh-Feldt Corrections
##  for Departure from Sphericity
##
##                  GG eps Pr(>F[GG])
## timepoint       0.95041     0.6234
## Group:timepoint 0.95041     0.2690
##
##                   HF eps Pr(>F[HF])
## timepoint       1.017729  0.6331324
## Group:timepoint 1.017729  0.2691876
##  Group timepoint  emmean    SE df lower.CL upper.CL
##  0     X1H       -0.4407 0.199 28  -0.8492  -0.0322
##  1     X1H        0.3744 0.163 28   0.0409   0.7080
##  0     X24H      -0.2936 0.155 28  -0.6102   0.0230
##  1     X24H       0.0645 0.126 28  -0.1940   0.3230
##  0     Day7      -0.4382 0.130 28  -0.7037  -0.1727
##  1     Day7       0.1048 0.106 28  -0.1120   0.3216
##
## Confidence level used: 0.95
```




```
## # A tibble: 6 × 5
##   Group timepoint mean_value sd_value     N
##   <fct> <chr>          <dbl>    <dbl> <int>
## 1 0     1H           -0.441     0.952    48
## 2 0     24H          -0.294     0.703    48
## 3 0     Day7         -0.438     0.566    48
## 4 1     1H            0.374     0.669    72
## 5 1     24H           0.0645    0.874    72
## 6 1     Day7          0.105     0.649    72
```

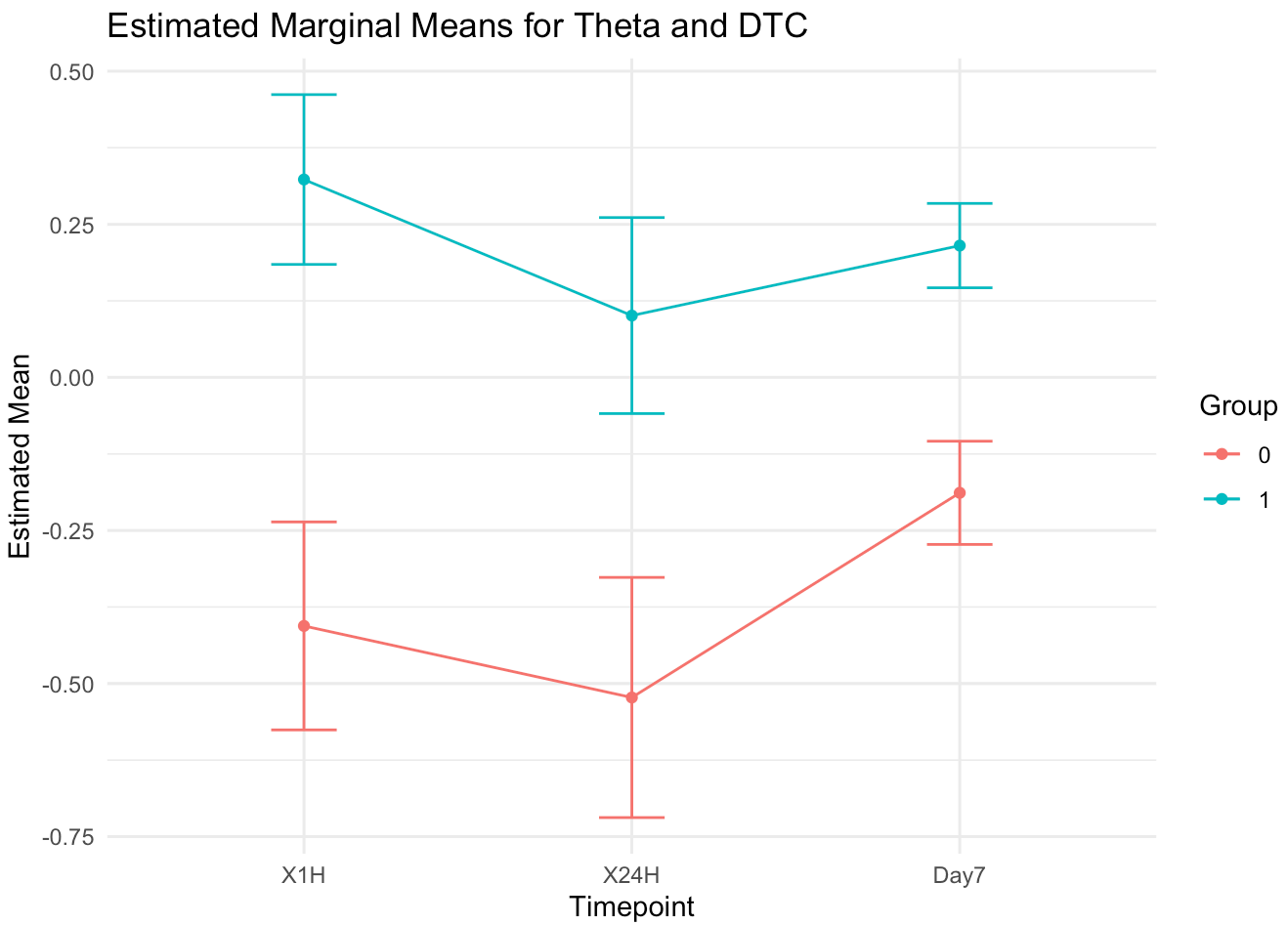
```
## Warning: More than one observation per design cell, aggregating data using `fun_aggregate = mean`.
## To turn off this warning, pass `fun_aggregate = mean` explicitly.
```

```
## Contrasts set to contr.sum for the following variables: Group
```

```
## ANOVA for Frequency Band: Theta and Measure: DTC
```

```
## Warning in summary.Anova.mlm(object$Anova, multivariate = FALSE): HF eps > 1
## treated as 1
```

```
##
## Univariate Type III Repeated-Measures ANOVA Assuming Sphericity
##
##                 Sum Sq num Df Error SS den Df F value    Pr(>F)
## (Intercept)     0.5480      1   11.775     28  1.3031 0.2633220
## Group           7.4058      1   11.775     28 17.6102 0.0002476 ***
## timepoint       0.7876      2   13.227     56  1.6673 0.1979918
## Group:timepoint 0.3968      2   13.227     56  0.8400 0.4370584
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Mauchly Tests for Sphericity
##
##                 Test statistic p-value
## timepoint              0.98581 0.82448
## Group:timepoint        0.98581 0.82448
##
##
## Greenhouse-Geisser and Huynh-Feldt Corrections
##  for Departure from Sphericity
##
##                 GG eps Pr(>F[GG])
## timepoint        0.986     0.1984
## Group:timepoint  0.986     0.4357
##
##                   HF eps Pr(>F[HF])
## timepoint       1.060171  0.1979918
## Group:timepoint 1.060171  0.4370584
##  Group timepoint emmean     SE df lower.CL upper.CL
##  0     X1H       -0.406 0.1698 28  -0.7538  -0.0580
##  1     X1H        0.323 0.1387 28   0.0392   0.6072
##  0     X24H      -0.523 0.1961 28  -0.9245  -0.1211
##  1     X24H       0.101 0.1601 28  -0.2270   0.4290
##  0     Day7      -0.189 0.0843 28  -0.3613  -0.0158
##  1     Day7       0.215 0.0688 28   0.0742   0.3563
##
## Confidence level used: 0.95
```




```
## # A tibble: 6 × 5
##   Group timepoint mean_value sd_value     N
##   <fct> <chr>          <dbl>    <dbl> <int>
## 1 0     1H            -0.406    0.862    48
## 2 0     24H           -0.523    1.03     48
## 3 0     Day7          -0.189    0.416    48
## 4 1     1H             0.323    0.837    72
## 5 1     24H            0.101    0.785    72
## 6 1     Day7           0.215    0.473    72
```

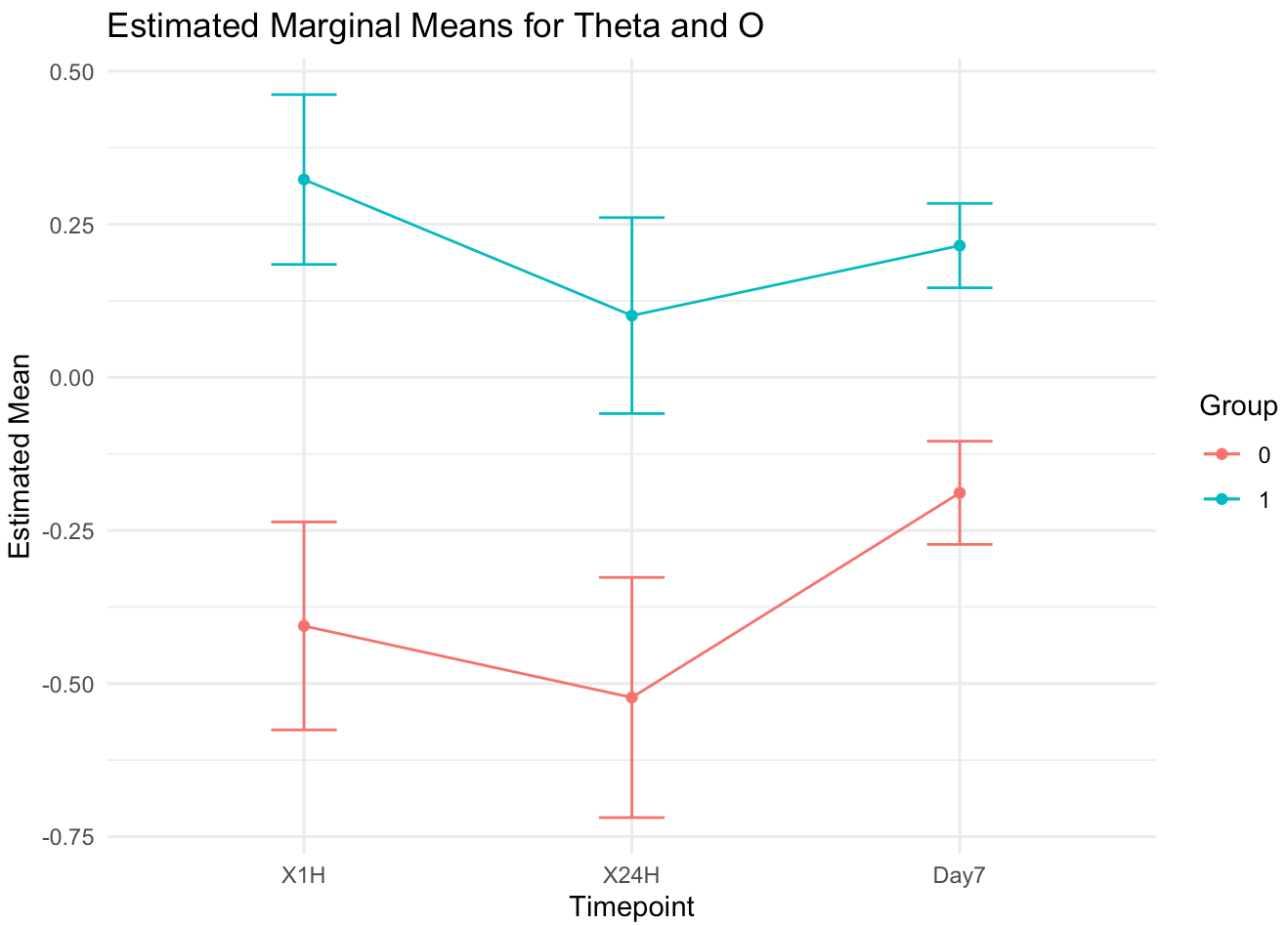
```
## Warning: More than one observation per design cell, aggregating data using `fun_aggregate = mean`.
## To turn off this warning, pass `fun_aggregate = mean` explicitly.
```

```
## Contrasts set to contr.sum for the following variables: Group
```

```
## ANOVA for Frequency Band: Theta and Measure: O
```

```
## Warning in summary.Anova.mlm(object$Anova, multivariate = FALSE): HF eps > 1
## treated as 1
```

```
##
## Univariate Type III Repeated-Measures ANOVA Assuming Sphericity
##
##                 Sum Sq num Df Error SS den Df F value    Pr(>F)
## (Intercept)     0.5480      1   11.775     28  1.3031 0.2633220
## Group           7.4058      1   11.775     28 17.6102 0.0002476 ***
## timepoint       0.7876      2   13.227     56  1.6673 0.1979918
## Group:timepoint 0.3968      2   13.227     56  0.8400 0.4370584
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Mauchly Tests for Sphericity
##
##                 Test statistic p-value
## timepoint              0.98581 0.82448
## Group:timepoint        0.98581 0.82448
##
##
## Greenhouse-Geisser and Huynh-Feldt Corrections
##  for Departure from Sphericity
##
##                 GG eps Pr(>F[GG])
## timepoint        0.986     0.1984
## Group:timepoint  0.986     0.4357
##
##                   HF eps Pr(>F[HF])
## timepoint       1.060171  0.1979918
## Group:timepoint 1.060171  0.4370584
##  Group timepoint emmean     SE df lower.CL upper.CL
##  0     X1H       -0.406 0.1698 28  -0.7538  -0.0580
##  1     X1H        0.323 0.1387 28   0.0392   0.6072
##  0     X24H      -0.523 0.1961 28  -0.9245  -0.1211
##  1     X24H       0.101 0.1601 28  -0.2270   0.4290
##  0     Day7      -0.189 0.0843 28  -0.3613  -0.0158
##  1     Day7       0.215 0.0688 28   0.0742   0.3563
##
## Confidence level used: 0.95
```




```
## # A tibble: 6 × 5
##   Group timepoint mean_value sd_value     N
##   <fct> <chr>          <dbl>    <dbl> <int>
## 1 0     1H            -0.406    0.862    48
## 2 0     24H           -0.523    1.03     48
## 3 0     Day7          -0.189    0.416    48
## 4 1     1H             0.323    0.837    72
## 5 1     24H            0.101    0.785    72
## 6 1     Day7           0.215    0.473    72
```

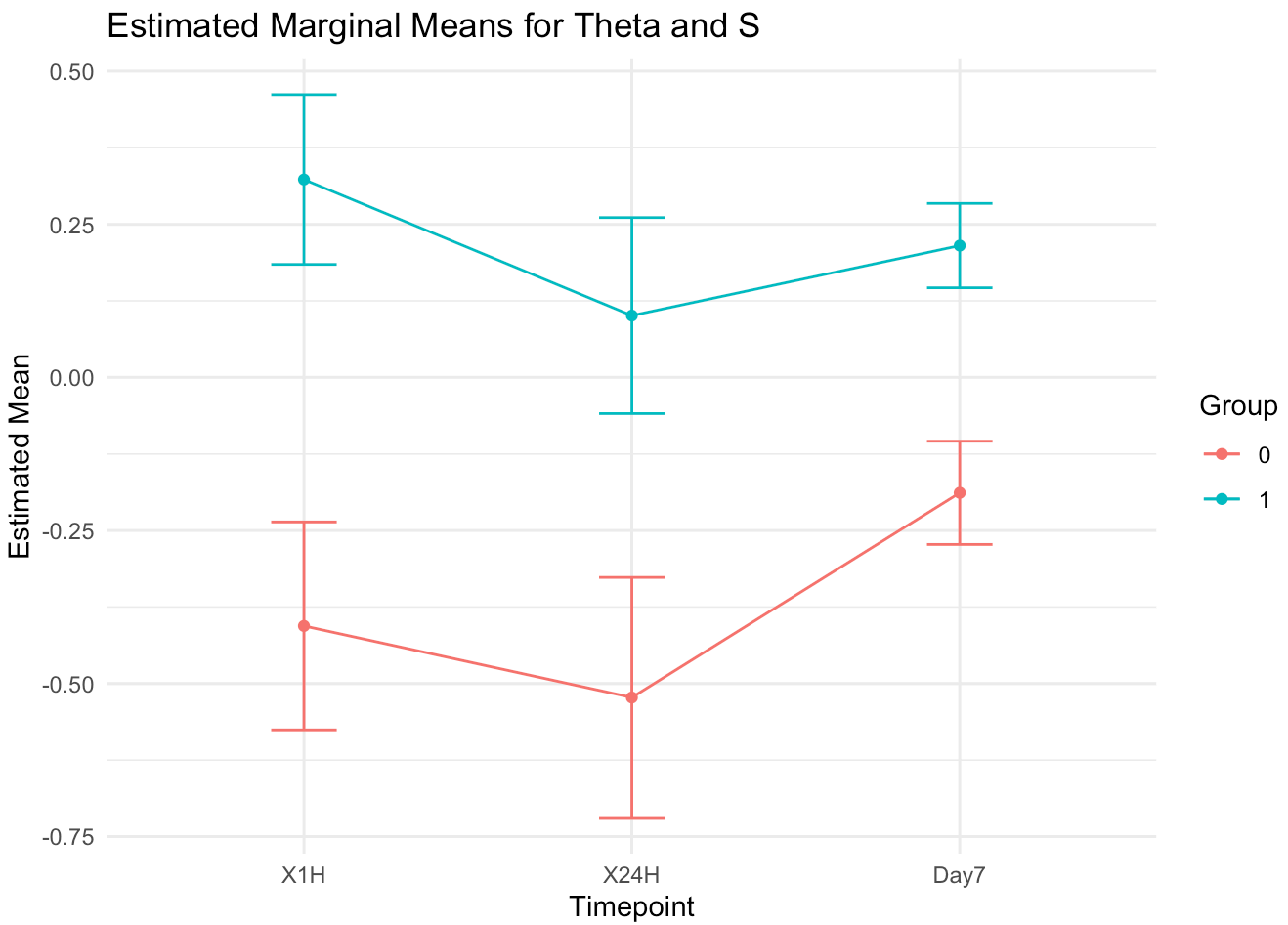
```
## Warning: More than one observation per design cell, aggregating data using `fun_aggregate = mean`.
## To turn off this warning, pass `fun_aggregate = mean` explicitly.
```

```
## Contrasts set to contr.sum for the following variables: Group
```

```
## ANOVA for Frequency Band: Theta and Measure: S
```

```
## Warning in summary.Anova.mlm(object$Anova, multivariate = FALSE): HF eps > 1
## treated as 1
```

```
##
## Univariate Type III Repeated-Measures ANOVA Assuming Sphericity
##
##                 Sum Sq num Df Error SS den Df F value    Pr(>F)
## (Intercept)     0.5480      1   11.775     28  1.3031 0.2633220
## Group           7.4058      1   11.775     28 17.6102 0.0002476 ***
## timepoint       0.7876      2   13.227     56  1.6673 0.1979918
## Group:timepoint 0.3968      2   13.227     56  0.8400 0.4370584
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Mauchly Tests for Sphericity
##
##                 Test statistic p-value
## timepoint              0.98581 0.82448
## Group:timepoint        0.98581 0.82448
##
##
## Greenhouse-Geisser and Huynh-Feldt Corrections
##  for Departure from Sphericity
##
##                 GG eps Pr(>F[GG])
## timepoint        0.986     0.1984
## Group:timepoint  0.986     0.4357
##
##                   HF eps Pr(>F[HF])
## timepoint       1.060171  0.1979918
## Group:timepoint 1.060171  0.4370584
##  Group timepoint emmean     SE df lower.CL upper.CL
##  0     X1H       -0.406 0.1698 28  -0.7538  -0.0580
##  1     X1H        0.323 0.1387 28   0.0392   0.6072
##  0     X24H      -0.523 0.1961 28  -0.9245  -0.1211
##  1     X24H       0.101 0.1601 28  -0.2270   0.4290
##  0     Day7      -0.189 0.0843 28  -0.3613  -0.0158
##  1     Day7       0.215 0.0688 28   0.0742   0.3563
##
## Confidence level used: 0.95
```




```
## # A tibble: 6 × 5
##   Group timepoint mean_value sd_value     N
##   <fct> <chr>          <dbl>    <dbl> <int>
## 1 0     1H            -0.406    0.862    48
## 2 0     24H           -0.523    1.03     48
## 3 0     Day7          -0.189    0.416    48
## 4 1     1H             0.323    0.837    72
## 5 1     24H            0.101    0.785    72
## 6 1     Day7           0.215    0.473    72
```

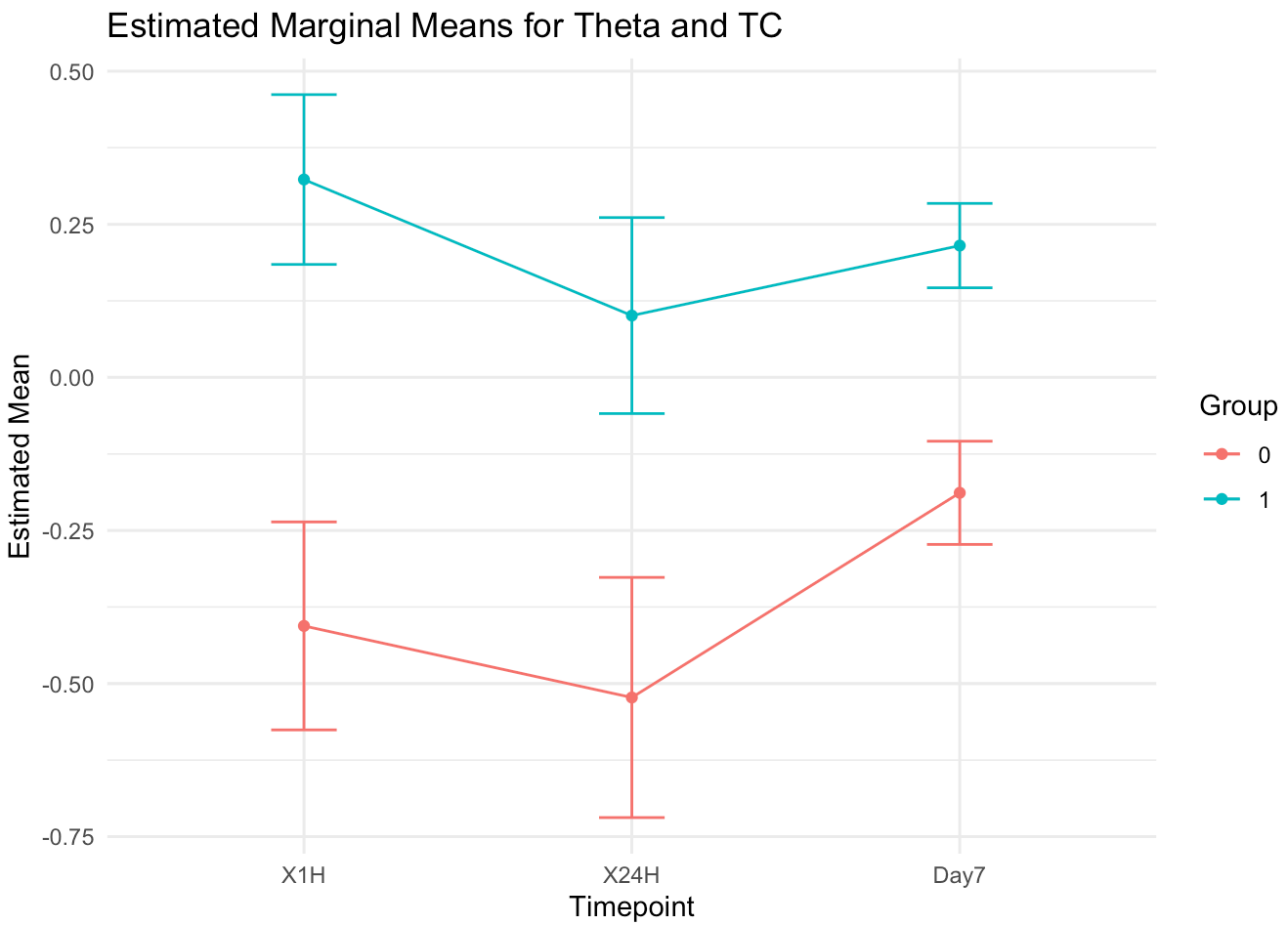
```
## Warning: More than one observation per design cell, aggregating data using `fun_aggregate = mean`.
## To turn off this warning, pass `fun_aggregate = mean` explicitly.
```

```
## Contrasts set to contr.sum for the following variables: Group
```

```
## ANOVA for Frequency Band: Theta and Measure: TC
```

```
## Warning in summary.Anova.mlm(object$Anova, multivariate = FALSE): HF eps > 1
## treated as 1
```

```
##
## Univariate Type III Repeated-Measures ANOVA Assuming Sphericity
##
##                 Sum Sq num Df Error SS den Df F value    Pr(>F)
## (Intercept)     0.5480      1   11.775     28  1.3031 0.2633220
## Group           7.4058      1   11.775     28 17.6102 0.0002476 ***
## timepoint       0.7876      2   13.227     56  1.6673 0.1979918
## Group:timepoint 0.3968      2   13.227     56  0.8400 0.4370584
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Mauchly Tests for Sphericity
##
##                 Test statistic p-value
## timepoint              0.98581 0.82448
## Group:timepoint        0.98581 0.82448
##
##
## Greenhouse-Geisser and Huynh-Feldt Corrections
##  for Departure from Sphericity
##
##                 GG eps Pr(>F[GG])
## timepoint        0.986     0.1984
## Group:timepoint  0.986     0.4357
##
##                   HF eps Pr(>F[HF])
## timepoint       1.060171  0.1979918
## Group:timepoint 1.060171  0.4370584
##  Group timepoint emmean     SE df lower.CL upper.CL
##  0     X1H       -0.406 0.1698 28  -0.7538  -0.0580
##  1     X1H        0.323 0.1387 28   0.0392   0.6072
##  0     X24H      -0.523 0.1961 28  -0.9245  -0.1211
##  1     X24H       0.101 0.1601 28  -0.2270   0.4290
##  0     Day7      -0.189 0.0843 28  -0.3613  -0.0158
##  1     Day7       0.215 0.0688 28   0.0742   0.3563
##
## Confidence level used: 0.95
```



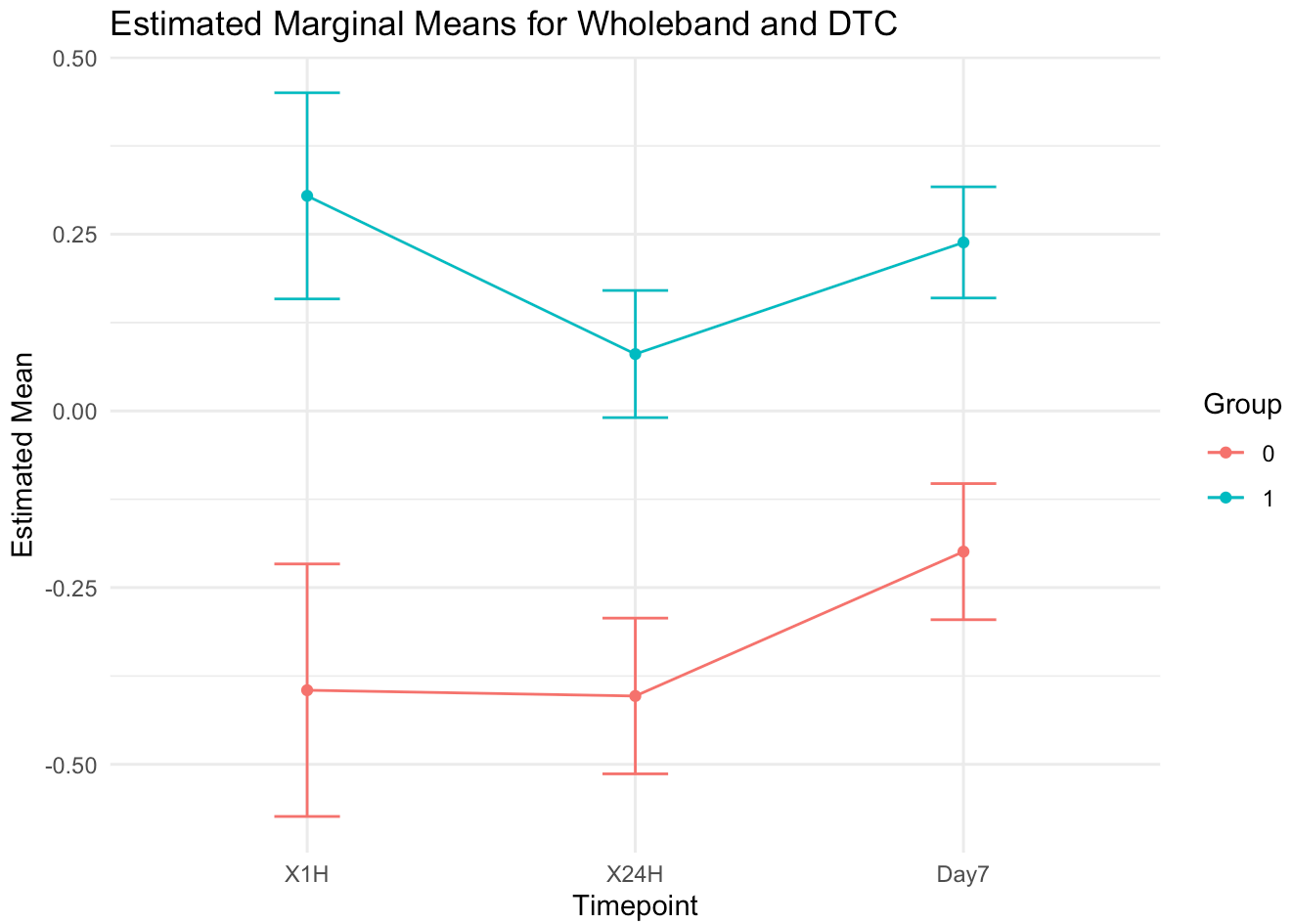

```
## # A tibble: 6 × 5
##   Group timepoint mean_value sd_value     N
##   <fct> <chr>          <dbl>    <dbl> <int>
## 1 0     1H            -0.406    0.862    48
## 2 0     24H           -0.523    1.03     48
## 3 0     Day7          -0.189    0.416    48
## 4 1     1H             0.323    0.837    72
## 5 1     24H            0.101    0.785    72
## 6 1     Day7           0.215    0.473    72
```

```
## Warning: More than one observation per design cell, aggregating data using `fun_aggregate = mean`.
## To turn off this warning, pass `fun_aggregate = mean` explicitly.
```

```
## Contrasts set to contr.sum for the following variables: Group
```

```
## ANOVA for Frequency Band: Wholeband and Measure: DTC
##
## Univariate Type III Repeated-Measures ANOVA Assuming Sphericity
##
##                 Sum Sq num Df Error SS den Df F value    Pr(>F)
## (Intercept)     0.3363      1   9.4920     28  0.9921 0.3277541
## Group           6.3046      1   9.4920     28 18.5976 0.0001809 ***
## timepoint       0.4848      2   8.4237     56  1.6115 0.2087054
## Group:timepoint 0.2815      2   8.4237     56  0.9357 0.3983388
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Mauchly Tests for Sphericity
##
##                 Test statistic  p-value
## timepoint              0.81286 0.060987
## Group:timepoint        0.81286 0.060987
##
##
## Greenhouse-Geisser and Huynh-Feldt Corrections
##  for Departure from Sphericity
##
##                  GG eps Pr(>F[GG])
## timepoint       0.84236     0.2127
## Group:timepoint 0.84236     0.3852
##
##                    HF eps Pr(>F[HF])
## timepoint       0.8903013  0.2115779
## Group:timepoint 0.8903013  0.3895023
##  Group timepoint  emmean     SE df lower.CL upper.CL
##  0     X1H       -0.3951 0.1786 28 -0.76106 -0.02922
##  1     X1H        0.3043 0.1459 28  0.00557  0.60312
##  0     X24H      -0.4033 0.1102 28 -0.62902 -0.17766
##  1     X24H       0.0805 0.0900 28 -0.10382  0.26472
##  0     Day7      -0.1991 0.0963 28 -0.39632 -0.00184
##  1     Day7       0.2384 0.0786 28  0.07737  0.39946
```

```
##
## Confidence level used: 0.95
```



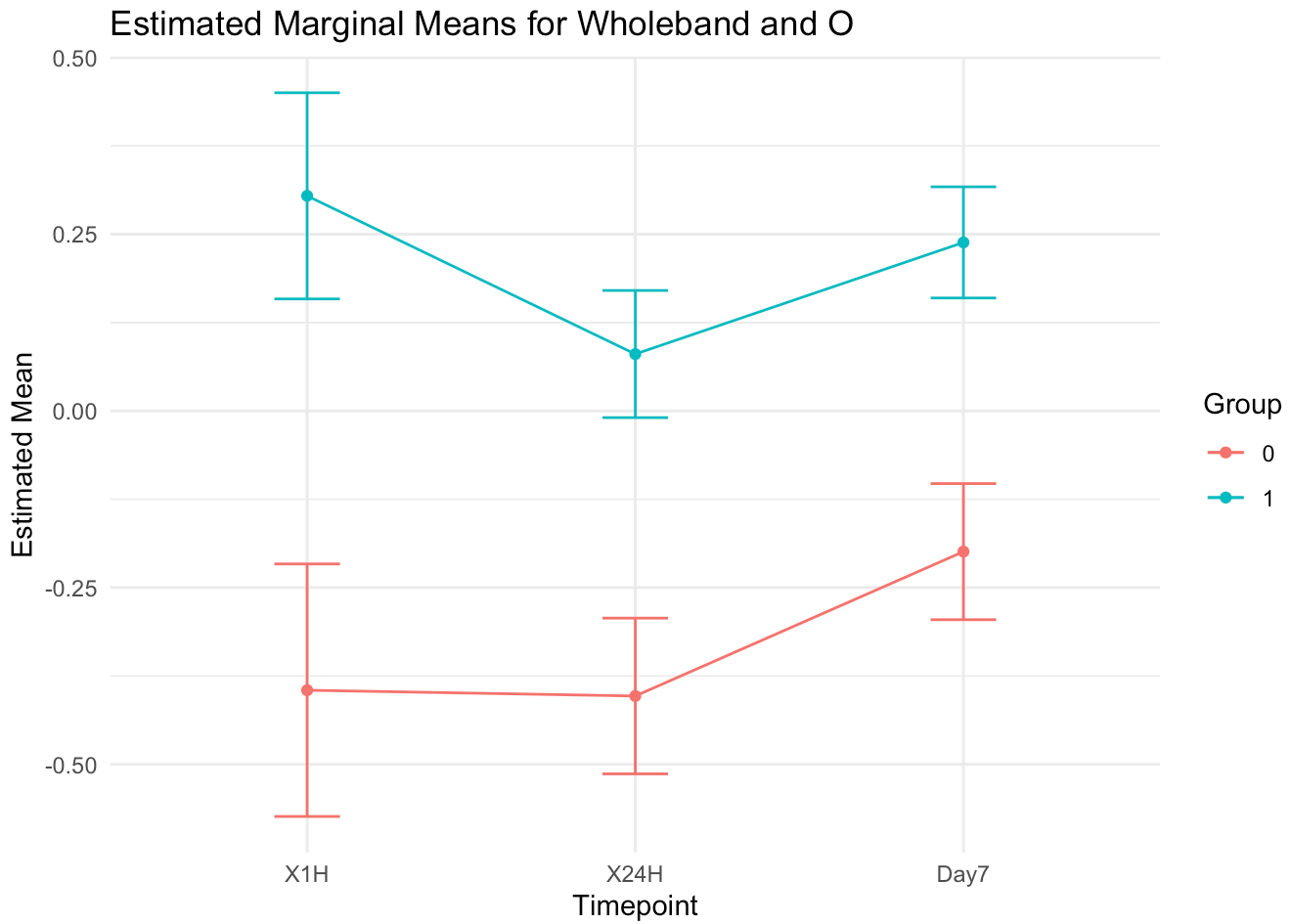

```
## # A tibble: 6 × 5
##   Group timepoint mean_value sd_value     N
##   <fct> <chr>          <dbl>    <dbl> <int>
## 1 0     1H           -0.395     0.833    48
## 2 0     24H          -0.403     0.685    48
## 3 0     Day7         -0.199     0.415    48
## 4 1     1H            0.304     0.790    72
## 5 1     24H           0.0805    0.503    72
## 6 1     Day7          0.238     0.505    72
```

```
## Warning: More than one observation per design cell, aggregating data using `fun_aggregate = mean`.
## To turn off this warning, pass `fun_aggregate = mean` explicitly.
```

```
## Contrasts set to contr.sum for the following variables: Group
```

```
## ANOVA for Frequency Band: Wholeband and Measure: O
##
## Univariate Type III Repeated-Measures ANOVA Assuming Sphericity
##
##                 Sum Sq num Df Error SS den Df F value    Pr(>F)
## (Intercept)     0.3363      1   9.4920     28  0.9921 0.3277541
## Group           6.3046      1   9.4920     28 18.5976 0.0001809 ***
## timepoint       0.4848      2   8.4237     56  1.6115 0.2087054
## Group:timepoint 0.2815      2   8.4237     56  0.9357 0.3983388
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Mauchly Tests for Sphericity
##
##                 Test statistic  p-value
## timepoint              0.81286 0.060987
## Group:timepoint        0.81286 0.060987
##
##
## Greenhouse-Geisser and Huynh-Feldt Corrections
##  for Departure from Sphericity
##
##                  GG eps Pr(>F[GG])
## timepoint       0.84236     0.2127
## Group:timepoint 0.84236     0.3852
##
##                    HF eps Pr(>F[HF])
## timepoint       0.8903013  0.2115779
## Group:timepoint 0.8903013  0.3895023
##  Group timepoint  emmean     SE df lower.CL upper.CL
##  0     X1H       -0.3951 0.1786 28 -0.76106 -0.02922
##  1     X1H        0.3043 0.1459 28  0.00557  0.60312
##  0     X24H      -0.4033 0.1102 28 -0.62902 -0.17766
##  1     X24H       0.0805 0.0900 28 -0.10382  0.26472
##  0     Day7      -0.1991 0.0963 28 -0.39632 -0.00184
##  1     Day7       0.2384 0.0786 28  0.07737  0.39946
```

```
##
## Confidence level used: 0.95
```



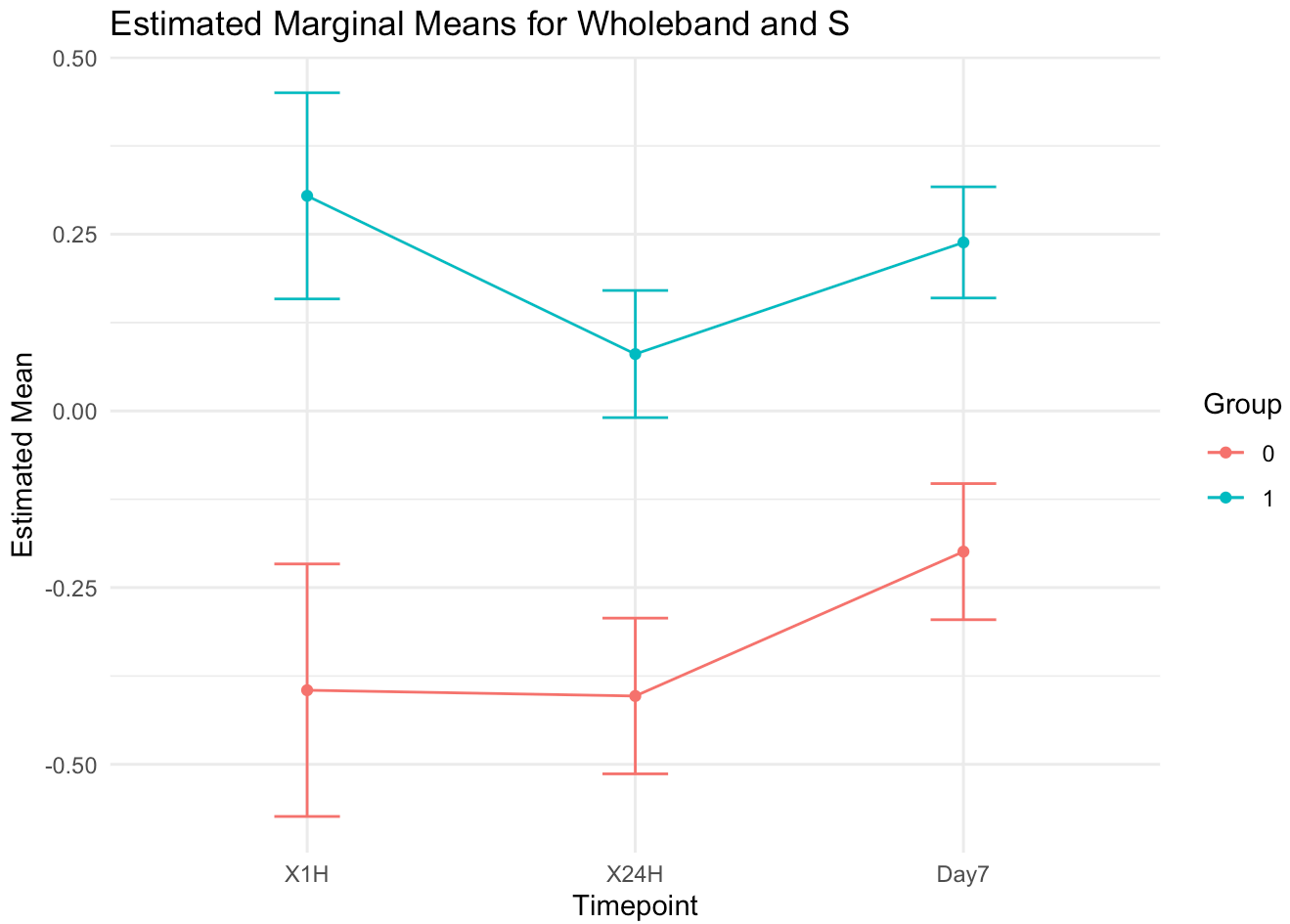

```
## # A tibble: 6 × 5
##   Group timepoint mean_value sd_value     N
##   <fct> <chr>          <dbl>    <dbl> <int>
## 1 0     1H           -0.395     0.833    48
## 2 0     24H          -0.403     0.685    48
## 3 0     Day7         -0.199     0.415    48
## 4 1     1H            0.304     0.790    72
## 5 1     24H           0.0805    0.503    72
## 6 1     Day7          0.238     0.505    72
```

```
## Warning: More than one observation per design cell, aggregating data using `fun_aggregate = mean`.
## To turn off this warning, pass `fun_aggregate = mean` explicitly.
```

```
## Contrasts set to contr.sum for the following variables: Group
```

```
## ANOVA for Frequency Band: Wholeband and Measure: S
##
## Univariate Type III Repeated-Measures ANOVA Assuming Sphericity
##
##                 Sum Sq num Df Error SS den Df F value    Pr(>F)
## (Intercept)     0.3363      1   9.4920     28  0.9921 0.3277541
## Group           6.3046      1   9.4920     28 18.5976 0.0001809 ***
## timepoint       0.4848      2   8.4237     56  1.6115 0.2087054
## Group:timepoint 0.2815      2   8.4237     56  0.9357 0.3983388
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Mauchly Tests for Sphericity
##
##                 Test statistic  p-value
## timepoint              0.81286 0.060987
## Group:timepoint        0.81286 0.060987
##
##
## Greenhouse-Geisser and Huynh-Feldt Corrections
##  for Departure from Sphericity
##
##                  GG eps Pr(>F[GG])
## timepoint       0.84236     0.2127
## Group:timepoint 0.84236     0.3852
##
##                    HF eps Pr(>F[HF])
## timepoint       0.8903013  0.2115779
## Group:timepoint 0.8903013  0.3895023
##  Group timepoint  emmean     SE df lower.CL upper.CL
##  0     X1H       -0.3951 0.1786 28 -0.76106 -0.02922
##  1     X1H        0.3043 0.1459 28  0.00557  0.60312
##  0     X24H      -0.4033 0.1102 28 -0.62902 -0.17766
##  1     X24H       0.0805 0.0900 28 -0.10382  0.26472
##  0     Day7      -0.1991 0.0963 28 -0.39632 -0.00184
##  1     Day7       0.2384 0.0786 28  0.07737  0.39946
```

```
##
## Confidence level used: 0.95
```



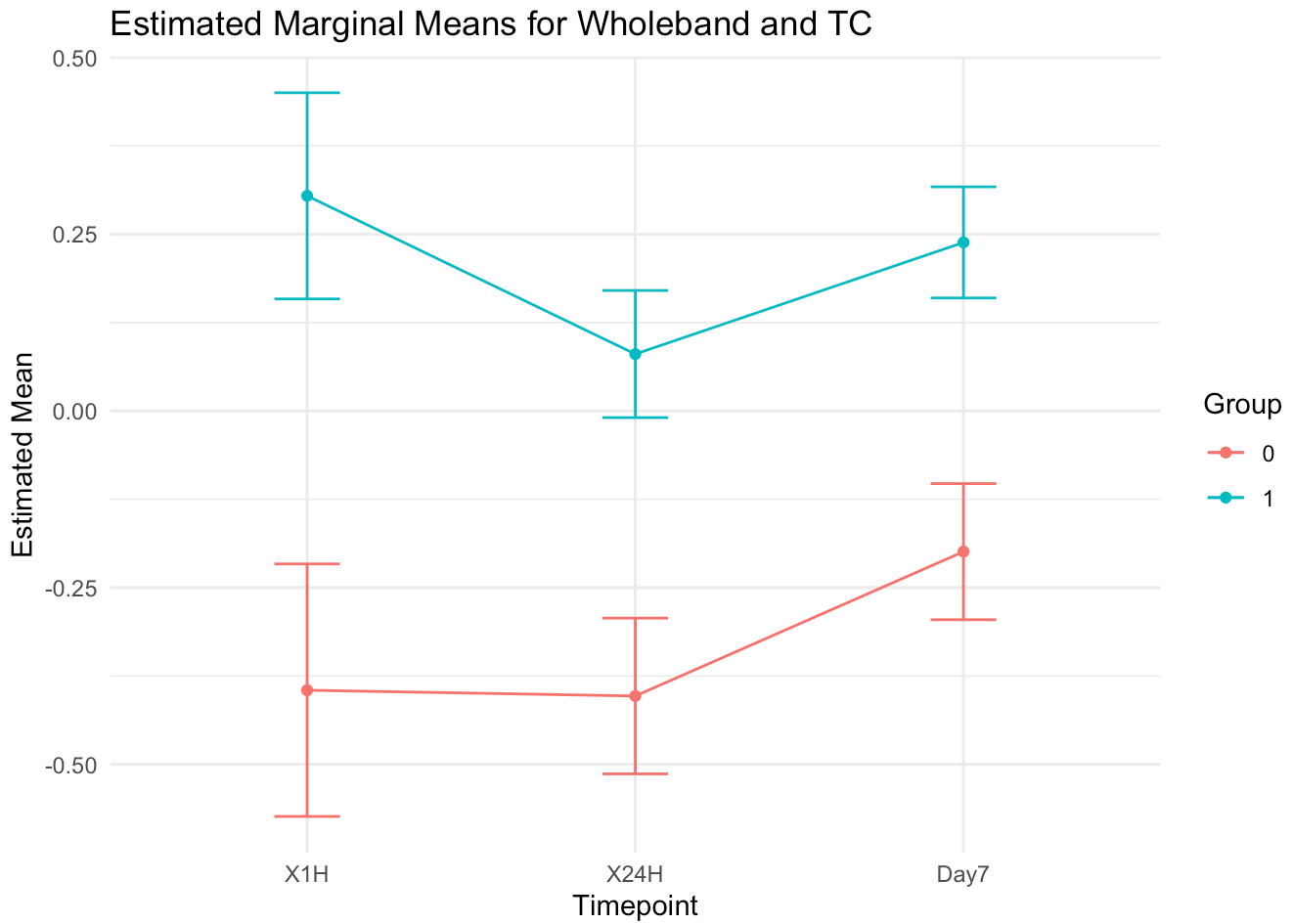

```
## # A tibble: 6 × 5
##   Group timepoint mean_value sd_value     N
##   <fct> <chr>          <dbl>    <dbl> <int>
## 1 0     1H           -0.395     0.833    48
## 2 0     24H          -0.403     0.685    48
## 3 0     Day7         -0.199     0.415    48
## 4 1     1H            0.304     0.790    72
## 5 1     24H           0.0805    0.503    72
## 6 1     Day7          0.238     0.505    72
```

```
## Warning: More than one observation per design cell, aggregating data using `fun_aggregate = mean`.
## To turn off this warning, pass `fun_aggregate = mean` explicitly.
```

```
## Contrasts set to contr.sum for the following variables: Group
```

```
## ANOVA for Frequency Band: Wholeband and Measure: TC
##
## Univariate Type III Repeated-Measures ANOVA Assuming Sphericity
##
##                 Sum Sq num Df Error SS den Df F value    Pr(>F)
## (Intercept)     0.3363      1   9.4920     28  0.9921 0.3277541
## Group           6.3046      1   9.4920     28 18.5976 0.0001809 ***
## timepoint       0.4848      2   8.4237     56  1.6115 0.2087054
## Group:timepoint 0.2815      2   8.4237     56  0.9357 0.3983388
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Mauchly Tests for Sphericity
##
##                 Test statistic  p-value
## timepoint              0.81286 0.060987
## Group:timepoint        0.81286 0.060987
##
##
## Greenhouse-Geisser and Huynh-Feldt Corrections
##  for Departure from Sphericity
##
##                  GG eps Pr(>F[GG])
## timepoint       0.84236     0.2127
## Group:timepoint 0.84236     0.3852
##
##                    HF eps Pr(>F[HF])
## timepoint       0.8903013  0.2115779
## Group:timepoint 0.8903013  0.3895023
##  Group timepoint  emmean     SE df lower.CL upper.CL
##  0     X1H       -0.3951 0.1786 28 -0.76106 -0.02922
##  1     X1H        0.3043 0.1459 28  0.00557  0.60312
##  0     X24H      -0.4033 0.1102 28 -0.62902 -0.17766
##  1     X24H       0.0805 0.0900 28 -0.10382  0.26472
##  0     Day7      -0.1991 0.0963 28 -0.39632 -0.00184
##  1     Day7       0.2384 0.0786 28  0.07737  0.39946
```

```
##
## Confidence level used: 0.95
```




```
## # A tibble: 6 × 5
##   Group timepoint mean_value sd_value     N
##   <fct> <chr>          <dbl>    <dbl> <int>
## 1 0     1H           -0.395     0.833    48
## 2 0     24H          -0.403     0.685    48
## 3 0     Day7         -0.199     0.415    48
## 4 1     1H            0.304     0.790    72
## 5 1     24H           0.0805    0.503    72
## 6 1     Day7          0.238     0.505    72
```