

Exposure to Zero-Sum Political Polarization on Social Media and Their Impact on Mental Health Among Undergraduates

Politically Polarizing Social Media Content and Mental Health

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“This study examines how exposure to polarizing social media content, particularly promoting zero-sum beliefs, affects the mental health of undergraduate students. Zero-sum beliefs are the perception that one group’s gain inherently results in another’s loss. Gains have been linked to heightened political intergroup conflict and increased polarization (Roberts, 2022; Davidai, 2023). A mixed-methods survey was designed to assess participants’ engagements with politically polarizing zero-sum media and their corresponding emotional and psychological responses. Undergraduate students of 18 or older were recruited through campus tabling, poster advertisements, and email outreach, with an expected sample size of approximately 300 participants. Given the current sociopolitical climate, understanding how zero-sum thinking influences mental health is essential. Political polarization not only undermines constructive democracy but may also contribute to increased stress, anxiety, and emotional distress among individuals. Findings from this study aim to clarify the psychological effects of exposure to zero-sum social media content and to inform future interventions that promote healthier online engagements and reduce the mental health burden associated with political polarization. The study seeks to identify whether exposure to zero-sum messaging contributes to measurable declines in the mental health of undergraduates.”

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1 Results

1.1 Quantitative Findings

everything you did below

1.2 Qualitative Findings

insert Brianna

2 Discussion

2.1 Future work

pilot testing videos - ratings of minor vs. extreme categorization

3 Import

Loading R Packages

```
library(readxl)
library(dplyr)
```

```
Attaching package: 'dplyr'
```

```
The following objects are masked from 'package:stats':
```

```
filter, lag
```

```
The following objects are masked from 'package:base':
```

```
intersect, setdiff, setequal, union
```

```
library(ggplot2)
library(stats)
library(tidyverse)
```

```
-- Attaching core tidyverse packages ----- tidyverse 2.0.0 --
v forcats 1.0.1      v stringr 1.5.2
v lubridate 1.9.4    v tibble  3.3.0
v purrr    1.1.0     v tidyr   1.3.1
v readr    2.1.5
```

```
-- Conflicts ----- tidyverse_conflicts() --
x dplyr::filter() masks stats::filter()
x dplyr::lag()     masks stats::lag()
i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become
```

```
library(psych)
```

Attaching package: 'psych'

The following objects are masked from 'package:ggplot2':

%+%, alpha

```
library(knitr)
library(tibble)
library(tidyr)
library(scales)
```

Attaching package: 'scales'

The following objects are masked from 'package:psych':

alpha, rescale

The following object is masked from 'package:purrr':

discard

The following object is masked from 'package:readr':

col_factor

```
library(english)
```

Attaching package: 'english'

The following object is masked from 'package:scales':

```
ordinal
```

```
library(stringr)
library(patchwork)
library(corrplot)
```

corrplot 0.95 loaded

```
library(RColorBrewer)
library(stats)
```

```
# source: The FRI Playbook (McCarty, 2025)
# explanation: loads different libraries to use for data analysis/cleaning
```

Importing Data

```
library(readxl)
alldata <- read_excel(
  "11.06.2025.Intervention.Team3.Clean.xlsx",
  col_names = TRUE)
```

```
alldata[alldata == -99] <- NA
alldata[alldata == -50] <- NA
```

```
# source: The FRI Playbook (McCarty, 2025)
# explanation: alldata with values as -99 or -50 will count as missing data and will therefore
```

Variable Selection

```
library(dplyr)
selecteddata <- alldata %>%
  select(ZSPRE_IMM, ZSPRE_HEALTH, ZSPRE_WOMEN1, ZSPRE_WOMEN2, ZSPRE_ECONOMY, ZSPRE_DEI1, ZSPRE_
```

```
# source: R for Data Science - Data Transformation (Wickham et al., 2023)
# explanation: Selects variables to be used in the data analyses. Filter() cleans the data so t
```

4 Transform

Zero Sum Belief Composites

```
library(psych)
zerosum_keys <- list(
  PREZEROSUM = c("ZSPRE_IMM", "ZSPRE_HEALTH", "ZSPRE_WOMEN1", "ZSPRE_WOMEN2", "ZSPRE_ECONOMY",
  POSTZEROSUM = c("ZSPOST_IMMI", "ZSPOST_HEALTH", "ZSPOST_WOMEN1", "ZSPOST_WOMEN2", "ZSPOST_EC
)

# source: The FRI Playbook (McCarty, 2025)
# explanation: a list called zerosum_keys is created. This tells R which survey questions belong
```

```
zerosum_scores <- scoreItems(zerosum_keys, selecteddata)
composite_scores <- zerosum_scores$scores

selecteddata$PREZEROSUM <- composite_scores[, "PREZEROSUM"]
selecteddata$POSTZEROSUM <- composite_scores[, "POSTZEROSUM"]

# source: The FRI Playbook (McCarty, 2025)
# explanation: Extracts the scores from the PREZEROSUM and POSTZEROSUM lists and adds it to the
```

```
condition1_selecteddata <- selecteddata %>%
  filter(CONDITION == 1)

# source: The FRI Playbook (McCarty, 2025)
# explanation: creates a new dataset called condition1_selecteddata by taking the existing data
```

Women's Rights Composites

```
library(psych)
women_keys <- list(
  PREZSWOMEN = c("ZSPRE_WOMEN1", "ZSPRE_WOMEN2"),
  POSTZSWOMEN = c("ZSPOST_WOMEN1", "ZSPOST_WOMEN2")
)

# source: The FRI Playbook (McCarty, 2025)
# explanation: a list called women_keys is created. This tells R which survey questions belong
```

```
women_scores <- scoreItems(women_keys, selecteddata)
composite_scores_women <- women_scores$scores

selecteddata$PREZSWOMEN <- composite_scores_women[, "PREZSWOMEN"]
selecteddata$POSTZSWOMEN <- composite_scores_women[, "POSTZSWOMEN"]

# source: The FRI Playbook (McCarty, 2025)
# explanation: Extracts the scores from the PREZSWOMEN and POSTZSWOMEN lists and adds it to the
```

```

condition2_selecteddata <- selecteddata %>%
  filter(CONDITION == 1)

# source: The FRI Playbook (McCarty, 2025)
# explanation: creates a new dataset called condition2_selecteddata by taking the existing data

```

DEI Composites

```

library(psych)
DEI_keys <- list(
  PREZSDEI = c("ZSPRE_DEI1", "ZSPRE_DEI2"),
  POSTZSDEI = c("ZSPOST_DEI1", "ZSPOST_DEI1")
)

# source: The FRI Playbook (McCarty, 2025)
# explanation: a list called DEI_keys is created. This tells R which survey questions belong to

```

```

DEI_scores <- scoreItems(DEI_keys, selecteddata)
composite_scores_DEI <- DEI_scores$scores

selecteddata$PREZSDEI <- composite_scores_DEI[, "PREZSDEI"]
selecteddata$POSTZSDEI <- composite_scores_DEI[, "POSTZSDEI"]

# source: The FRI Playbook (McCarty, 2025)
# explanation: Extracts the scores from the PREZSDEI and POSTZSDEI lists and adds it to the data

```

```

condition3_selecteddata <- selecteddata %>%
  filter(CONDITION == 1)

# source: The FRI Playbook (McCarty, 2025)
# explanation: creates a new dataset called condition3_selecteddata by taking the existing data

```

Numeric Conversion

```

library(dplyr)

# Convert all ENGAGE columns to numeric using dplyr
selecteddata <- selecteddata %>%
  mutate(across(ends_with("_ENGAGE"), ~ as.numeric(as.character(.))))

```

```

Warning: There were 6 warnings in `mutate()`.
The first warning was:
i In argument: `across(ends_with("_ENGAGE"), ~as.numeric(as.character(.)))`.
Caused by warning:
! NAs introduced by coercion
i Run `dplyr::last_dplyr_warnings()` to see the 5 remaining warnings.

```

```
# Verify conversion
cat("Checking ENGAGE column types:\n")
```

Checking ENGAGE column types:

```
selecteddata %>%
  select(ends_with("_ENGAGE")) %>%
  sapply(class) %>%
  print()
```

POL_IMM_ENGAGE	POL_HEALTHC_ENGAGE	POL_WOMEN_ENGAGE	POL_ECONOMY_ENGAGE
"numeric"	"numeric"	"numeric"	"numeric"
POL_DEI_ENGAGE	POL_ENVI_ENGAGE	LEAN_IMM_ENGAGE	LEAN_HEALTHC_ENGAGE
"numeric"	"numeric"	"numeric"	"numeric"
LEAN_WOMEN_ENGAGE	LEAN_ECONOMY_ENGAGE	LEAN_DEI_ENGAGE	LEAN_ENVIRO_ENGAGE
"numeric"	"numeric"	"numeric"	"numeric"

```
# source: Team 2 code
# explanation: converts variables into numeric data
```

Environment Composites

```
library(psych)
enviro_keys <- list(
  PREZSENVIRO = c("ZSPRE_ENVIRO1", "ZSPRE_ENVIRO2"),
  POSTZSENVIRO = c("ZSPOST_ENVIRO1", "ZSPOST_ENVIRO1")
)
```

```
# source: The FRI Playbook (McCarty, 2025)
# explanation: a list called enviro_keys is created. This tells R which survey questions belong
```

```
enviro_scores <- scoreItems(enviro_keys, selecteddata)
```

Warning in sqrt(y[i] * y[j]): NaNs produced

```
composite_scores_enviro <- enviro_scores$scores

selecteddata$PREZSENVIRO <- composite_scores_enviro[, "PREZSENVIRO"]
selecteddata$POSTZSENVIRO <- composite_scores_enviro[, "POSTZSENVIRO"]
```

```
# source: The FRI Playbook (McCarty, 2025)
# explanation: Extracts the scores from the PREZSENVIRO and POSTZSENVIRO lists and adds it to t
```

```

condition5_selecteddata <- selecteddata %>%
  filter(CONDITION == 1)

# source: The FRI Playbook (McCarty, 2025)
# explanation: creates a new dataset called condition5_selecteddata by taking the existing data

```

ALIGN Composites

```

library(psych)
ALIGN_keys <- list(
  POLARALIGN = c("POL_IMM_ALIGN", "POL_HEALTHC_ALIGN", "POL_WOMEN_ALIGN", "POL_ECONOMY_ALIGN",
  LEANALIGN = c("LEAN_IMM_ALIGN", "LEAN_HEALTHC_ALIGN", "LEAN_WOMEN_ALIGN", "LEAN_ECONOMY_ALIGN")
)

# source: The FRI Playbook (McCarty, 2025)
# explanation: a list called ALIGN_keys is created. This tells R which survey questions belong

```

```
ALIGN_scores <- scoreItems(ALIGN_keys, selecteddata)
```

Warning in sqrt(Q/n.subjects): NaNs produced

```

composite_scores_ALIGN <- ALIGN_scores$scores

selecteddata$POLARALIGN <- composite_scores_ALIGN[, "POLARALIGN"]
selecteddata$LEANALIGN <- composite_scores_ALIGN[, "LEANALIGN"]

ALIGN_vars <- c("POLARALIGN", "LEANALIGN")
# source: The FRI Playbook (McCarty, 2025)
# explanation: Extracts the scores from the POLARALIGN and LEANALIGN lists and adds it to the c

```

Engagement Composites

```

library(psych)
engagement_keys <- list(
  POLARENAGEMENT = c("POL_IMM_ENGAGE", "POL_HEALTHC_ENGAGE", "POL_WOMEN_ENGAGE", "POL_ECONOMY_ENGAGE",
  LEANENGAGEMENT = c("LEAN_IMM_ENGAGE", "LEAN_HEALTHC_ENGAGE", "LEAN_WOMEN_ENGAGE", "LEAN_ECONOMY_ENGAGE")
)

# source: The FRI Playbook (McCarty, 2025)
# explanation: a list called engagement_keys is created. This tells R which survey questions belong

```

```

library(psych)
engagement_scores <- psych::scoreItems(engagement_keys, selecteddata, missing = TRUE, impute = "pca")
composite_scores_engagement <- engagement_scores$scores

```

```

selecteddata$POLARENGAGEMENT <- composite_scores_engagement[, "POLARENGAGEMENT"]
selecteddata$LEANENGAGEMENT <- composite_scores_engagement[, "LEANENGAGEMENT"]

# The FRI Playbook (McCarty, 2025)
# explanation: Extracts the scores from the POLARENGAGEMENT and LEANENGAGEMENT lists and adds

```

Numeric Conversions

```

library(dplyr)

# Convert all POST ZERO SUM columns to numeric using dplyr
selecteddata <- selecteddata %>%
  mutate(across(starts_with("POST"), ~ as.numeric(as.character(.))))

# Verify conversion
cat("Checking POST ZERO SUM column types:\n")

```

Checking POST ZERO SUM column types:

```

selecteddata %>%
  select(starts_with("POST")) %>%
  sapply(class) %>%
  print()

```

```

      POST_HOPE POST_ANXIETY  POSTZEROSUM  POSTZSWOMEN  POSTZSDEI POSTZSENVIRO
      "numeric"   "numeric"   "numeric"   "numeric"   "numeric"   "numeric"

```

```

# source: Team 2 code
# explanation: converts variables into numeric data

```

```

library(dplyr)

# Convert all PRE ZERO SUM columns to numeric using dplyr
selecteddata <- selecteddata %>%
  mutate(across(starts_with("PRE"), ~ as.numeric(as.character(.))))

# Verify conversion
cat("Checking PRE ZERO SUM column types:\n")

```

Checking PRE ZERO SUM column types:

```

selecteddata %>%
  select(starts_with("PRE")) %>%
  sapply(class) %>%
  print()

```

```

PRE_HOPE PRE_ANXIETY PREZEROSUM PREZSWOMEN PREZSDEI PREZSENVIRO
"numeric" "numeric" "numeric" "numeric" "numeric" "numeric"

```

```

# source: Team 2 code
# explanation: converts variables into numeric data

```

```

library(dplyr)

# Convert all ALIGN columns to numeric using dplyr
selecteddata <- selecteddata %>%
  mutate(across(ends_with("_ALIGN"), ~ as.numeric(as.character(.))))

# Verify conversion
cat("Checking ALIGN column types:\n")

```

Checking ALIGN column types:

```

selecteddata %>%
  select(ends_with("_ALIGN")) %>%
  sapply(class) %>%
  print()

```

```

POL_IMM_ALIGN POL_HEALTHC_ALIGN POL_WOMEN_ALIGN POL_ECONOMY_ALIGN
"numeric" "numeric" "numeric" "numeric"
POL_DEI_ALIGN POL_ENVI_ALIGN LEAN_IMM_ALIGN LEAN_HEALTHC_ALIGN
"numeric" "numeric" "numeric" "numeric"
LEAN_WOMEN_ALIGN LEAN_ECONOMY_ALIGN LEAN_DEI_ALIGN LEAN_ENVIRO_ALIGN
"numeric" "numeric" "numeric" "numeric"

```

```

# source: Team 2 code
# explanation: converts variables into numeric data

```

5 Visualize

Reliability Analysis

zerosum_scores

Call: scoreItems(keys = zerosum_keys, items = selecteddata)

(Unstandardized) Alpha:

	PREZEROSUM	POSTZEROSUM
alpha	0.65	0.59

Standard errors of unstandardized Alpha:

	PREZEROSUM	POSTZEROSUM
ASE	0.072	0.081

Average item correlation:

	PREZEROSUM	POSTZEROSUM
average.r	0.17	0.14

Median item correlation:

	PREZEROSUM	POSTZEROSUM
	0.31	0.25

Guttman 6* reliability:

	PREZEROSUM	POSTZEROSUM
Lambda.6	0.84	0.82

Signal/Noise based upon av.r :

	PREZEROSUM	POSTZEROSUM
Signal/Noise	1.9	1.4

Scale intercorrelations corrected for attenuation

raw correlations below the diagonal, alpha on the diagonal
corrected correlations above the diagonal:

	PREZEROSUM	POSTZEROSUM
PREZEROSUM	0.65	1.05
POSTZEROSUM	0.65	0.59

Average adjusted correlations within and between scales (MIMS)

	PREZE	POSTZ
PREZEROSUM	0.17	
POSTZEROSUM	0.24	0.14

Average adjusted item x scale correlations within and between scales (MIMT)

	PREZE	POSTZ
PREZEROSUM	0.55	
POSTZEROSUM	0.36	0.53

In order to see the item by scale loadings and frequency counts of the data
print with the short option = FALSE

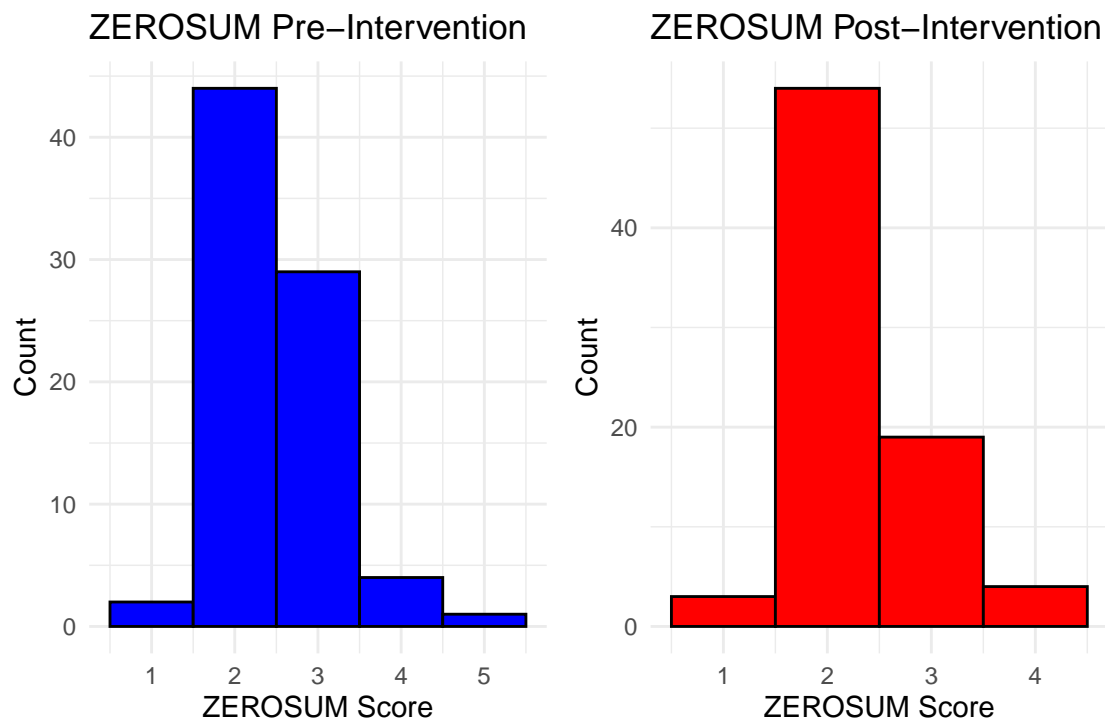
```
# source: The FRI Playbook (McCarty, 2025)
# explanation: Views reliability statistics to check consistency in measuring a construct. the
```

Zero-sum Beliefs Histogram

```
p1 <- ggplot(selecteddata, aes(x = PREZEROSUM)) +
  geom_histogram(binwidth = 1, fill = "blue", color = "black") +
  labs(title = "ZEROSUM Pre-Intervention", x = "ZEROSUM Score", y = "Count") + theme_minimal()

p2 <- ggplot(selecteddata, aes(x = POSTZEROSUM)) +
  geom_histogram(binwidth = 1, fill = "red", color = "black") +
  labs(title = "ZEROSUM Post-Intervention", x = "ZEROSUM Score", y = "Count") + theme_minimal()

p1 + p2
```



```
# source: R for Data Science - Data Visualization (Wickham et al., 2023)
# explanation: creates two histograms to display the distribution of participants' zerosum scores
```

Hope Histogram

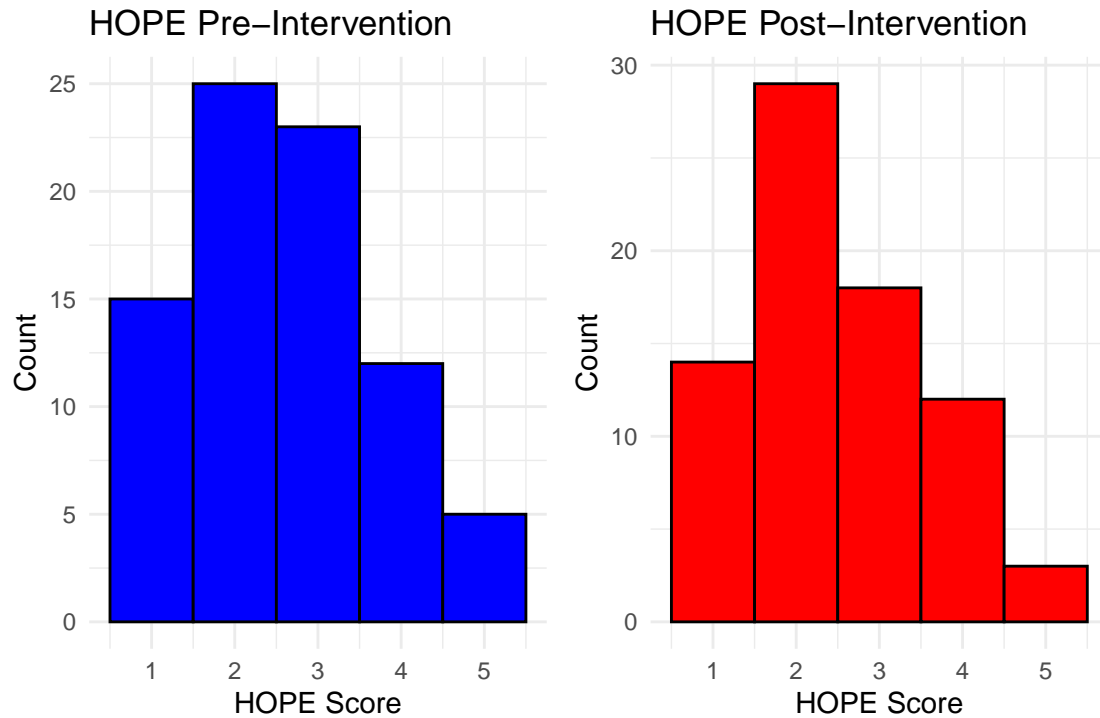
```
p3 <- ggplot(selecteddata, aes(x = PRE_HOPE)) +
  geom_histogram(binwidth = 1, fill = "blue", color = "black") +
  labs(title = "HOPE Pre-Intervention", x = "HOPE Score", y = "Count") + theme_minimal()

p4 <- ggplot(selecteddata, aes(x = POST_HOPE)) +
```

```
geom_histogram(binwidth = 1, fill = "red", color = "black") +
labs(title = "HOPE Post-Intervention", x = "HOPE Score", y = "Count") + theme_minimal()
```

p3 + p4

Warning: Removed 4 rows containing non-finite outside the scale range (``stat_bin()``).



```
# source: R for Data Science - Data Visualization (Wickham et al., 2023)
# explanation: creates two histograms to display the distribution of participants' hope scores
```

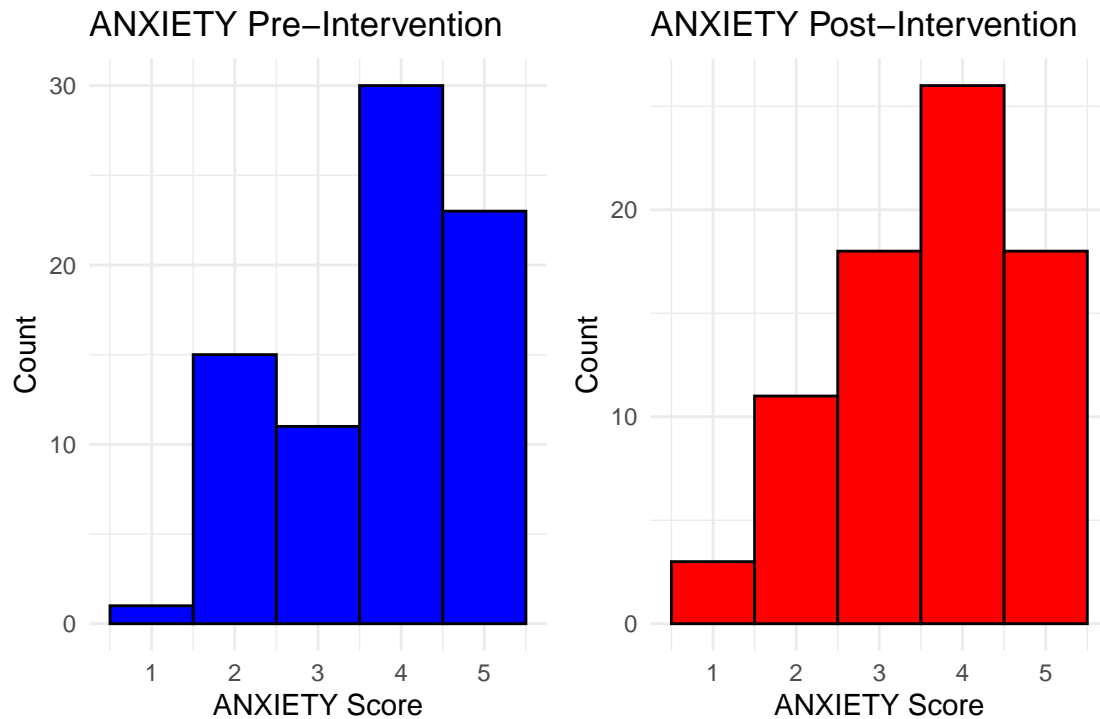
Anxiety Histogram

```
p5 <- ggplot(selecteddata, aes(x = PRE_ANXIETY)) +
  geom_histogram(binwidth = 1, fill = "blue", color = "black") +
  labs(title = "ANXIETY Pre-Intervention", x = "ANXIETY Score", y = "Count") + theme_minimal()
```

```
p6 <- ggplot(selecteddata, aes(x = POST_ANXIETY)) +
  geom_histogram(binwidth = 1, fill = "red", color = "black") +
  labs(title = "ANXIETY Post-Intervention", x = "ANXIETY Score", y = "Count") + theme_minimal()
```

p5 + p6

Warning: Removed 4 rows containing non-finite outside the scale range (``stat_bin()``).



```
# source: R for Data Science - Data Visualization (Wickham et al., 2023)
# explanation: creates two histograms to display the distrubution of participants' anxiety scores
```

6 Model: Zero-sum Paired Samples Wilcoxon Test

Impact of zero-sum videos: pre- vs. post-intervention

```
# Create long data with participant ID
paired_data_long <- condition1_selecteddata %>%
  select(POSTZEROSUM, PREZEROSUM) %>%
  filter(!is.na(POSTZEROSUM) & !is.na(PREZEROSUM)) %>% # Remove missing pairs
  mutate(ID = row_number()) %>%
  pivot_longer(cols = c(PREZEROSUM, POSTZEROSUM),
               names_to = "Composite",
               values_to = "Score") %>%
  mutate(Composite = factor(Composite, levels = c("PREZEROSUM", "POSTZEROSUM"))) # changes the

# Plot: boxplot + paired lines
zero_sum_figure <- ggplot(paired_data_long, aes(x = Composite, y = Score, group = ID)) +
  geom_boxplot(aes(group = Composite), width = 0.5, alpha = 0.3, fill = "white", outlier.shape = NA) +
  geom_line(color = "gray70", alpha = 0.6) +
  geom_point(data = paired_data_long %>%
             filter(Composite == "POSTZEROSUM"),
             shape = 16, size = 3, color = "#3779ba") +
  geom_point(data = paired_data_long %>%
```

```

    filter(Composite == "PREZEROSUM"),
    shape = 17, size = 3, color = "#c8d9f8") +
  labs(title = "Pre vs. Post Intervention with Zero-sum Videos",
    x = "Intervention Period", y = "Score") +
  theme_minimal()

```

zero_sum_figure

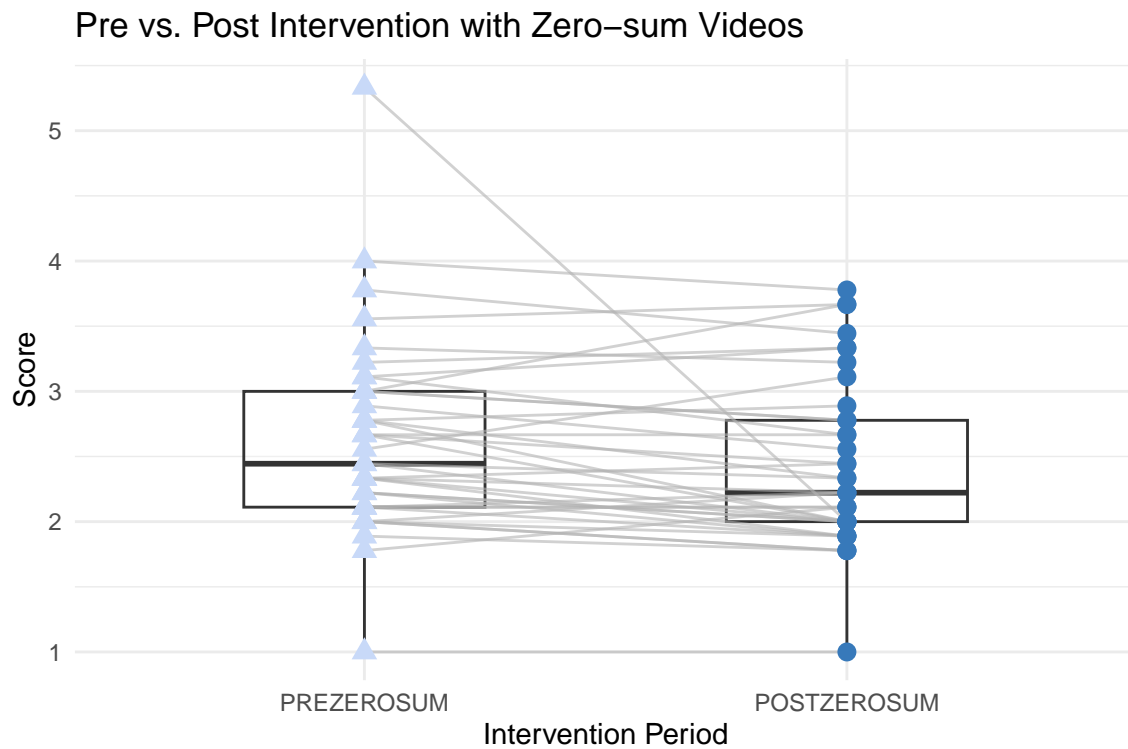


Figure 1: figure 1. Paired pre- and post-intervention zero-sum beliefs of participants. Boxplots show overall distributions with lines connecting participants scores before and after the intervention.

```

ggsave("Paired Samples: Pre vs. Post Intervention with Zero-sum Videos.png", plot = zero_sum_f

```

Saving 6 x 4 in image

```

# source: Zero-sum social identity, not zero-sum economic beliefs, explain voting preference in
# explanation: Compares participants' zero-sum beliefs scores before and after watching interve

```

```

wilcox.test(condition1_selecteddata$PREZEROSUM, condition1_selecteddata$POSTZEROSUM, paired = T

```

```

Warning in wilcox.test.default(condition1_selecteddata$PREZEROSUM,
condition1_selecteddata$POSTZEROSUM, : cannot compute exact p-value with ties

```

```
Warning in wilcox.test.default(condition1_selecteddata$PREZEROSUM,
condition1_selecteddata$POSTZEROSUM, : cannot compute exact p-value with zeroes
```

Wilcoxon signed rank test with continuity correction

```
data: condition1_selecteddata$PREZEROSUM and condition1_selecteddata$POSTZEROSUM
V = 480, p-value = 0.006717
alternative hypothesis: true location shift is not equal to 0
```

```
# source: Paired Samples Wilcoxon Test in R (STHDA, n.d.)
# explanation: Performs a paired-samples Wilcoxon test to compare participants' zero-sum scores
```

Impact of zero-sum immigration videos: pre- vs. post-intervention

```
# Create long data with participant ID
paired_data_long <- condition1_selecteddata %>%
  select(ZSPRE_IMM, ZSPOST_IMMI) %>%
  filter(!is.na(ZSPRE_IMM) & !is.na(ZSPOST_IMMI)) %>% # Remove missing pairs
  mutate(ID = row_number()) %>%
  pivot_longer(cols = c(ZSPOST_IMMI, ZSPRE_IMM),
               names_to = "Composite",
               values_to = "Score") %>%
  mutate(Composite = factor(Composite, levels = c("ZSPRE_IMM", "ZSPOST_IMMI"))) # changes the c

# Plot: boxplot + paired lines
immigration_figure <- ggplot(paired_data_long, aes(x = Composite, y = Score, group = ID)) +
  geom_boxplot(aes(group = Composite), width = 0.5, alpha = 0.3, fill = "white", outlier.shape = NA) +
  geom_line(color = "gray70", alpha = 0.6) +
  geom_point(data = paired_data_long %>%
             filter(Composite == "ZSPRE_IMM"),
             shape = 16, size = 3, color = "blue") +
  geom_point(data = paired_data_long %>%
             filter(Composite == "ZSPOST_IMMI"),
             shape = 17, size = 3, color = "red") +
  labs(title = "Pre vs. Post Intervention with Zero-sum Immigration Videos",
       x = "Intervention Period", y = "Score") +
  theme_minimal()

immigration_figure
```

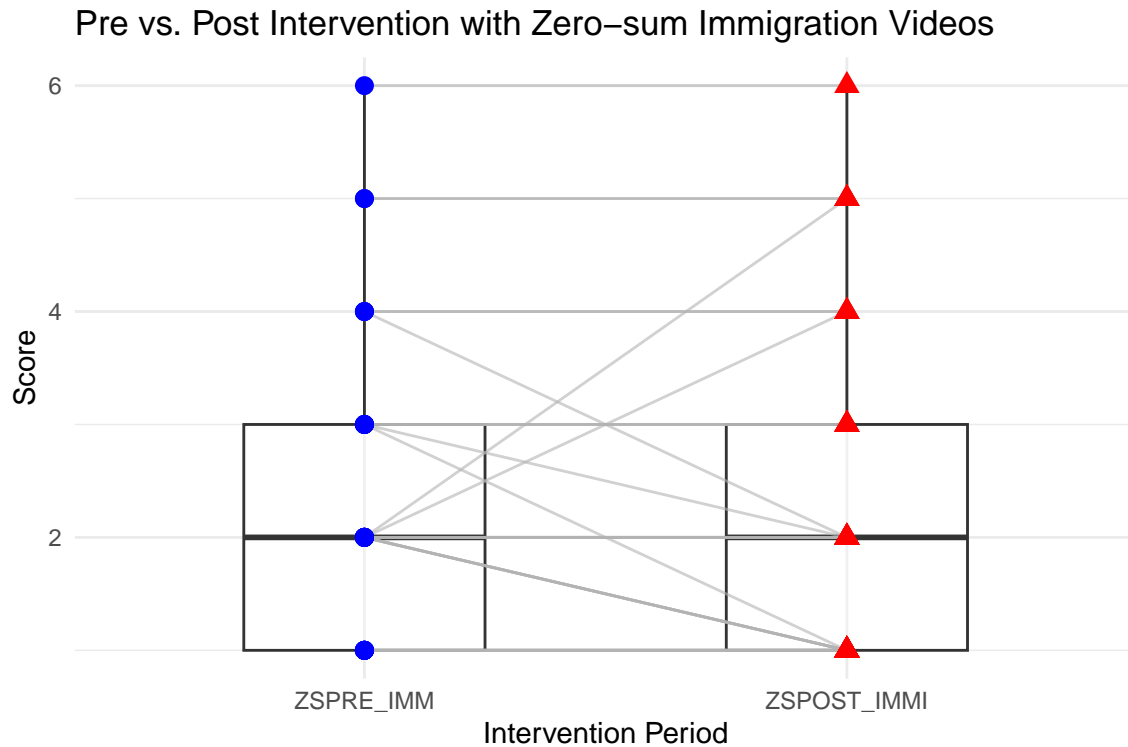


Figure 2: figure 2. Paired pre- and post-intervention immigration zero-sum beliefs of participants. Boxplots show overall distributions with lines connecting participants scores before and after the intervention.

```
ggsave("Pre vs. Post Intervention with Zero-sum Immigration Videos.png", plot = immigration_fig)
```

Saving 6 x 4 in image

```
# source: Zero-sum social identity, not zero-sum economic beliefs, explain voting preference in
# explanation: Compares participants' immigration zero-sum beliefs scores before and after watching
```

```
wilcox.test(condition1_selecteddata$ZSPRE_IMM, condition1_selecteddata$ZSPOST_IMMI, paired = TRUE)
```

Warning in wilcox.test.default(condition1_selecteddata\$ZSPRE_IMM, condition1_selecteddata\$ZSPOST_IMMI, : cannot compute exact p-value with ties

Warning in wilcox.test.default(condition1_selecteddata\$ZSPRE_IMM, condition1_selecteddata\$ZSPOST_IMMI, : cannot compute exact p-value with zeroes

Wilcoxon signed rank test with continuity correction

data: condition1_selecteddata\$ZSPRE_IMM and condition1_selecteddata\$ZSPOST_IMMI
 V = 37, p-value = 0.3464
 alternative hypothesis: true location shift is not equal to 0

```
# source: Paired Samples Wilcoxon Test in R (STHDA, n.d.)
# explanation: Performs a paired-samples Wilcoxon test to compare participants' zero-sum scores
```

Impact of zero-sum healthcare videos: pre- vs. post-intervention

```
# Create long data with participant ID
paired_data_long <- condition1_selecteddata %>%
  select(ZSPRE_HEALTH, ZSPOST_HEALTH) %>%
  filter(!is.na(ZSPRE_HEALTH) & !is.na(ZSPOST_HEALTH)) %>% # Remove missing pairs
  mutate(ID = row_number()) %>%
  pivot_longer(cols = c(ZSPOST_HEALTH, ZSPRE_HEALTH),
               names_to = "Composite",
               values_to = "Score") %>%
  mutate(Composite = factor(Composite, levels = c("ZSPRE_HEALTH", "ZSPOST_HEALTH"))) # changes

# Plot: boxplot + paired lines
healthcare_figure <- ggplot(paired_data_long, aes(x = Composite, y = Score, group = ID)) +
  geom_boxplot(aes(group = Composite), width = 0.5, alpha = 0.3, fill = "white", outlier.shape = NA) +
  geom_line(color = "gray70", alpha = 0.6) +
  geom_point(data = paired_data_long %>%
             filter(Composite == "ZSPRE_HEALTH"),
             shape = 16, size = 3, color = "blue") +
  geom_point(data = paired_data_long %>%
             filter(Composite == "ZSPOST_HEALTH"),
             shape = 17, size = 3, color = "red") +
  labs(title = "Pre vs. Post Intervention with Zero-sum Healthcare Videos",
       x = "Intervention Period", y = "Score") +
  theme_minimal()

healthcare_figure
```

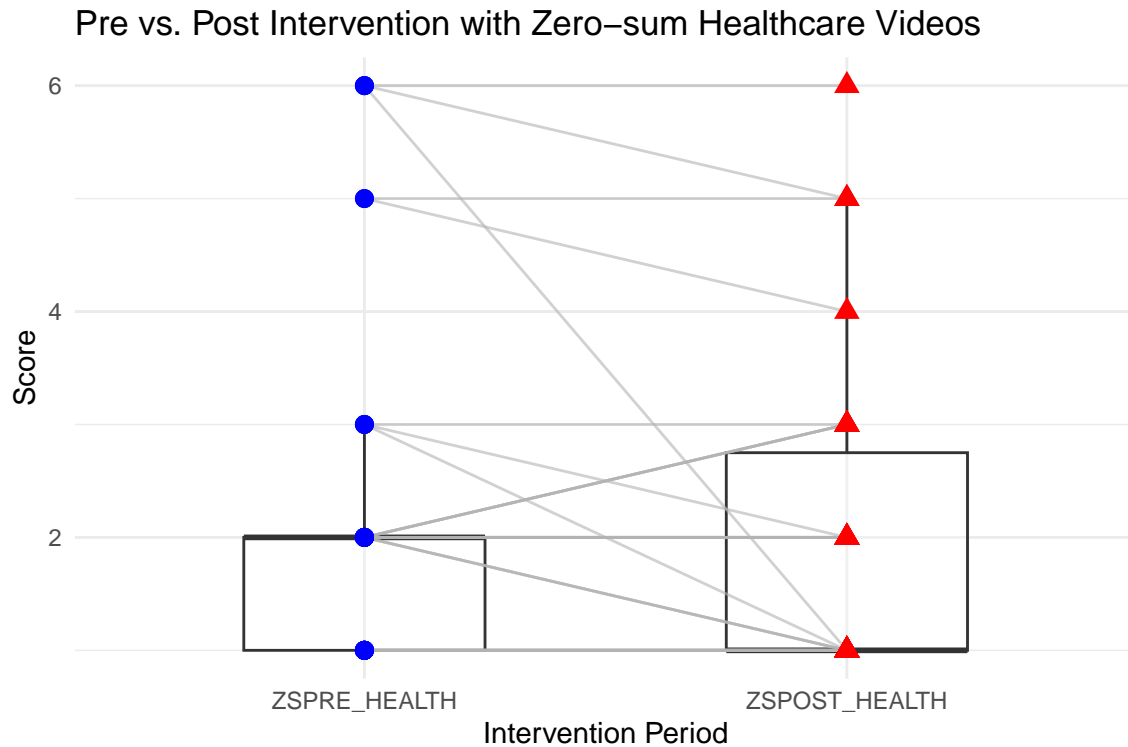


Figure 3: figure 3. Paired pre- and post-intervention healthcare zero-sum beliefs of participants. Boxplots show overall distributions with lines connecting participants scores before and after the intervention.

```
ggsave("Pre vs. Post Intervention with Zero-sum Healthcare Videos.png", plot = healthcare_figur
```

Saving 6 x 4 in image

```
# source: Zero-sum social identity, not zero-sum economic beliefs, explain voting preference in
# explanation: Compares participants' healthcare zero-sum beliefs scores before and after watch
```

```
wilcox.test(condition1_selecteddata$ZSPRE_HEALTH, condition1_selecteddata$ZSPOST_HEALTH, paired
```

Warning in wilcox.test.default(condition1_selecteddata\$ZSPRE_HEALTH, condition1_selecteddata\$ZSPOST_HEALTH, : cannot compute exact p-value with ties

Warning in wilcox.test.default(condition1_selecteddata\$ZSPRE_HEALTH, condition1_selecteddata\$ZSPOST_HEALTH, : cannot compute exact p-value with zeroes

Wilcoxon signed rank test with continuity correction

```
data: condition1_selecteddata$ZSPRE_HEALTH and condition1_selecteddata$ZSPOST_HEALTH
V = 56, p-value = 0.166
alternative hypothesis: true location shift is not equal to 0
```

```
# source: Paired Samples Wilcoxon Test in R (STHDA, n.d.)
# explanation: Performs a paired-samples Wilcoxon test to compare participants' zero-sum scores
```

Impact of zero-sum women's rights videos: pre- vs. post-intervention

```
# source: Zero-sum social identity, not zero-sum economic beliefs, explain voting preference in
# explanation: Compares participants' women's rights zero-sum beliefs scores before and after
```

```
# Create long data with participant ID
paired_data_long <- condition1_selecteddata %>%
  select(ZSPRE_WOMEN1, ZSPOST_WOMEN1) %>%
  filter(!is.na(ZSPRE_WOMEN1) & !is.na(ZSPOST_WOMEN1)) %>% # Remove missing pairs
  mutate(ID = row_number()) %>%
  pivot_longer(cols = c(ZSPRE_WOMEN1, ZSPOST_WOMEN1),
               names_to = "Composite",
               values_to = "Score") %>%
  mutate(Composite = factor(Composite, levels = c("ZSPRE_WOMEN1", "ZSPOST_WOMEN1"))) # changes

# Plot: boxplot + paired lines
women_figure <- ggplot(paired_data_long, aes(x = Composite, y = Score, group = ID)) +
  geom_boxplot(aes(group = Composite), width = 0.5, alpha = 0.3, fill = "white", outlier.shape = NA) +
  geom_line(color = "gray70", alpha = 0.6) +
  geom_point(data = paired_data_long %>%
             filter(Composite == "ZSPRE_WOMEN1"),
             shape = 16, size = 3, color = "blue") +
  geom_point(data = paired_data_long %>%
             filter(Composite == "ZSPOST_WOMEN1"),
             shape = 17, size = 3, color = "red") +
  labs(title = "Pre vs. Post Intervention with Zero-sum Women's Rights Videos",
       x = "Intervention Period", y = "Score") +
  theme_minimal()

women_figure
```

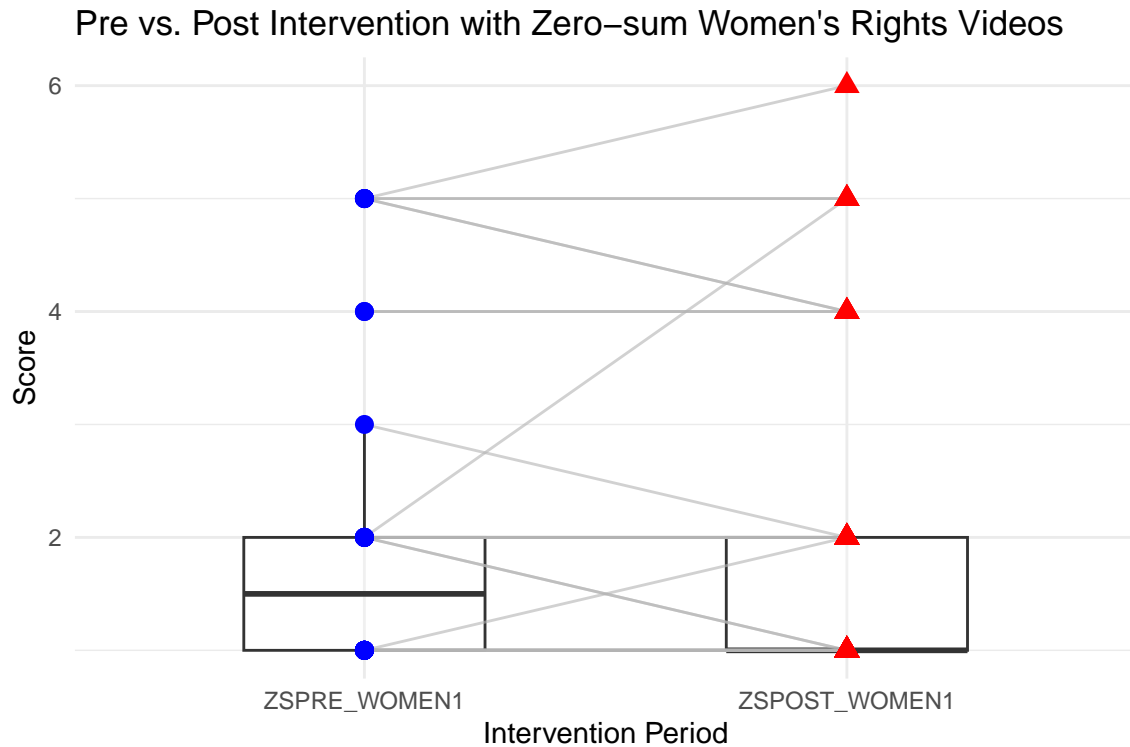


Figure 4: figure 4. Paired pre- and post-intervention women's rights zero-sum beliefs of participants. Boxplots show overall distributions with lines connecting participants scores before and after the intervention.

```
ggsave("Pre vs. Post Intervention with Zero-sum Women's Rights Videos.png", plot = women_figures)
```

Saving 6 x 4 in image

```
# source: Zero-sum social identity, not zero-sum economic beliefs, explain voting preference in
# explanation: Compares participants' women's rights zero-sum beliefs scores before and after v
```

```
wilcox.test(condition1_selecteddata$ZSPRE_WOMEN1, condition1_selecteddata$ZSPOST_WOMEN1, paired = TRUE)
```

```
Warning in wilcox.test.default(condition1_selecteddata$ZSPRE_WOMEN1,
condition1_selecteddata$ZSPOST_WOMEN1, : cannot compute exact p-value with ties
```

```
Warning in wilcox.test.default(condition1_selecteddata$ZSPRE_WOMEN1,
condition1_selecteddata$ZSPOST_WOMEN1, : cannot compute exact p-value with
zeroes
```

Wilcoxon signed rank test with continuity correction

```
data: condition1_selecteddata$ZSPRE_WOMEN1 and condition1_selecteddata$ZSPOST_WOMEN1
V = 20, p-value = 0.8211
alternative hypothesis: true location shift is not equal to 0
```

```
# source: Paired Samples Wilcoxon Test in R (STHDA, n.d.)
# explanation: Performs a paired-samples Wilcoxon test to compare participants' zero-sum scores
```

```
# Create long data with participant ID
paired_data_long <- condition1_selecteddata %>%
  select(ZSPRE_WOMEN2, ZSPOST_WOMEN2) %>%
  filter(!is.na(ZSPRE_WOMEN2) & !is.na(ZSPOST_WOMEN2)) %>% # Remove missing pairs
  mutate(ID = row_number()) %>%
  pivot_longer(cols = c(ZSPRE_WOMEN2, ZSPOST_WOMEN2),
               names_to = "Composite",
               values_to = "Score") %>%
  mutate(Composite = factor(Composite, levels = c("ZSPRE_WOMEN2", "ZSPOST_WOMEN2"))) # changes

# Plot: boxplot + paired lines
women_figure <- ggplot(paired_data_long, aes(x = Composite, y = Score, group = ID)) +
  geom_boxplot(aes(group = Composite), width = 0.5, alpha = 0.3, fill = "white", outlier.shape = NA) +
  geom_line(color = "gray70", alpha = 0.6) +
  geom_point(data = paired_data_long %>%
             filter(Composite == "ZSPRE_WOMEN2"),
             shape = 16, size = 3, color = "blue") +
  geom_point(data = paired_data_long %>%
             filter(Composite == "ZSPOST_WOMEN2"),
             shape = 17, size = 3, color = "red") +
  labs(title = "Pre vs. Post Intervention with Zero-sum Women's Rights Videos 2",
       x = "Intervention Period", y = "Score") +
  theme_minimal()

women_figure
```

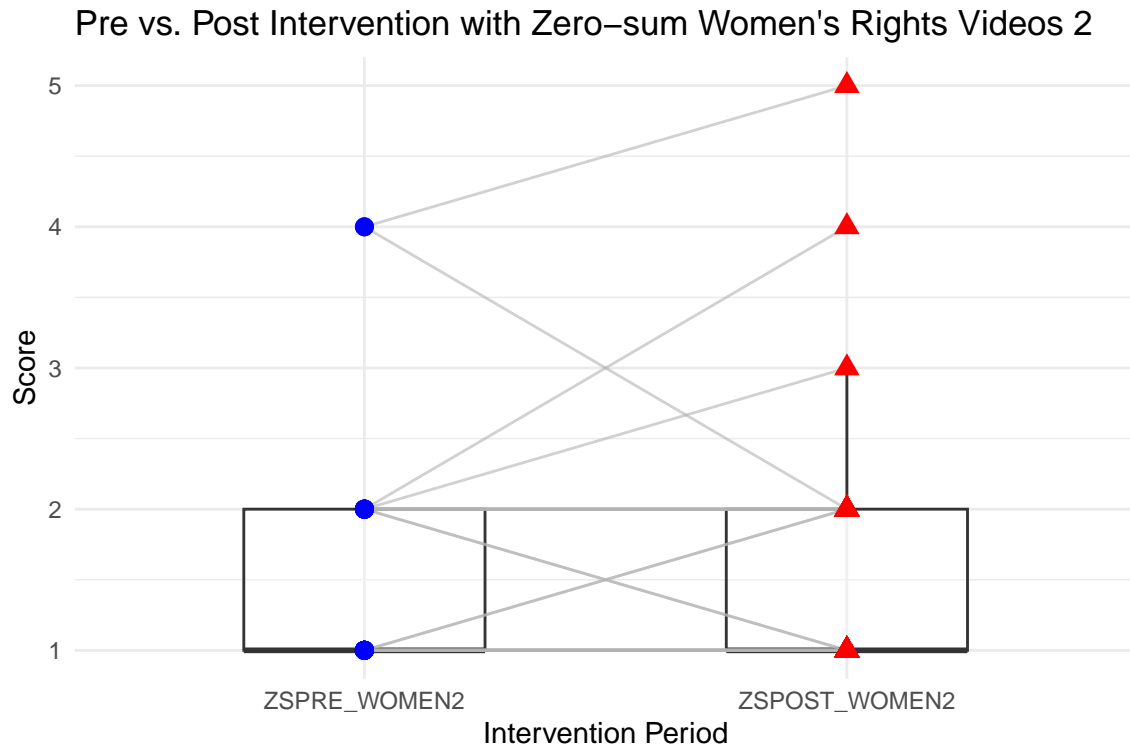


Figure 5: figure 4. Paired pre- and post-intervention women's rights zero-sum beliefs of participants. Boxplots show overall distributions with lines connecting participants scores before and after the intervention.

```
ggsave("Pre vs. Post Intervention with Zero-sum Women's Rights Videos 2.png", plot = women_fig)
```

Saving 6 x 4 in image

```
# source: Zero-sum social identity, not zero-sum economic beliefs, explain voting preference in
# explanation: Compares participants' women's rights zero-sum beliefs scores before and after v
```

```
wilcox.test(condition1_selecteddata$ZSPRE_WOMEN2, condition1_selecteddata$ZSPOST_WOMEN2, paired
```

```
Warning in wilcox.test.default(condition1_selecteddata$ZSPRE_WOMEN2,
condition1_selecteddata$ZSPOST_WOMEN2, : cannot compute exact p-value with ties
```

```
Warning in wilcox.test.default(condition1_selecteddata$ZSPRE_WOMEN2,
condition1_selecteddata$ZSPOST_WOMEN2, : cannot compute exact p-value with
zeroes
```

Wilcoxon signed rank test with continuity correction

```
data: condition1_selecteddata$ZSPRE_WOMEN2 and condition1_selecteddata$ZSPOST_WOMEN2
V = 14.5, p-value = 0.66
alternative hypothesis: true location shift is not equal to 0
```

```
# source: Paired Samples Wilcoxon Test in R (STHDA, n.d.)
# explanation: Performs a paired-samples Wilcoxon test to compare participants' zero-sum scores
```

Impact of zero-sum economy videos: pre- vs. post-intervention

```
# Create long data with participant ID
paired_data_long <- condition1_selecteddata %>%
  select(ZSPRE_ECONOMY, ZSPOST_ECONOMY) %>%
  filter(!is.na(ZSPRE_ECONOMY) & !is.na(ZSPOST_ECONOMY)) %>% # Remove missing pairs
  mutate(ID = row_number()) %>%
  pivot_longer(cols = c(ZSPRE_ECONOMY, ZSPOST_ECONOMY),
               names_to = "Composite",
               values_to = "Score") %>%
  mutate(Composite = factor(Composite, levels = c("ZSPRE_ECONOMY", "ZSPOST_ECONOMY"))) # change

# Plot: boxplot + paired lines
economy_figure <- ggplot(paired_data_long, aes(x = Composite, y = Score, group = ID)) +
  geom_boxplot(aes(group = Composite), width = 0.5, alpha = 0.3, fill = "white", outlier.shape = NA) +
  geom_line(color = "gray70", alpha = 0.6) +
  geom_point(data = paired_data_long %>%
             filter(Composite == "ZSPRE_ECONOMY"),
             shape = 16, size = 3, color = "blue") +
  geom_point(data = paired_data_long %>%
             filter(Composite == "ZSPOST_ECONOMY"),
             shape = 17, size = 3, color = "red") +
  labs(title = "Pre vs. Post Intervention with Zero-sum Economy Videos",
       x = "Intervention Period", y = "Score") +
  theme_minimal()

economy_figure
```

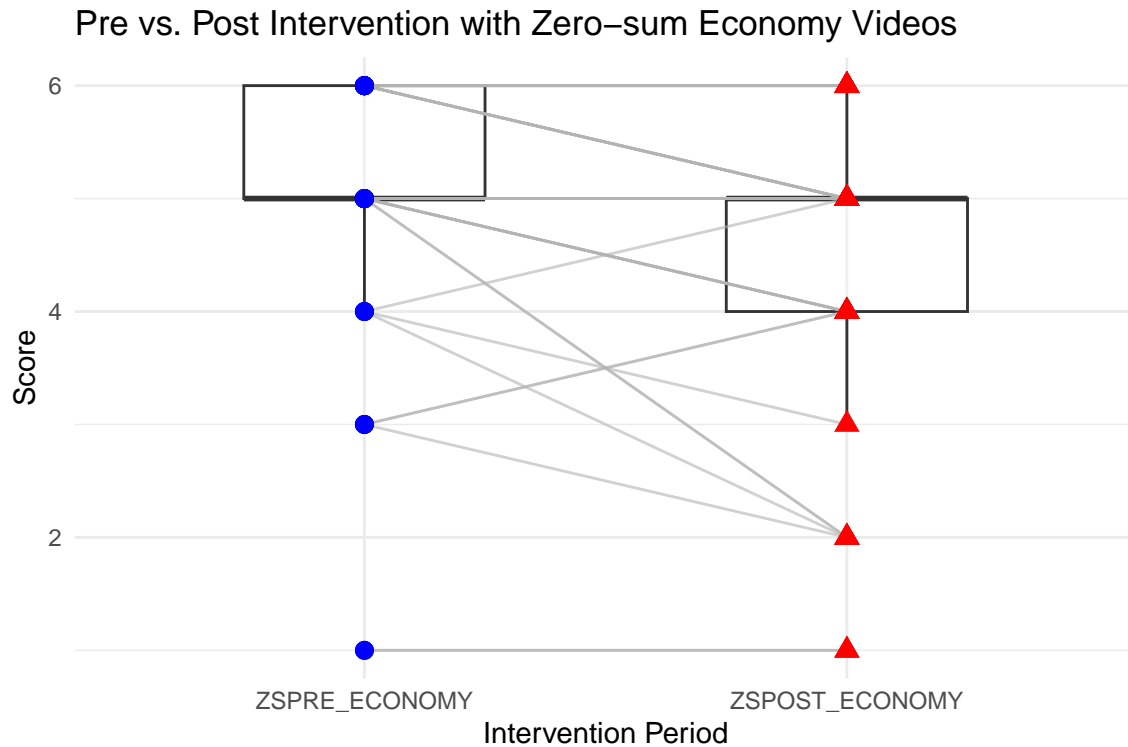


Figure 6: figure 5. Paired pre- and post-intervention economy zero-sum beliefs of participants. Boxplots show overall distributions with lines connecting participants scores before and after the intervention.

```
ggsave("Pre vs. Post Intervention with Zero-sum Economy Videos.png", plot = economy_figure)
```

Saving 6 x 4 in image

```
# source: Zero-sum social identity, not zero-sum economic beliefs, explain voting preference in
# explanation: Compares participants' economy zero-sum beliefs scores before and after watching
```

```
wilcox.test(condition1_selecteddata$ZSPRE_ECONOMY, condition1_selecteddata$ZSPOST_ECONOMY, pair
```

```
Warning in wilcox.test.default(condition1_selecteddata$ZSPRE_ECONOMY,
condition1_selecteddata$ZSPOST_ECONOMY, : cannot compute exact p-value with
ties
```

```
Warning in wilcox.test.default(condition1_selecteddata$ZSPRE_ECONOMY,
condition1_selecteddata$ZSPOST_ECONOMY, : cannot compute exact p-value with
zeroes
```

Wilcoxon signed rank test with continuity correction

```
data: condition1_selecteddata$ZSPRE_ECONOMY and condition1_selecteddata$ZSPOST_ECONOMY
V = 164.5, p-value = 0.002785
alternative hypothesis: true location shift is not equal to 0
```

```
# source: Paired Samples Wilcoxon Test in R (STHDA, n.d.)
# explanation: Performs a paired-samples Wilcoxon test to compare participants' zero-sum scores
```

Impact of zero-sum DEI videos: pre- vs. post-intervention

```
# Create long data with participant ID
paired_data_long <- condition1_selecteddata %>%
  select(ZSPRE_DEI1, ZSPOST_DEI1) %>%
  filter(!is.na(ZSPRE_DEI1) & !is.na(ZSPOST_DEI1)) %>% # Remove missing pairs
  mutate(ID = row_number()) %>%
  pivot_longer(cols = c(ZSPRE_DEI1, ZSPOST_DEI1),
               names_to = "Composite",
               values_to = "Score") %>%
  mutate(Composite = factor(Composite, levels = c("ZSPRE_DEI1", "ZSPOST_DEI1"))) # changes the

# Plot: boxplot + paired lines
dei_figure <- ggplot(paired_data_long, aes(x = Composite, y = Score, group = ID)) +
  geom_boxplot(aes(group = Composite), width = 0.5, alpha = 0.3, fill = "white", outlier.shape = NA) +
  geom_line(color = "gray70", alpha = 0.6) +
  geom_point(data = paired_data_long %>%
             filter(Composite == "ZSPRE_DEI1"),
             shape = 16, size = 3, color = "#d9d2e9ff") +
  geom_point(data = paired_data_long %>%
             filter(Composite == "ZSPOST_DEI1"),
             shape = 17, size = 3, color = "#aa98d3ff") +
  labs(title = "Pre vs. Post Intervention with Zero-sum DEI Videos",
       x = "Intervention Period", y = "Score") +
  theme_minimal()

dei_figure
```

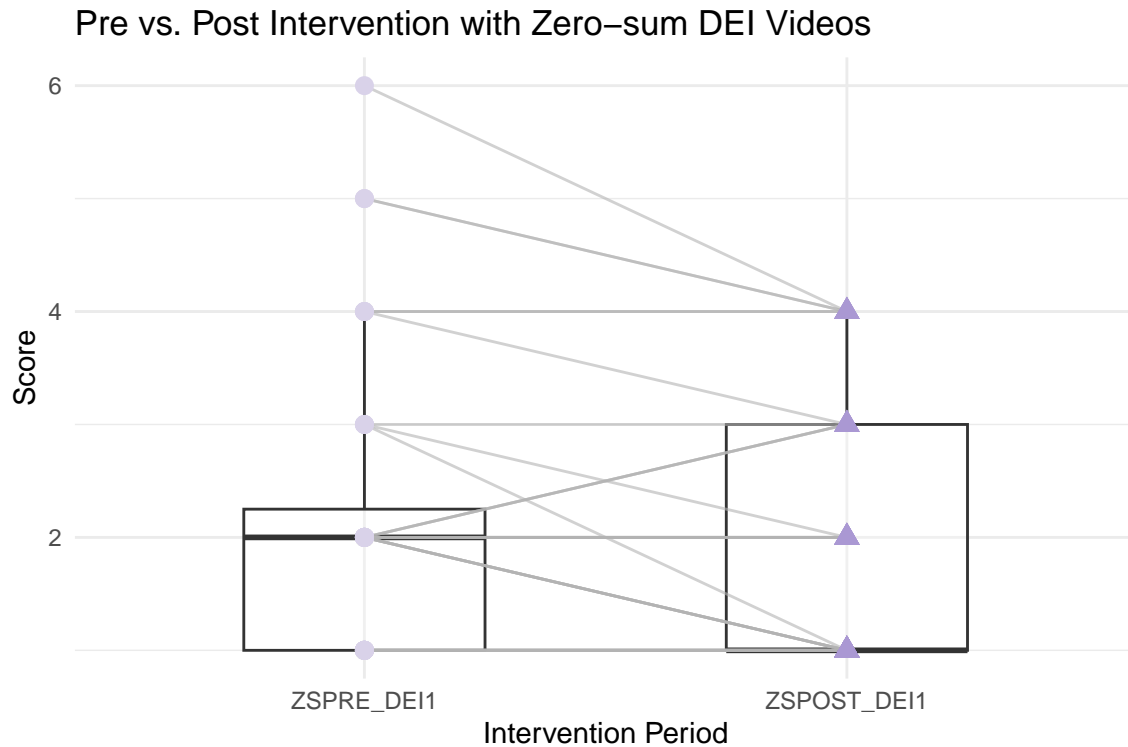


Figure 7: figure 6. Paired pre- and post-intervention DEI zero-sum beliefs of participants. Boxplots show overall distributions with lines connecting participants scores before and after the intervention.

```
ggsave("Pre vs. Post Intervention with Zero-sum DEI Videos.png", plot = dei_figure)
```

Saving 6 x 4 in image

```
# source: Zero-sum social identity, not zero-sum economic beliefs, explain voting preference in
# explanation: Compares participants' economy zero-sum beliefs scores before and after watching
```

```
wilcox.test(condition1_selecteddata$ZSPRE_DEI1, condition1_selecteddata$ZSPOST_DEI1, paired = T)
```

```
Warning in wilcox.test.default(condition1_selecteddata$ZSPRE_DEI1,
condition1_selecteddata$ZSPOST_DEI1, : cannot compute exact p-value with ties
```

```
Warning in wilcox.test.default(condition1_selecteddata$ZSPRE_DEI1,
condition1_selecteddata$ZSPOST_DEI1, : cannot compute exact p-value with zeroes
```

Wilcoxon signed rank test with continuity correction

```
data: condition1_selecteddata$ZSPRE_DEI1 and condition1_selecteddata$ZSPOST_DEI1
V = 85.5, p-value = 0.02768
alternative hypothesis: true location shift is not equal to 0
```

```

# source: Paired Samples Wilcoxon Test in R (STHDA, n.d.)
# explanation: Performs a paired-samples Wilcoxon test to compare participants' zero-sum scores

# Create long data with participant ID
paired_data_long <- condition1_selecteddata %>%
  select(ZSPRE_DEI2, ZSPOST_DEI2) %>%
  filter(!is.na(ZSPRE_DEI2) & !is.na(ZSPOST_DEI2)) %>% # Remove missing pairs
  mutate(ID = row_number()) %>%
  pivot_longer(cols = c(ZSPRE_DEI2, ZSPOST_DEI2),
               names_to = "Composite",
               values_to = "Score") %>%
  mutate(Composite = factor(Composite, levels = c("ZSPRE_DEI2", "ZSPOST_DEI2"))) # changes the

# Plot: boxplot + paired lines
dei_figure <- ggplot(paired_data_long, aes(x = Composite, y = Score, group = ID)) +
  geom_boxplot(aes(group = Composite), width = 0.5, alpha = 0.3, fill = "white", outlier.shape = NA) +
  geom_line(color = "gray70", alpha = 0.6) +
  geom_point(data = paired_data_long %>%
             filter(Composite == "ZSPRE_DEI2"),
             shape = 16, size = 3, color = "blue") +
  geom_point(data = paired_data_long %>%
             filter(Composite == "ZSPOST_DEI2"),
             shape = 17, size = 3, color = "red") +
  labs(title = "Pre vs. Post Intervention with Zero-sum DEI Videos 2",
       x = "Intervention Period", y = "Score") +
  theme_minimal()

dei_figure

```

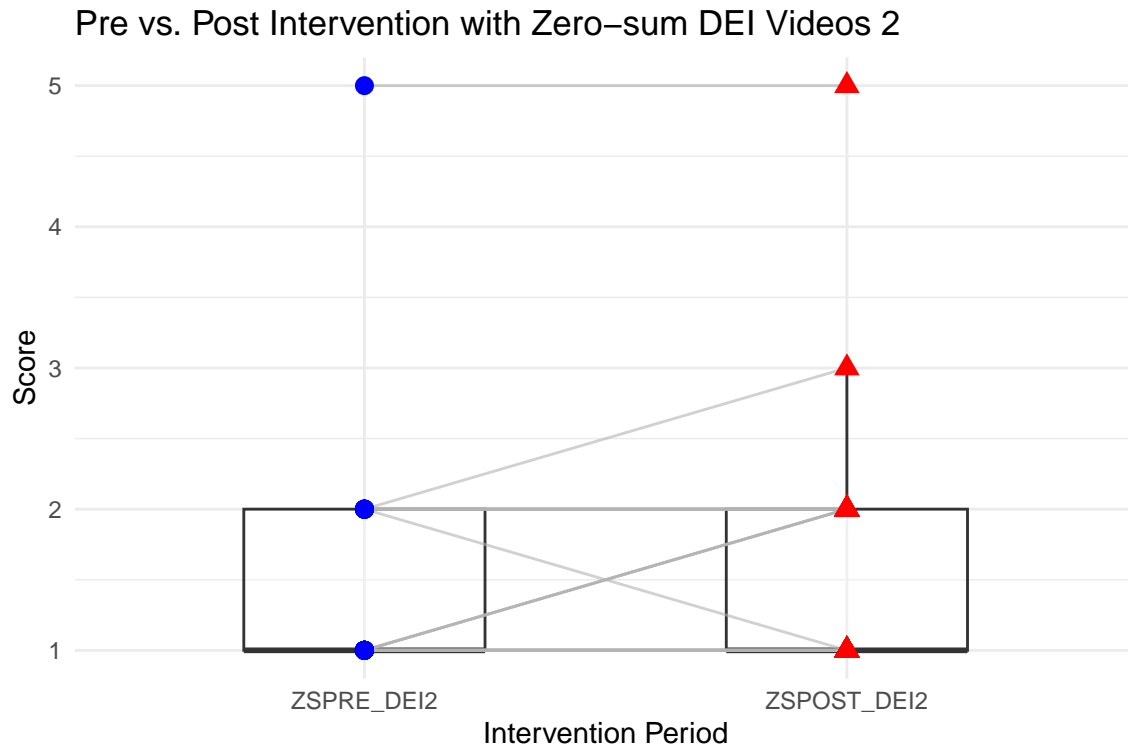


Figure 8: figure 6. Paired pre- and post-intervention DEI zero-sum beliefs of participants. Boxplots show overall distributions with lines connecting participants scores before and after the intervention.

```
ggsave("Pre vs. Post Intervention with Zero-sum DEI Videos 2.png", plot = dei_figure)
```

Saving 6 x 4 in image

```
# source: Zero-sum social identity, not zero-sum economic beliefs, explain voting preference in
# explanation: Compares participants' economy zero-sum beliefs scores before and after watching
```

```
wilcox.test(condition1_selecteddata$ZSPRE_DEI2, condition1_selecteddata$ZSPOST_DEI2, paired = T)
```

```
Warning in wilcox.test.default(condition1_selecteddata$ZSPRE_DEI2,
condition1_selecteddata$ZSPOST_DEI2, : cannot compute exact p-value with ties
```

```
Warning in wilcox.test.default(condition1_selecteddata$ZSPRE_DEI2,
condition1_selecteddata$ZSPOST_DEI2, : cannot compute exact p-value with zeroes
```

Wilcoxon signed rank test with continuity correction

```
data: condition1_selecteddata$ZSPRE_DEI2 and condition1_selecteddata$ZSPOST_DEI2
V = 3.5, p-value = 0.1294
alternative hypothesis: true location shift is not equal to 0
```

```
# source: Paired Samples Wilcoxon Test in R (STHDA, n.d.)
# explanation: Performs a paired-samples Wilcoxon test to compare participants' zero-sum scores
```

Impact of zero-sum environment videos: pre- vs. post-intervention

```
# Create long data with participant ID
paired_data_long<- condition1_selecteddata %>%
  select(ZSPRE_ENVIRO1, ZSPOST_ENVIRO1) %>%
  filter(!is.na(ZSPRE_ENVIRO1) & !is.na(ZSPOST_ENVIRO1)) %>% # Remove missing pairs
  mutate(ID = row_number()) %>%
  pivot_longer(cols = c(ZSPRE_ENVIRO1, ZSPOST_ENVIRO1),
               names_to = "Composite",
               values_to = "Score") %>%
  mutate(Composite = factor(Composite, levels = c("ZSPRE_ENVIRO1", "ZSPOST_ENVIRO1"))) # change

# Plot: boxplot + paired lines
environment_figure <- ggplot(paired_data_long, aes(x = Composite, y = Score, group = ID)) +
  geom_boxplot(aes(group = Composite), width = 0.5, alpha = 0.3, fill = "white", outlier.shape = NA) +
  geom_line(color = "gray70", alpha = 0.6) +
  geom_point(data = paired_data_long %>%
             filter(Composite == "ZSPRE_ENVIRO1"),
             shape = 16, size = 3, color = "blue") +
  geom_point(data = paired_data_long %>%
             filter(Composite == "ZSPOST_ENVIRO1"),
             shape = 17, size = 3, color = "red") +
  labs(title = "Pre vs. Post Intervention with Zero-sum Environment Videos",
       x = "Intervention Period", y = "Score") +
  theme_minimal()

environment_figure
```

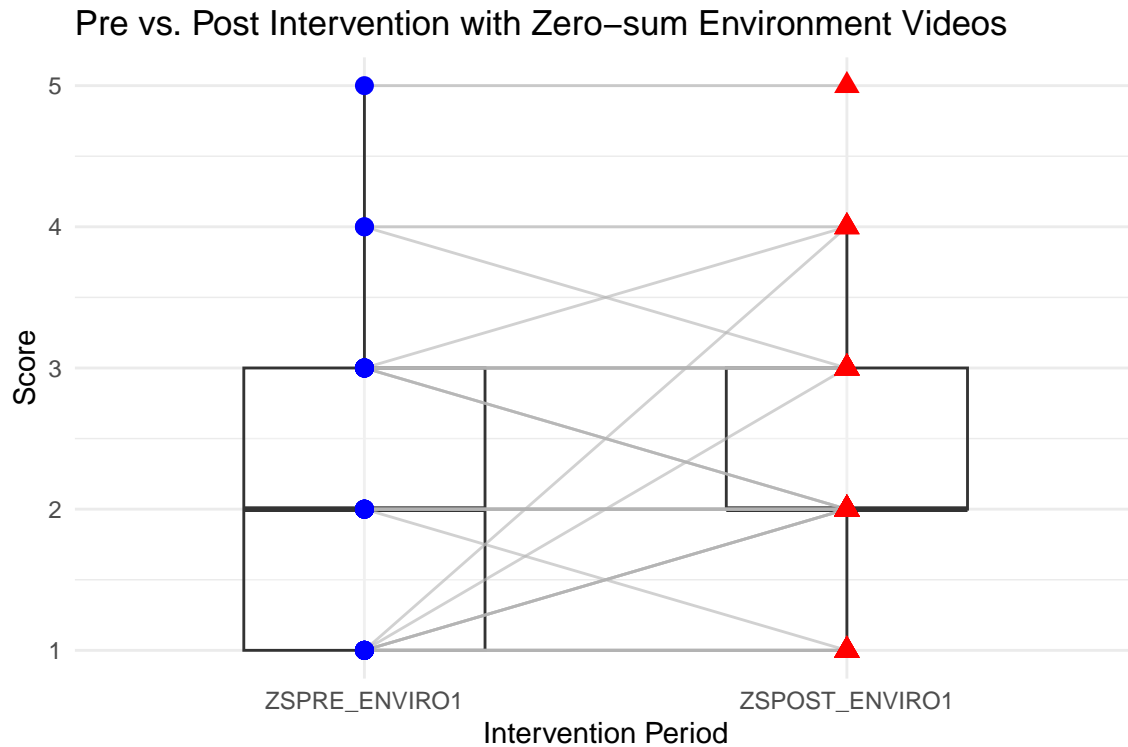


Figure 9: figure 7. Paired pre- and post-intervention environment zero-sum beliefs of participants. Boxplots show overall distributions with lines connecting participants scores before and after the intervention.

```
ggsave("Pre vs. Post Intervention with Zero-sum Environment Videos.png", plot = environment_fig)
```

Saving 6 x 4 in image

```
# source: Zero-sum social identity, not zero-sum economic beliefs, explain voting preference in
# explanation: Compares participants' environment zero-sum beliefs scores before and after watching
```

```
wilcox.test(condition1_selecteddata$ZSPRE_ENVIRO1, condition1_selecteddata$ZSPOST_ENVIRO1, paired = TRUE)
```

Warning in wilcox.test.default(condition1_selecteddata\$ZSPRE_ENVIRO1, condition1_selecteddata\$ZSPOST_ENVIRO1, : cannot compute exact p-value with ties

Warning in wilcox.test.default(condition1_selecteddata\$ZSPRE_ENVIRO1, condition1_selecteddata\$ZSPOST_ENVIRO1, : cannot compute exact p-value with zeroes

Wilcoxon signed rank test with continuity correction

```
data: condition1_selecteddata$ZSPRE_ENVIRO1 and condition1_selecteddata$ZSPOST_ENVIRO1
V = 27.5, p-value = 0.3557
alternative hypothesis: true location shift is not equal to 0
```

```
# source: Paired Samples Wilcoxon Test in R (STHDA, n.d.)
# explanation: Performs a paired-samples Wilcoxon test to compare participants' zero-sum scores
```

```
# Create long data with participant ID
paired_data_long<- condition1_selecteddata %>%
  select(ZSPRE_ENVIRO2, ZSPOST_ENVIRO2) %>%
  filter(!is.na(ZSPRE_ENVIRO2) & !is.na(ZSPOST_ENVIRO2)) %>% # Remove missing pairs
  mutate(ID = row_number()) %>%
  pivot_longer(cols = c(ZSPRE_ENVIRO2, ZSPOST_ENVIRO2),
               names_to = "Composite",
               values_to = "Score") %>%
  mutate(Composite = factor(Composite, levels = c("ZSPRE_ENVIRO2", "ZSPOST_ENVIRO2"))) # change

# Plot: boxplot + paired lines
environment_figure <- ggplot(paired_data_long, aes(x = Composite, y = Score, group = ID)) +
  geom_boxplot(aes(group = Composite), width = 0.5, alpha = 0.3, fill = "white", outlier.shape = NA) +
  geom_line(color = "gray70", alpha = 0.6) +
  geom_point(data = paired_data_long %>%
             filter(Composite == "ZSPRE_ENVIRO2"),
             shape = 16, size = 3, color = "blue") +
  geom_point(data = paired_data_long %>%
             filter(Composite == "ZSPOST_ENVIRO2"),
             shape = 17, size = 3, color = "red") +
  labs(title = "Pre vs. Post Intervention with Zero-sum Environment Videos 2",
       x = "Intervention Period", y = "Score") +
  theme_minimal()

environment_figure
```

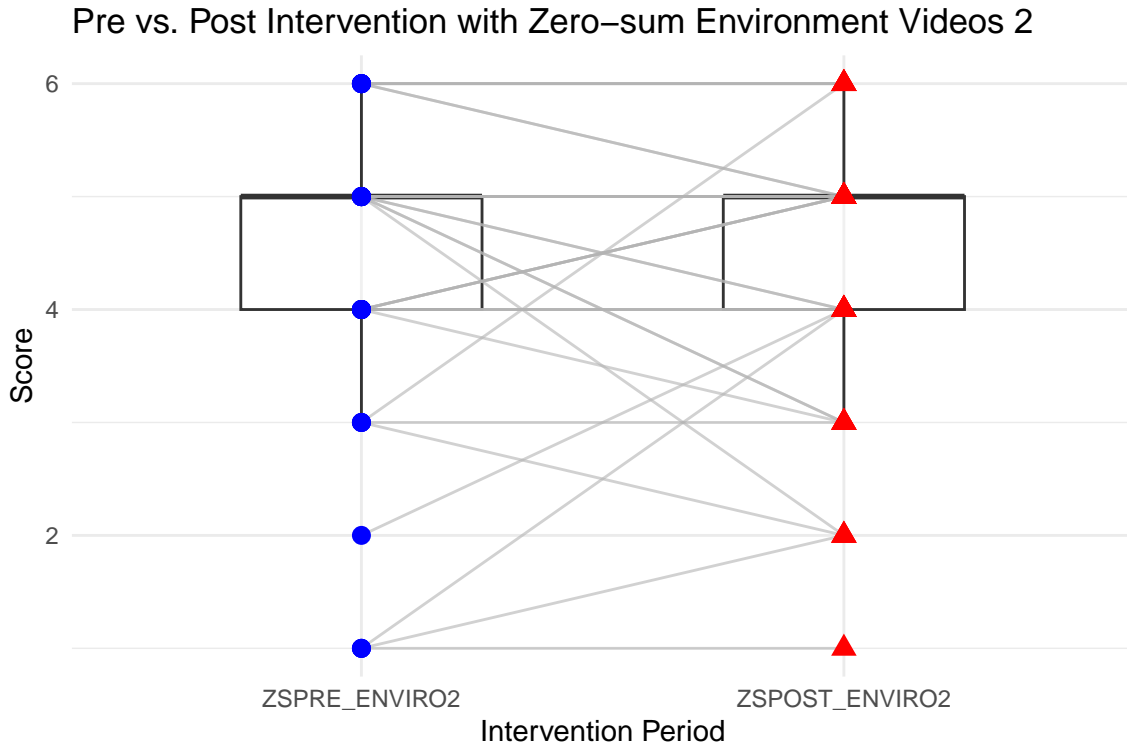


Figure 10: figure 8. Paired pre- and post-intervention environment zero-sum beliefs of participants. Boxplots show overall distributions with lines connecting participants scores before and after the intervention.

```
ggsave("Pre vs. Post Intervention with Zero-sum Environment Videos 2.png", plot = environment_
```

Saving 6 x 4 in image

```
# source: Zero-sum social identity, not zero-sum economic beliefs, explain voting preference in
# explanation: Compares participants' environment zero-sum beliefs scores before and after wat
```

```
wilcox.test(condition1_selecteddata$ZSPRE_ENVIRO2, condition1_selecteddata$ZSPOST_ENVIRO2, pair
```

Warning in wilcox.test.default(condition1_selecteddata\$ZSPRE_ENVIRO2, condition1_selecteddata\$ZSPOST_ENVIRO2, : cannot compute exact p-value with ties

Warning in wilcox.test.default(condition1_selecteddata\$ZSPRE_ENVIRO2, condition1_selecteddata\$ZSPOST_ENVIRO2, : cannot compute exact p-value with zeroes

Wilcoxon signed rank test with continuity correction

```
data: condition1_selecteddata$ZSPRE_ENVIRO2 and condition1_selecteddata$ZSPOST_ENVIRO2
V = 78, p-value = 0.961
alternative hypothesis: true location shift is not equal to 0
```

```
# source: Paired Samples Wilcoxon Test in R (STHDA, n.d.)
# explanation: Performs a paired-samples Wilcoxon test to compare participants' zero-sum scores
```

7 Model: Hope and Anxiety Paired Samples Wilcoxon Test

Hope scores: pre- vs. post-intervention

```
long_data <- condition1_selecteddata %>%
  select(PRE_HOPE, POST_HOPE) %>%
  pivot_longer(cols = c(PRE_HOPE, POST_HOPE),
               names_to = "Intervention_Period",
               values_to = "Hope_Score") %>%
  mutate(Intervention_Period = factor(Intervention_Period, levels = c("PRE_HOPE", "POST_HOPE"))

# creates boxplots
hope_figure <- ggplot(long_data, aes(x = Intervention_Period, y = Hope_Score, fill = Intervention_Period)) +
  geom_boxplot(width = 0.5, alpha = 0.7) +
  labs(title = "Pre vs Post Intervention Hope Levels",
       x = "Intervention Period",
       y = "Hope Score") +
  scale_y_continuous(limits = c(1, 7), breaks = 1:7) +
  scale_fill_manual(values = c("PRE_HOPE" = "red", "POST_HOPE" = "blue")) +
  theme_minimal() +
  theme(legend.position = "none")

hope_figure
```

Warning: Removed 4 rows containing non-finite outside the scale range (``stat_boxplot()``).

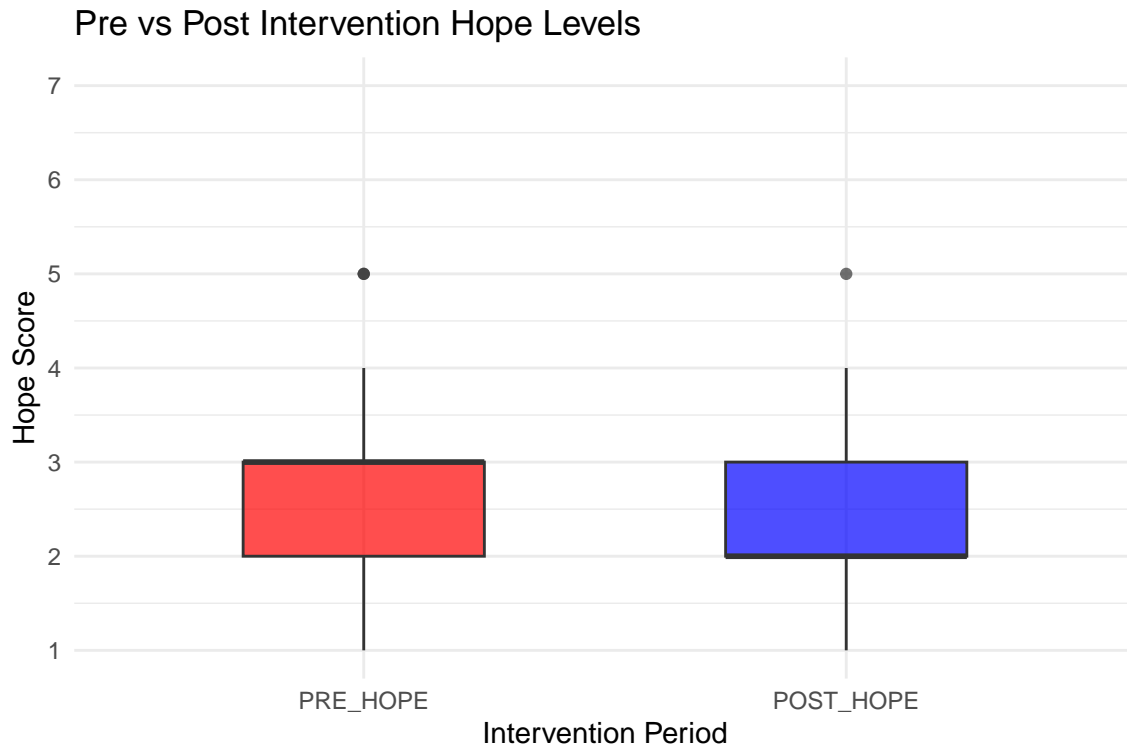


Figure 11: figure 8. Paired pre- and post-intervention hope scores of participants. Boxplots show overall distributions.

```
ggsave("Pre vs Post Intervention Hope Levels.png", plot = hope_figure)
```

Saving 6 x 4 in image

Warning: Removed 4 rows containing non-finite outside the scale range
(`stat_boxplot()`).

```
# source: Zero-sum social identity, not zero-sum economic beliefs, explain voting preference in  
# explanation: Compares participants' hope scores before and after watching intervention videos
```

```
wilcox.test(condition1_selecteddata$PRE_HOPE, condition1_selecteddata$POST_HOPE, paired = TRUE)
```

Warning in wilcox.test.default(condition1_selecteddata\$PRE_HOPE,
condition1_selecteddata\$POST_HOPE, : cannot compute exact p-value with ties

Warning in wilcox.test.default(condition1_selecteddata\$PRE_HOPE,
condition1_selecteddata\$POST_HOPE, : cannot compute exact p-value with zeroes

Wilcoxon signed rank test with continuity correction

```
data: condition1_selecteddata$PRE_HOPE and condition1_selecteddata$POST_HOPE
V = 38.5, p-value = 0.2273
alternative hypothesis: true location shift is not equal to 0
```

```
# source: Paired Samples Wilcoxon Test in R (STHDA, n.d.)
# explanation: Performs a paired-samples Wilcoxon test to compare participants' hope scores pre
```

Anxiety scores: pre- vs. post-intervention

```
long_data <- condition1_selecteddata %>%
  select(PRE_ANXIETY, POST_ANXIETY) %>%
  pivot_longer(cols = c(PRE_ANXIETY, POST_ANXIETY),
               names_to = "Intervention_Period",
               values_to = "Anxiety_Score") %>%
  mutate(Intervention_Period = factor(Intervention_Period, levels = c("PRE_ANXIETY", "POST_ANXIETY")))

# creates boxplots
anxiety_figure <- ggplot(long_data, aes(x = Intervention_Period, y = Anxiety_Score, fill = Intervention_Period)) +
  geom_boxplot(width = 0.5, alpha = 0.7) +
  labs(title = "Pre vs Post Intervention Anxiety Levels",
       x = "Intervention Period",
       y = "Anxiety Score") +
  scale_y_continuous(limits = c(1, 7), breaks = 1:7) +
  scale_fill_manual(values = c("PRE_ANXIETY" = "red", "POST_ANXIETY" = "blue")) +
  theme_minimal() +
  theme(legend.position = "none")

anxiety_figure
```

```
Warning: Removed 4 rows containing non-finite outside the scale range
(`stat_boxplot()`).
```

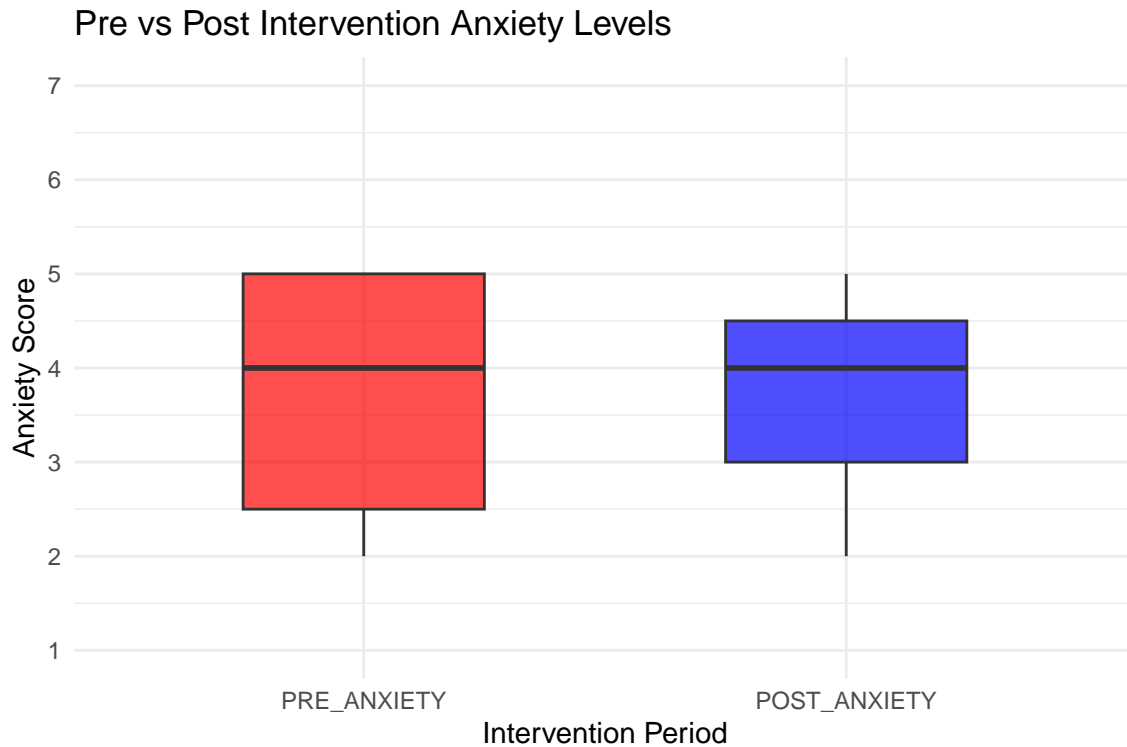


Figure 12: figure 9. Paired pre- and post-intervention anxiety scores of participants. Boxplots show overall distributions.

```
ggsave("Pre vs Post Intervention Anxiety Levels.png", plot = anxiety_figure)
```

Saving 6 x 4 in image

Warning: Removed 4 rows containing non-finite outside the scale range
(`stat_boxplot()`).

```
# source: Zero-sum social identity, not zero-sum economic beliefs, explain voting preference in  
# explanation: Compares participants' hope scores before and after watching intervention videos
```

```
wilcox.test(condition1_selecteddata$PRE_ANKIETY, condition1_selecteddata$POST_ANKIETY, paired = TRUE)
```

Warning in wilcox.test.default(condition1_selecteddata\$PRE_ANKIETY,
condition1_selecteddata\$POST_ANKIETY, : cannot compute exact p-value with ties

Warning in wilcox.test.default(condition1_selecteddata\$PRE_ANKIETY,
condition1_selecteddata\$POST_ANKIETY, : cannot compute exact p-value with zeroes

```
Wilcoxon signed rank test with continuity correction

data: condition1_selecteddata$PRE_ANXIETY and condition1_selecteddata$POST_ANXIETY
V = 7, p-value = 0.484
alternative hypothesis: true location shift is not equal to 0

# source: Paired Samples Wilcoxon Test in R (STHDA, n.d.)
# explanation: Performs a paired-samples Wilcoxon test to compare participants' anxiety scores
```

8 Model: Linear Regression Spearman Correlation

Polarizing content: alignment vs engagement

```
polar_align_engage <- ggplot(selecteddata, aes(x = POLARALIGN, y = POLARENGAGEMENT)) +
  geom_point(alpha = 0.6, color = "red") +
  geom_smooth(method = "lm", color = "darkred", se = TRUE) +
  labs(title = "Polarizing Video Engagement vs alignment",
       x = "Alignment", y = "Engagement") +
  theme_minimal()

polar_align_engage
```

`geom_smooth()` using formula = 'y ~ x'

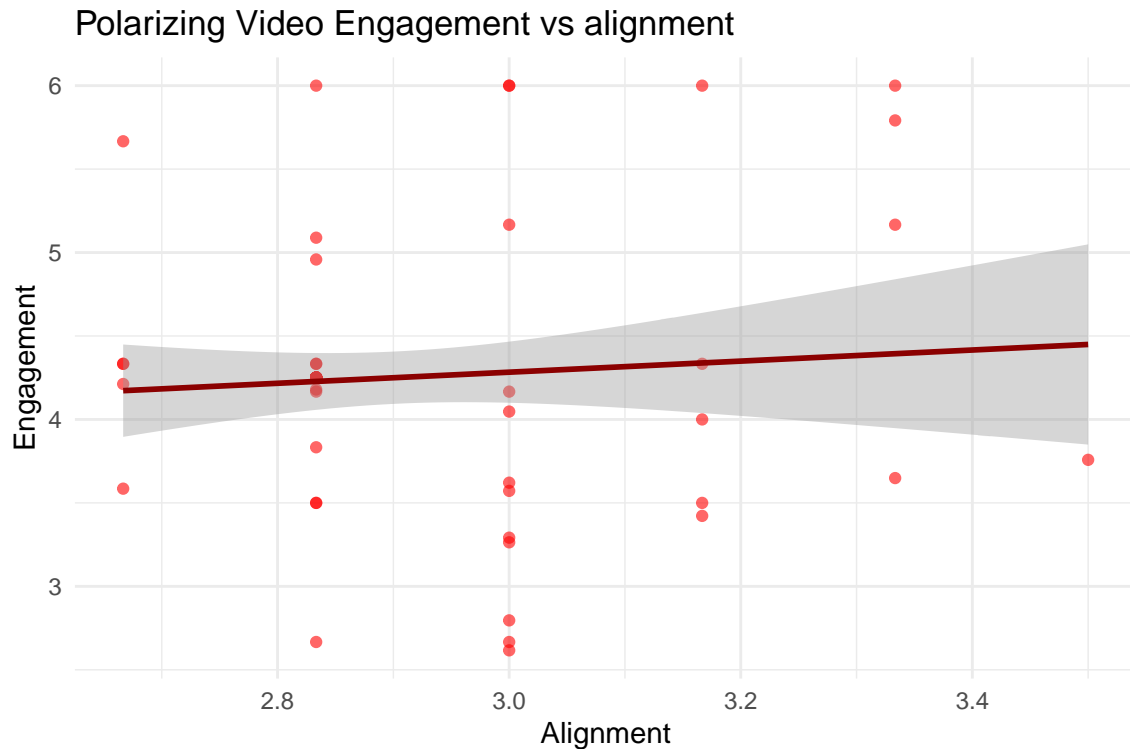


Figure 13: figure 10. Relationship between polarization alignment and engagement. Fitted with a regression line to show the association between participant's alignment with polarizing videos and their engagement levels.

```
ggsave("Polarizing Video Engagement vs alignment.png", plot = polar_align_engage)
```

```
Saving 6 x 4 in image
`geom_smooth()` using formula = 'y ~ x'
```

```
# source: R for Data Science - Data Visualization (Wickham et al., 2023)
# explanation: Linear regression showing the relationship between a person's alignment with the
```

```
cor.test(selecteddata$POLARALIGN, selecteddata$POLARENGAGEMENT, method = "spearman")
```

```
Warning in cor.test.default(selecteddata$POLARALIGN,
selecteddata$POLARENGAGEMENT, : Cannot compute exact p-value with ties
```

```
Spearman's rank correlation rho
```

```
data: selecteddata$POLARALIGN and selecteddata$POLARENGAGEMENT
S = 99786, p-value = 0.1327
alternative hypothesis: true rho is not equal to 0
sample estimates:
```

```
rho
-0.169555
```

```
# source: Correlation Test Between Two Variables in R (STHDA, n.d.)
# explanation: performs a correlation test. Spearman is used because of nonnormality.
```

Leaning content: engagement vs alignment

```
lean_align_engage <- ggplot(selecteddata, aes(x = LEANALIGN, y = LEANENGAGEMENT)) +
  geom_point(alpha = 0.6, color = "blue") +
  geom_smooth(method = "lm", color = "darkblue", se = TRUE) +
  labs(title = "Leaning Video Engagement vs ALIGN",
       x = "Alignment", y = "Engagement") +
  theme_minimal()

lean_align_engage
```

`geom_smooth()` using formula = 'y ~ x'

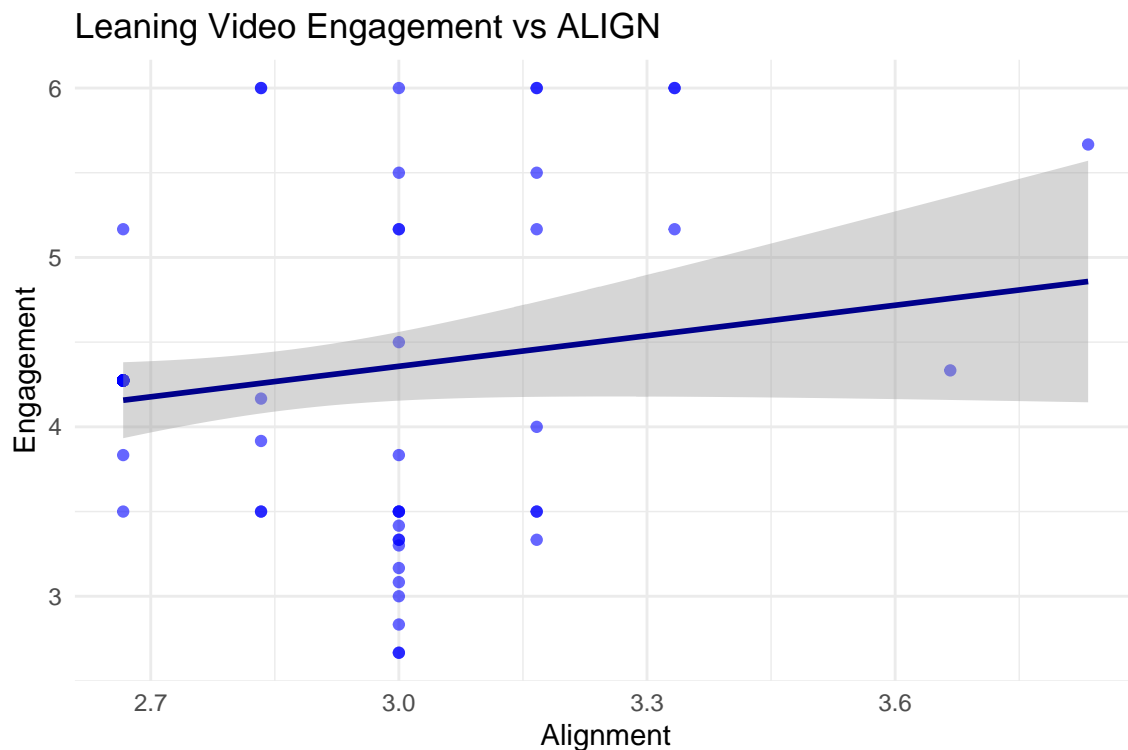


Figure 14: figure 11. Relationship between leaning alignment and engagement. Fitted with a regression line to show the association between participant's alignment with leaning videos and their engagement levels.

```
ggsave("Leaning Video Engagement vs alignment.png", plot = lean_align_engage)
```

```
Saving 6 x 4 in image  
`geom_smooth()` using formula = 'y ~ x'
```

```
# source: R for Data Science - Data Visualization (Wickham et al., 2023)  
# explanation: Linear regression showing the relationship between a person's alignment with the
```

```
cor.test(selecteddata$LEANENGAGEMENT, selecteddata$LEANALIGN, method = "spearman")
```

```
Warning in cor.test.default(selecteddata$LEANENGAGEMENT,  
selecteddata$LEANALIGN, : Cannot compute exact p-value with ties
```

Spearman's rank correlation rho

```
data: selecteddata$LEANENGAGEMENT and selecteddata$LEANALIGN  
S = 86799, p-value = 0.8787  
alternative hypothesis: true rho is not equal to 0  
sample estimates:  
rho  
-0.0173329
```

```
# source: correlation Test Between Two Variables in R (STHDA, n.d.)  
# explanation: performs a correlation test. Spearman is used because of nonnormality.
```

9 Model: Zero-sum Correlation Matrixes

```
zero_sum_pre_items <- c("ZSPRE_IMM", "ZSPRE_HEALTH", "ZSPRE_WOMEN1", "ZSPRE_WOMEN2",  
                        "ZSPRE_ECONOMY", "ZSPRE_DEI1", "ZSPRE_DEI2",  
                        "ZSPRE_ENVIRO1", "ZSPRE_ENVIRO2")  
  
cor_data <- selecteddata[, c(zero_sum_pre_items, "PREZEROSUM")]  
  
cor_data <- data.frame(lapply(cor_data, function(x) {  
  if(is.factor(x)) as.numeric(x) else as.numeric(x)  
}))  
  
M <- cor(cor_data, use = "pairwise.complete.obs", method = "pearson")  
print(round(M, 2))
```

	ZSPRE_IMM	ZSPRE_HEALTH	ZSPRE_WOMEN1	ZSPRE_WOMEN2	ZSPRE_ECONOMY
ZSPRE_IMM	1.00	0.53	0.35	0.51	-0.15
ZSPRE_HEALTH	0.53	1.00	0.06	0.46	-0.23
ZSPRE_WOMEN1	0.35	0.06	1.00	0.38	-0.13
ZSPRE_WOMEN2	0.51	0.46	0.38	1.00	-0.07
ZSPRE_ECONOMY	-0.15	-0.23	-0.13	-0.07	1.00
ZSPRE_DEI1	0.76	0.44	0.32	0.55	-0.15
ZSPRE_DEI2	0.59	0.57	0.29	0.70	-0.26
ZSPRE_ENVIRO1	0.49	0.36	0.24	0.54	0.10
ZSPRE_ENVIRO2	-0.25	-0.13	-0.10	-0.24	0.29
PREZEROSUM	0.73	0.60	0.50	0.71	0.16

	ZSPRE_DEI1	ZSPRE_DEI2	ZSPRE_ENVIRO1	ZSPRE_ENVIRO2	PREZEROSUM
ZSPRE_IMM	0.76	0.59	0.49	-0.25	0.73
ZSPRE_HEALTH	0.44	0.57	0.36	-0.13	0.60
ZSPRE_WOMEN1	0.32	0.29	0.24	-0.10	0.50
ZSPRE_WOMEN2	0.55	0.70	0.54	-0.24	0.71
ZSPRE_ECONOMY	-0.15	-0.26	0.10	0.29	0.16
ZSPRE_DEI1	1.00	0.66	0.56	-0.12	0.78
ZSPRE_DEI2	0.66	1.00	0.40	-0.18	0.71
ZSPRE_ENVIRO1	0.56	0.40	1.00	-0.06	0.70
ZSPRE_ENVIRO2	-0.12	-0.18	-0.06	1.00	0.13
PREZEROSUM	0.78	0.71	0.70	0.13	1.00

```

cor.mtest <- function(mat, ...) {
  mat <- as.matrix(mat)
  n <- ncol(mat)
  p.mat <- matrix(NA, n, n)
  diag(p.mat) <- 0
  for(i in 1:(n-1)) {
    for(j in (i+1):n) {
      tmp <- cor.test(mat[,i], mat[,j], ...)
      p.mat[i,j] <- p.mat[j,i] <- tmp$p.value
    }
  }
  colnames(p.mat) <- rownames(p.mat) <- colnames(mat)
  return(p.mat)
}

p.mat <- cor.mtest(cor_data)

col <- colorRampPalette(c("red", "white", "blue"))(20)

corrplot(M,
  type = "upper",
  order = "hclust",

```

```

col = col,
tl.col = "black",
tl.srt = 45,
p.mat = p.mat,
sig.level = 0.05,
insig = "blank",
addCoef.col = "black")

```

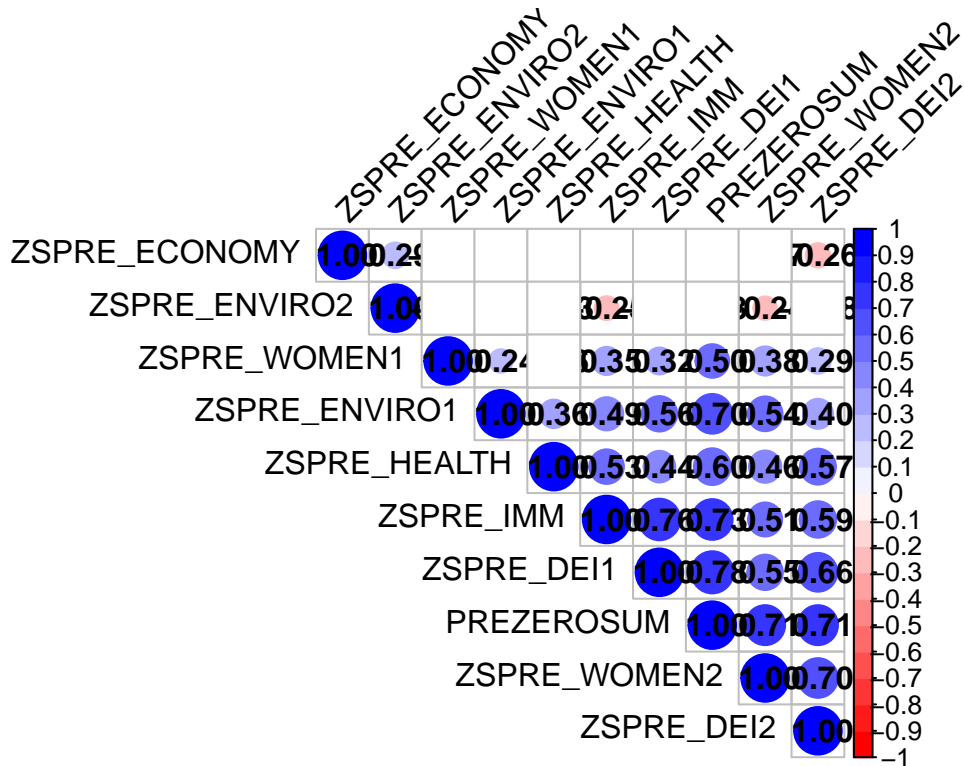


Figure 15: figure 12. Correlation matrix of pre-intervention zero-sum survey items and the composite pre-zero-sum score.

```

# source: Correlation matrix : An R function to do all you need (STHDA, n.d.)
# explanation: Correlation matrix of pre-intervention zero-sum survey items and the composite

```