Predoc Data Task Analysis

Contents

1 1. Load Data

```
# Load the main data sheet (raw data is treated as read-only).
data_raw <- readxl::read_excel(input_path, sheet = "Data")

# Explicitly require the variables that the plan allows us to analyze.
required_vars <- c("ResponseId", "Finished", "passedattn", "consent", "IPAddress",
    "sex", "age", "real_imaginary", "blame_1", "outcome_binary1", "outcome_binary2")

# Fail loudly if any required variable is missing.
missing_vars <- setdiff(required_vars, names(data_raw))
if (length(missing_vars) > 0) {
    stop(paste("Missing required variables:", paste(missing_vars, collapse = ", ")))
}
```

2 2. Data Pipeline

2.1 2.1 Recoding and Missing Data Approach (Overview)

- This pipeline keeps `data_raw` read-only after import. There is no imputation of missing values.

- Missing values would be handled by listwise deletion, if any existed.
- In this dataset, post-recode missingness for core variables is 0.
  - Consequentially, no explicit missing-value exclusions are applied in the pipeline.

2.2 2.2 Eligibility Filters (Applied First)

```
# Exclusion flags follow the plan exactly.  1) Finished must be TRUE.
exclude_not_finished <- !(data_raw$Finished %in% TRUE)
# 2) Attention check must be 'yes'.
exclude_failed_attn <- !(data_raw$passedattn %in% "yes")
# 3) Consent must be AGREE (no explicit 'do not use' flag exists).
exclude_nonconsent <- (!is.na(data_raw$consent)) & (data_raw$consent != "AGREE")

keep_eligible <- !(exclude_not_finished | exclude_failed_attn | exclude_nonconsent)
data_eligible <- data_raw[keep_eligible, ]

cat("Eligible rows after filters (Finished, attention, consent):", nrow(data_eligible),
    "\n")
```

```
## Eligible rows after filters (Finished, attention, consent): 46
```

2.3 2.3 Data Quality Checks (Review)

```
# Confirm each respondent appears once (ResponseId should be unique).
if (anyDuplicated(data_eligible$ResponseId) > 0) {
    dup_ids <- data_eligible$ResponseId[duplicated(data_eligible$ResponseId)]
    stop(paste("Duplicate ResponseId values found:", paste(unique(dup_ids), collapse = ", ")))
}

# Additional respondent uniqueness check using IP address (trimmed).
ip_norm <- trimws(as.character(data_eligible$IPAddress))
if (any(is.na(ip_norm) | ip_norm == "")) {
    stop("Missing IPAddress values found; cannot check uniqueness by IP address.")
}
if (anyDuplicated(ip_norm) > 0) {
    dup_ips <- unique(ip_norm[duplicated(ip_norm)])
    dup_counts <- table(ip_norm)[dup_ips]
    cat("Duplicate IPAddress values found (continuing):\n")
    cat("Total distinct duplicate IPs:", length(dup_ips), "\n")
    for (ip in dup_ips) {
        cat(" -", ip, "count:", as.integer(dup_counts[[ip]]), "\n")
    }
```

```
    # Print requested fields for all rows with duplicate IPs.
    extra_vars <- c("IPAddress", "StartDate", "EndDate", "Duration (in seconds)",
        "Q26_Operating System", "describe")
    missing_extra_vars <- setdiff(extra_vars, names(data_eligible))
    if (length(missing_extra_vars) > 0) {
        stop(paste("Missing required fields for duplicate IP review:", paste(missing_extra_vars,
            collapse = ", ")))
    }
    dup_rows <- data_eligible[ip_norm %in% dup_ips, extra_vars]

    # Table for timestamps, duration, and OS (plus IP for clarity).
    table_vars <- c("IPAddress", "StartDate", "EndDate", "Duration (in seconds)",
        "Q26_Operating System")
    dup_table <- dup_rows[, table_vars]
    cat("Duplicate IP rows (timestamps, duration, OS):\n")
    print(dup_table)

    # List of describe fields for each duplicate row.
    cat("Describe field entries for duplicate IP rows:\n")
    for (i in seq_len(nrow(dup_rows))) {
        desc_text <- as.character(dup_rows$describe[i])
        desc_text <- ifelse(is.na(desc_text), "[NA]", desc_text)
        wrapped_desc <- strwrap(desc_text, width = 80)
        cat(" - IP:", dup_rows$IPAddress[i], "Describe:\n")
        for (line in wrapped_desc) {
            cat("    ", line, "\n")
        }
    }
}
```

```
## Duplicate IPAddress values found (continuing):
## Total distinct duplicate IPs: 1
##  - 50.237.5.2 count: 4
## Duplicate IP rows (timestamps, duration, OS):
## # A tibble: 4 x 5
##   IPAddress  StartDate           EndDate             `Duration (in seconds)`
##   <chr>      <dttm>              <dttm>                                 <dbl>
## 1 50.237.5.2 2021-01-27 12:12:53 2021-01-27 12:16:56                      243
## 2 50.237.5.2 2021-01-27 12:12:45 2021-01-27 12:17:46                      300
## 3 50.237.5.2 2021-01-27 12:12:51 2021-01-27 12:18:01                      310
## 4 50.237.5.2 2021-01-27 12:12:42 2021-01-27 12:18:35                      352
## # i 1 more variable: `Q26_Operating System` <chr>
## Describe field entries for duplicate IP rows:
##  - IP: 50.237.5.2 Describe:
##      This colleague felt that I was not delivering a creative/out of the box enough
##      solution and I felt that I was providing as much as possible given the
##      constraints I was working with. There was no extreme argument but I could tell
##      that he was not pleased with my explanation.
##  - IP: 50.237.5.2 Describe:
##      Work conflict -- he was my direct supervisor and always made unreasonable asks
##      of the team and treated people poorly (e.g. yelling at them). There was one
##      incident in particular where I had not thought critically enough about a
##      workstream that I was on, and he blew up at me.
```

```
##  - IP: 50.237.5.2 Describe:
##      I was managing someone who was older and more educated than me (they were in
##      their 40s and had a PhD, and I was in my 20's and did not). They were being
##      generally very hostile in the workplace (towards many people), and they were
##      letting small frustrations lead to strong, negative emotional reactions. While
##      their negative emotional state was partly due to external factors, they were
##      also frustrated by what they saw was me not being qualified to be managing them
##      or telling them what to do.
##  - IP: 50.237.5.2 Describe:
##      My colleague and I disagreed on the degrees of prioritization in implementing a
##      project.
```

```r
# After analyzing the duplicates, I've decided to keep them.  The reasoning
# will be in the report appendix.

# Inventory variables used (plan requires an explicit list).
used_vars <- required_vars

# Helper: numeric summaries for ranges/missingness.
summarize_numeric <- function(x) {
    x_num <- as.numeric(x)
    if (all(is.na(x_num))) {
        return(list(n = length(x_num), missing = sum(is.na(x_num)), mean = NA, sd = NA,
            min = NA, max = NA))
    }
    list(n = length(x_num), missing = sum(is.na(x_num)), mean = mean(x_num, na.rm = TRUE),
        sd = sd(x_num, na.rm = TRUE), min = min(x_num, na.rm = TRUE), max = max(x_num,
            na.rm = TRUE))
}

# Helper: categorical level inventory for observed values.
summarize_categorical <- function(x) {
    tab <- table(x, useNA = "ifany")
    as.data.frame(tab, stringsAsFactors = FALSE)
}

# Check for unexpected non-numeric entries in numeric fields.
count_non_numeric <- function(x) {
    x_num <- suppressWarnings(as.numeric(x))
    sum(!is.na(x) & is.na(x_num))
}

non_numeric_age <- count_non_numeric(data_eligible$age)
non_numeric_blame <- count_non_numeric(data_eligible$blame_1)

cat("Non-numeric entries (age):", non_numeric_age, "\n")
```

```
## Non-numeric entries (age): 0
```

```r
cat("Non-numeric entries (blame_1):", non_numeric_blame, "\n")
```

```
## Non-numeric entries (blame_1): 0
```

```r
# Categorical variables to list levels for checks.
categorical_vars <- c("Finished", "passedattn", "consent", "sex", "real_imaginary",
    "outcome_binary1", "outcome_binary2")

# Numeric summaries for checks.
age_stats <- summarize_numeric(data_eligible$age)
blame_stats <- summarize_numeric(data_eligible$blame_1)

# Print key structure and quality checks in the knitted output.
cat("Data checks: total eligible rows:", nrow(data_eligible), "\n")
```

```
## Data checks: total eligible rows: 46
```

```r
cat("Data checks: unique ResponseId rows:", nrow(data_eligible), "\n")
```

```
## Data checks: unique ResponseId rows: 46
```

```r
cat("Data checks: variables used:", paste(used_vars, collapse = ", "), "\n")
```

```
## Data checks: variables used: ResponseId, Finished, passedattn, consent, IPAddress, sex, age, real_ima
```

```r
cat("Data checks: age missing/mean/sd/min/max:", age_stats$missing, round(age_stats$mean,
    2), round(age_stats$sd, 2), age_stats$min, age_stats$max, "\n")
```

```
## Data checks: age missing/mean/sd/min/max: 0 33.63 19.95 18 149
```

```r
cat("Data checks: blame_1 missing/mean/sd/min/max:", blame_stats$missing, round(blame_stats$mean,
    2), round(blame_stats$sd, 2), blame_stats$min, blame_stats$max, "\n")
```

```
## Data checks: blame_1 missing/mean/sd/min/max: 0 37.93 16.95 0 75
```

```r
cat("Data checks: observed levels for categorical variables:\n")
```

```
## Data checks: observed levels for categorical variables:
```

```r
for (v in categorical_vars) {
    tab <- summarize_categorical(data_eligible[[v]])
    levels_text <- paste(tab$x, tab$Freq, sep = ": ", collapse = "; ")
    cat(" -", v, "->", levels_text, "\n")
}
```

```
##  - Finished -> TRUE: 46
##  - passedattn -> yes: 46
##  - consent -> AGREE: 46
##  - sex -> Female: 26; Male: 20
##  - real_imaginary -> I am imagining myself in a fictional situation where this is true (I can't think
##  - outcome_binary1 -> I apologize first, then ${e://Field/initials} apologizes.: 36; Neither I nor $
##  - outcome_binary2 -> I apologize first, but ${e://Field/initials} does not apologize after that.: 2
```

2.4 2.4 Extreme Value Review (Ages)

```
# We review extreme ages because Section 2.3 showed a max age of 149.  Identify
# extreme ages for review (above 100 only).
extreme_mask <- !is.na(data_eligible$age) & (data_eligible$age > 100)
extreme_count <- sum(extreme_mask)

cat("Number of extreme ages (>100):", extreme_count, "\n")
```

```
## Number of extreme ages (>100): 1
```

```
# Show the full rows for extreme ages so decisions can be made explicitly.
t(data_eligible[extreme_mask, ])
```

```
##                            [,1]
## StartDate                  "2021-01-27 12:12:43"
## EndDate                    "2021-01-27 12:16:46"
## Status                     "IP Address"
## IPAddress                  "72.83.222.239"
## Progress                   "100"
## Duration (in seconds)      "242"
## Finished                   "TRUE"
## RecordedDate               "2021-01-27 12:16:48"
## ResponseId                 "R_bBJ75JWs3W8KSgF"
## RecipientLastName          NA
## RecipientFirstName         NA
## RecipientEmail             NA
## ExternalReference          NA
## LocationLatitude           "38.9489"
## LocationLongitude          "-76.9352"
## DistributionChannel        "anonymous"
## UserLanguage               "EN"
## consent                    "AGREE"
## Q26_Browser                "Chrome"
## Q26_Version                "88.0.4324.104"
## Q26_Operating System       "Windows NT 10.0"
## Q26_Resolution             "1920x1200"
## QID54_First Click          "29.019"
## QID54_Last Click           "29.019"
## QID54_Page Submit          "42.399"
## QID54_Click Count          "1"
## real_imaginary             "I have thought of a real argument/conflict from my life where this is tru
## initials_box               "TR"
## describe                   "I'm not comfortable writing this."
## feelings_youalone          "-30"
## feelings_bothyoufirst      "8"
## feelings_themalone         "1"
## feelings_boththemfirst     "20"
## feelings_neither           "-20"
## feelings_youaloneforgiven "-30"
## feelings_DO_1              "2"
## feelings_DO_2              "1"
```

```
## feelings_DO_3             "3"
## feelings_DO_4             "5"
## feelings_DO_5             "4"
## feelings_DO_6             "6"
## feelings_exp              NA
## outcome_binary1           "I apologize first, then ${e://Field/initials} apologizes."
## outcome_binary1_DO_1      "2"
## outcome_binary1_DO_2      "1"
## outcome_binary2           "Neither I nor ${e://Field/initials} apologizes."
## outcome_binary2_DO_1      "1"
## outcome_binary2_DO_2      "2"
## blame_1                   "31"
## attention_1               NA
## attention_1_TEXT          NA
## attention_2               NA
## attention_2_TEXT          NA
## attention_3               NA
## attention_3_TEXT          "Banana"
## target_sex                "Other"
## target_sex_3_TEXT         NA
## sex                       "Male"
## sex_3_TEXT                NA
## age                       "149"
## comments                  "don't use these data; was just clicking through."
## mainControl               "showConsentOn showAttnOn"
## passedattn                "yes"
## lottery_draw              "37"
## winner                    "0"
## initials                  "TR"
```

2.5 2.5 Apply Extreme Value Decision

```
# Rule: keep ages <= 100; drop ages > 100 because the flagged row includes a
# 'do not use' note.
data_no_extreme <- data_eligible[!extreme_mask, ]
cat("Rows dropped for age > 100:", nrow(data_eligible) - nrow(data_no_extreme), "\n")
```

```
## Rows dropped for age > 100: 1
```

2.6 2.6 Recode Outcomes and Controls

```
# Decision: sex is the primary explanatory variable. Only 'Female' and 'Male'
# are valid.
allowed_sex <- c("Female", "Male")
if (any(!is.na(data_no_extreme$sex) & !(data_no_extreme$sex %in% allowed_sex))) {
    # bad_vals captures unexpected sex entries; we stop so they are not
    # silently dropped or miscoded.
    bad_vals <- unique(data_no_extreme$sex[!is.na(data_no_extreme$sex) & !(data_no_extreme$sex %in%
        allowed_sex)])
    stop(paste("Unexpected values in sex:", paste(bad_vals, collapse = ", ")))
```

```
}

data_recoded <- data_no_extreme

# Set Female as the reference category for interpretation.
data_recoded$sex_factor <- factor(data_recoded$sex, levels = c("Female", "Male"))

# Decision: real_imaginary is used only as a control / robustness dimension.
real_label <- "I have thought of a real argument/conflict from my life where this is true"
imag_label <- "I am imagining myself in a fictional situation where this is true (I can't think of one i

allowed_real_imag <- c(real_label, imag_label)
if (any(!is.na(data_recoded$real_imaginary) & !(data_recoded$real_imaginary %in%
    allowed_real_imag))) {
    # bad_vals captures unexpected framing entries; we stop rather than coerce
    # to avoid misclassification.
    bad_vals <- unique(data_recoded$real_imaginary[!is.na(data_recoded$real_imaginary) &
        !(data_recoded$real_imaginary %in% allowed_real_imag)])
    stop(paste("Unexpected values in real_imaginary:", paste(bad_vals, collapse = ", ")))
}

# Map to concise labels for modeling.
data_recoded$real_imaginary_factor <- factor(ifelse(data_recoded$real_imaginary ==
    real_label, "real", ifelse(data_recoded$real_imaginary == imag_label, "imagined",
    NA)), levels = c("real", "imagined"))

# Decision: outcome coding (1 = 'I apologize first...', 0 = 'Neither
# apologizes').
ob1_yes <- "I apologize first, then ${e://Field/initials} apologizes."
ob1_no <- "Neither I nor ${e://Field/initials} apologizes."

ob2_yes <- "I apologize first, but ${e://Field/initials} does not apologize after that."
ob2_no <- "Neither I nor ${e://Field/initials} apologizes."

if (any(!is.na(data_recoded$outcome_binary1) & !(data_recoded$outcome_binary1 %in%
    c(ob1_yes, ob1_no)))) {
    # bad_vals captures outcome responses outside the two allowed strings; we
    # stop to prevent miscoding.
    bad_vals <- unique(data_recoded$outcome_binary1[!is.na(data_recoded$outcome_binary1) &
        !(data_recoded$outcome_binary1 %in% c(ob1_yes, ob1_no))])
    stop(paste("Unexpected values in outcome_binary1:", paste(bad_vals, collapse = ", ")))
}
if (any(!is.na(data_recoded$outcome_binary2) & !(data_recoded$outcome_binary2 %in%
    c(ob2_yes, ob2_no)))) {
    # bad_vals captures outcome responses outside the two allowed strings; we
    # stop to prevent miscoding.
    bad_vals <- unique(data_recoded$outcome_binary2[!is.na(data_recoded$outcome_binary2) &
        !(data_recoded$outcome_binary2 %in% c(ob2_yes, ob2_no))])
    stop(paste("Unexpected values in outcome_binary2:", paste(bad_vals, collapse = ", ")))
}

# Create numeric outcomes for analysis and plotting.
data_recoded$outcome1 <- ifelse(data_recoded$outcome_binary1 == ob1_yes, 1, ifelse(data_recoded$outcome
```

Table 1: Missingness after filters, extreme-age drop, and recoding

variable	missing_count
sex	0
age	0
real_imaginary	0
blame_1	0
outcome_binary1	0
outcome_binary2	0
outcome1	0
outcome2	0

```
    ob1_no, 0, NA))

data_recoded$outcome2 <- ifelse(data_recoded$outcome_binary2 == ob2_yes, 1, ifelse(data_recoded$outcome
    ob2_no, 0, NA))
```

2.7 2.7 Missingness After Recoding (Post-Filters)

```
# Missingness for analysis variables after eligibility filters and extreme-age
# drop.
vars_for_missing <- c("sex", "age", "real_imaginary", "blame_1", "outcome_binary1",
    "outcome_binary2", "outcome1", "outcome2")

missing_post_recode <- sapply(data_recoded[vars_for_missing], function(x) sum(is.na(x)))
missing_table <- data.frame(variable = names(missing_post_recode), missing_count = as.integer(missing_p
    stringsAsFactors = FALSE)

if (knitr::is_latex_output()) {
    knitr::kable(missing_table, format = "latex", caption = "Missingness after filters, extreme-age dro
} else {
    knitr::kable(missing_table, format = "html", caption = "Missingness after filters, extreme-age drop
}
```

```
float_barrier()
```

```
## \clearpage
```

2.8 2.8 Final Sample Construction and Flow Table

```
analysis_main <- data_recoded

# Only keep needed columns for analysis and output.
analysis_vars <- c("ResponseId", "sex_factor", "age", "real_imaginary_factor", "blame_1",
    "outcome1", "outcome2")
analysis_main <- analysis_main[, analysis_vars]
```

Table 2: Sample flow counts

step	n
raw	61
after_eligibility_filters	46
after_extreme_age_drop	45

```
# Save cleaned analysis dataset to /output (raw data remains untouched).
clean_path <- file.path(output_dir, "cleaned_analysis_data.csv")
write.csv(analysis_main, clean_path, row.names = FALSE)

sample_flow <- data.frame(step = c("raw", "after_eligibility_filters", "after_extreme_age_drop"),
    n = c(nrow(data_raw), nrow(data_eligible), nrow(data_no_extreme)), stringsAsFactors = FALSE)

if (knitr::is_latex_output()) {
    knitr::kable(sample_flow, format = "latex", caption = "Sample flow counts")
} else {
    knitr::kable(sample_flow, format = "html", caption = "Sample flow counts")
}
```

```
float_barrier()
```

```
## \clearpage
```

3 3. Descriptive Statistics

```
# Descriptive table: mean, median, SD by sex group (overall, female, male).
# Includes age, outcomes, real_imaginary (coded 1=real, 0=imagined), and
# blame_1.
if (!is.numeric(analysis_main$blame_1)) {
    stop("blame_1 must be numeric to compute mean/median/SD. Check the raw data coding.")
}

analysis_main$real_binary <- ifelse(analysis_main$real_imaginary_factor == "real",
    1, ifelse(analysis_main$real_imaginary_factor == "imagined", 0, NA))

stats_by_group <- function(x, group_name) {
    data.frame(group = group_name, mean = mean(x, na.rm = TRUE), median = median(x,
        na.rm = TRUE), sd = sd(x, na.rm = TRUE))
}

build_desc_table <- function(var_name, x, data) {
    rbind(cbind(variable = var_name, stats_by_group(x, "Overall")), cbind(variable = var_name,
        stats_by_group(x[data$sex_factor == "Female"], "Female")), cbind(variable = var_name,
        stats_by_group(x[data$sex_factor == "Male"], "Male")))
}

desc_table <- rbind(build_desc_table("age", analysis_main$age, analysis_main), build_desc_table("outcome
```

Table 3: Descriptive statistics by sex (mean, median, SD)

variable	group	mean	median	sd
age	Overall	31.067	29	9.882
age	Female	31.192	29	8.271
age	Male	30.895	29	11.986
outcome1	Overall	0.778	1	0.420
outcome1	Female	0.731	1	0.452
outcome1	Male	0.842	1	0.375
outcome2	Overall	0.467	0	0.505
outcome2	Female	0.462	0	0.508
outcome2	Male	0.474	0	0.513
real_imaginary_real	Overall	0.911	1	0.288
real_imaginary_real	Female	0.885	1	0.326
real_imaginary_real	Male	0.947	1	0.229
blame_1	Overall	38.089	40	17.112
blame_1	Female	34.308	34	13.356
blame_1	Male	43.263	46	20.472

```
    analysis_main$outcome1, analysis_main), build_desc_table("outcome2", analysis_main$outcome2,
    analysis_main), build_desc_table("real_imaginary_real", analysis_main$real_binary,
    analysis_main), build_desc_table("blame_1", analysis_main$blame_1, analysis_main))

if (knitr::is_latex_output()) {
    knitr::kable(desc_table, digits = 3, format = "latex", caption = "Descriptive statistics by sex (mea
} else {
    knitr::kable(desc_table, digits = 3, format = "html", caption = "Descriptive statistics by sex (mean
}
```

```
float_barrier()
```

```
## \clearpage
```

```
# Print simple sex counts
sex_counts <- table(analysis_main$sex_factor, useNA = "ifany")

cat(sprintf("Sex counts:  Female: %d, Male: %d\n", sex_counts["Female"], sex_counts["Male"]))
```

```
## Sex counts:  Female: 26, Male: 19
```

```
# Print simple real/imaginary counts
ri_counts <- table(analysis_main$real_imaginary_factor, useNA = "ifany")

cat(sprintf("Conflict counts: Real: %d, Imagined: %d\n", ri_counts["real"], ri_counts["imagined"]))
```

```
## Conflict counts: Real: 41, Imagined: 4
```

Table 4: Difference-in-means (Male - Female)

outcome	mean_male	mean_female	diff_male_minus_female	ci_lower	ci_upper	p_value
outcome_binary1	0.8421	0.7308	0.1113	-0.1379	0.3606	0.3725
outcome_binary2	0.4737	0.4615	0.0121	-0.2999	0.3242	0.9376

4 4. Main Analysis

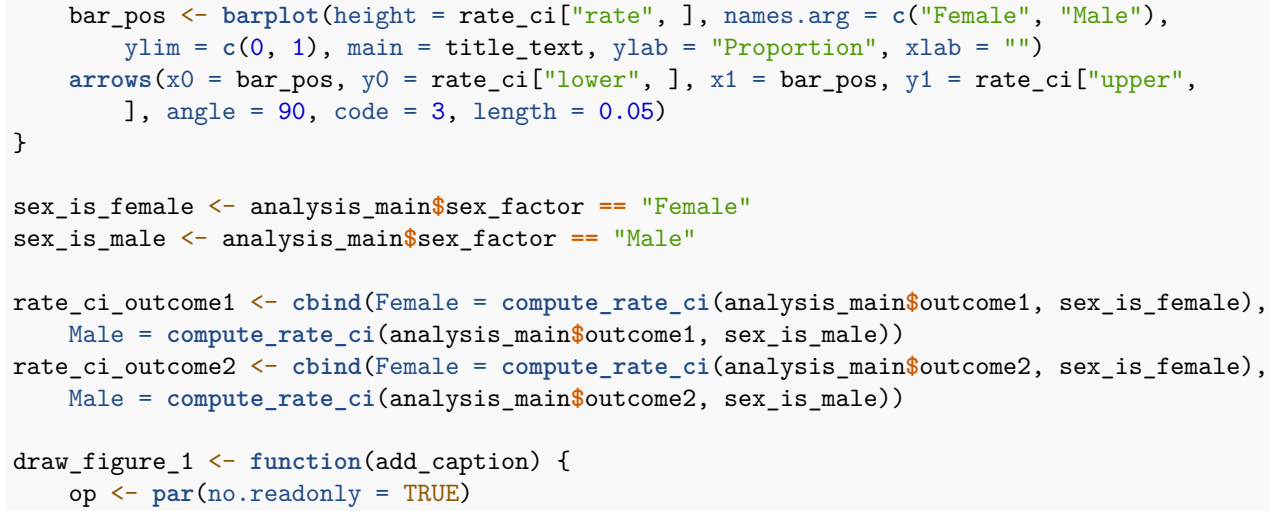
```
# Difference-in-means (Male minus Female) with 95% CI and p-values.  Test
# choice: t.test() compares group means directly and is valid for binary
# outcomes as a difference-in-means test.  Justification: this aligns with the
# linear probability model interpretation and keeps the contrast on the mean
# scale.
diff_in_means <- function(outcome_var, outcome_name) {
    male <- analysis_main[analysis_main$sex_factor == "Male", ]
    female <- analysis_main[analysis_main$sex_factor == "Female", ]

    mean_m <- mean(male[[outcome_var]], na.rm = TRUE)
    mean_f <- mean(female[[outcome_var]], na.rm = TRUE)

    test <- t.test(male[[outcome_var]], female[[outcome_var]])

    data.frame(outcome = outcome_name, mean_male = mean_m, mean_female = mean_f,
        diff_male_minus_female = mean_m - mean_f, ci_lower = test$conf.int[1], ci_upper = test$conf.int
        p_value = test$p.value)
}

dim1 <- diff_in_means("outcome1", "outcome_binary1")
dim2 <- diff_in_means("outcome2", "outcome_binary2")

diff_table <- rbind(dim1, dim2)
if (knitr::is_latex_output()) {
    knitr::kable(diff_table, digits = 4, format = "latex", caption = "Difference-in-means (Male - Femal
} else {
    knitr::kable(diff_table, digits = 4, format = "html", caption = "Difference-in-means (Male - Female
}
```

```
float_barrier()
```

```
## \clearpage
```

```
# Figure 1: Two-panel bar chart of outcome rates by sex with 95% CI error bars.
# Panel A: Reciprocal conciliation (outcome1).  Panel B: Unilateral
# conciliation (outcome2).  CI method: exact binomial confidence interval from
# binom.test().

compute_rate_ci <- function(x, group) {
    x_group <- x[group]
    n <- sum(!is.na(x_group))
    if (n == 0) {
```

```
        return(c(rate = NA_real_, lower = NA_real_, upper = NA_real_))
    }
    successes <- sum(x_group == 1, na.rm = TRUE)
    ci <- binom.test(successes, n)$conf.int
    c(rate = successes/n, lower = ci[1], upper = ci[2])
}

plot_rate_with_ci <- function(rate_ci, title_text) {
    bar_pos <- barplot(height = rate_ci["rate", ], names.arg = c("Female", "Male"),
        ylim = c(0, 1), main = title_text, ylab = "Proportion", xlab = "")
    arrows(x0 = bar_pos, y0 = rate_ci["lower", ], x1 = bar_pos, y1 = rate_ci["upper",
        ], angle = 90, code = 3, length = 0.05)
}

sex_is_female <- analysis_main$sex_factor == "Female"
sex_is_male <- analysis_main$sex_factor == "Male"

rate_ci_outcome1 <- cbind(Female = compute_rate_ci(analysis_main$outcome1, sex_is_female),
    Male = compute_rate_ci(analysis_main$outcome1, sex_is_male))
rate_ci_outcome2 <- cbind(Female = compute_rate_ci(analysis_main$outcome2, sex_is_female),
    Male = compute_rate_ci(analysis_main$outcome2, sex_is_male))

draw_figure_1 <- function(add_caption) {
    op <- par(no.readonly = TRUE)
    on.exit(par(op), add = TRUE)
    par(mfrow = c(1, 2), mar = c(4, 4, 3, 1), oma = c(2, 0, 0, 0), cex.main = 0.9,
        family = "serif")
    plot_rate_with_ci(rate_ci_outcome1, "Reciprocal conciliation by sex")
    plot_rate_with_ci(rate_ci_outcome2, "Unilateral conciliation by sex")
    if (add_caption) {
        mtext("Figure 1: Conciliation by Sex with 95% CIs", side = 1, outer = TRUE,
            line = 1, cex = 0.9)
    }
}

# Render for the knitted output (caption handled by fig.cap in PDF).
draw_figure_1(add_caption = FALSE)
```



```
# Also write a captioned PNG for the output folder.
png(filename = file.path(output_dir, "figure_1_conciliation.png"), width = 7, height = 3.5,
    units = "in", res = 300)
draw_figure_1(add_caption = TRUE)
dev.off()
```

```
## png
##   2
```

```
float_barrier()
```

```
## \clearpage
```

Figure 1: Conciliation by Sex with 95% CIs

```
# Main LPMs: outcome ~ sex + age (listwise deletion occurs naturally).  Model
# choice: linear probability models are used as the main specification.
# Justification: LPM coefficients are directly interpretable as
# percentage-point changes in probability, which is the most transparent way to
# answer the research question in this short data task.
reg_main_out1 <- lm(outcome1 ~ sex_factor + age, data = analysis_main)
reg_main_out2 <- lm(outcome2 ~ sex_factor + age, data = analysis_main)

# Helper: HC3 robust standard error and p-value for a coefficient.
robust_coef_stats <- function(model, term) {
    vc <- sandwich::vcovHC(model, type = "HC3")
    ct <- lmtest::coeftest(model, vcov. = vc)
    if (!(term %in% rownames(ct))) {
        stop(paste("Term not found in model coefficients:", term))
    }
    list(estimate = ct[term, "Estimate"], se = ct[term, "Std. Error"], p = ct[term,
        "Pr(>|t|)"])
}
```

```
# Main results table (stargazer) for Section 4.
stargazer(reg_main_out1, reg_main_out2, type = if (knitr::is_latex_output()) "latex" else "html",
    title = "Main LPM Regressions", label = if (knitr::is_latex_output()) "tab:main_lpm" else NULL,
    header = FALSE, float = TRUE, table.placement = "htbp", se = list(sqrt(diag(sandwich::vcovHC(reg_ma
        type = "HC3"))), sqrt(diag(sandwich::vcovHC(reg_main_out2, type = "HC3")))),
    dep.var.labels = c("Outcome 1", "Outcome 2"), covariate.labels = c("Male", "Age"),
    keep.stat = c("n"), digits = 3)
```

```
float_barrier()
```

Table 5: Main LPM Regressions

	Dependent variable:	
	Outcome 1	Outcome 2
	(1)	(2)
Male	0.112	0.010
	(0.128)	(0.159)
Age	0.002	−0.006
	(0.007)	(0.008)
Constant	0.672***	0.653**
	(0.214)	(0.257)
Observations	45	45
Note:	*p<0.1; **p<0.05; ***p<0.01	

5 5. Robustness Checks

```
# Influence/leverage check (concise): drop the single most influential
# observation and re-estimate.  Diagnostic used: Cook's distance from the main
# LPM to identify the most influential row.  Purpose: assess whether the main
# sex effect is sensitive to one high-leverage observation in a small sample.
refit_drop_top_influence <- function(model, data, label) {
    cooks <- cooks.distance(model)
    drop_idx <- which.max(cooks)
    refit <- lm(formula(model), data = data[-drop_idx, ])
    orig_stats <- robust_coef_stats(model, "sex_factorMale")
    refit_stats <- robust_coef_stats(refit, "sex_factorMale")
    se_orig <- orig_stats$se
    p_orig <- orig_stats$p
    se_refit <- refit_stats$se
    p_refit <- refit_stats$p
    coef_orig <- orig_stats$estimate
    coef_refit <- refit_stats$estimate
    coef_diff <- abs(coef_refit - coef_orig)
    se_diff <- abs(se_refit - se_orig)
    p_diff <- abs(p_refit - p_orig)
    cat("\nInfluence check:", label, "\n")
    cat("Diagnostic: Cook's distance (drop the single largest value).\n")
    cat("Dropped row index:", drop_idx, "\n")
    cat("Sex coefficient (original, refit):", round(coef_orig, 3), "->", round(coef_refit,
        3), "\n")
    cat("SE (original, refit):", round(se_orig, 3), "->", round(se_refit, 3), "\n")
    cat("p-value (original, refit):", round(p_orig, 3), "->", round(p_refit, 3),
        "\n")
    cat("Change summary (absolute): coef=", round(coef_diff, 3), ", SE=", round(se_diff,
        3), ", p-value=", round(p_diff, 3), "\n")
}

refit_drop_top_influence(reg_main_out1, analysis_main, "Main LPM - Outcome 1")
```

```
##
## Influence check: Main LPM - Outcome 1
## Diagnostic: Cook's distance (drop the single largest value).
## Dropped row index: 31
## Sex coefficient (original, refit): 0.112 -> 0.08
## SE (original, refit): 0.128 -> 0.127
## p-value (original, refit): 0.388 -> 0.534
## Change summary (absolute): coef= 0.032 , SE= 0.001 , p-value= 0.146
```

```
refit_drop_top_influence(reg_main_out2, analysis_main, "Main LPM - Outcome 2")
```

```
##
## Influence check: Main LPM - Outcome 2
## Diagnostic: Cook's distance (drop the single largest value).
## Dropped row index: 39
## Sex coefficient (original, refit): 0.01 -> 0.033
```

```
## SE (original, refit): 0.159 -> 0.166
## p-value (original, refit): 0.948 -> 0.844
## Change summary (absolute): coef= 0.022 , SE= 0.007 , p-value= 0.104
```

```
# Control robustness: add real_imaginary to the main specification.
# Justification: the plan specifies real/imaginary as a control or sample
# dimension; adding it tests whether the main sex effect is sensitive to
# framing.
reg_main_out1_real <- lm(outcome1 ~ sex_factor + age + real_imaginary_factor, data = analysis_main)
reg_main_out2_real <- lm(outcome2 ~ sex_factor + age + real_imaginary_factor, data = analysis_main)

# Control robustness: add blame_1 to the main specification.  Justification:
# tests whether results are sensitive to including perceived blame as an
# additional control.  blame_1: higher values indicate more blame assigned to
# the respondent lower values indicate more blame assigned to the other person.
reg_main_out1_blame <- lm(outcome1 ~ sex_factor + age + blame_1, data = analysis_main)
reg_main_out2_blame <- lm(outcome2 ~ sex_factor + age + blame_1, data = analysis_main)

# Across regressions, the gender effect remains small and non-significant.
```

```
# Robustness regression table (stargazer) comparing main spec to each check.
robust_models <- list(reg_main_out1, reg_main_out1_real, reg_main_out1_blame, reg_main_out2,
    reg_main_out2_real, reg_main_out2_blame)

stargazer(robust_models, type = if (knitr::is_latex_output()) "latex" else "html",
    title = "Robustness Regressions (Main + Controls)", label = if (knitr::is_latex_output()) "tab:robus
    header = FALSE, float = TRUE, table.placement = "htbp", object.names = FALSE,
    se = lapply(robust_models, function(m) sqrt(diag(sandwich::vcovHC(m, type = "HC3")))),
    dep.var.labels = c("Outcome 1", "Outcome 2"), column.separate = c(3, 3), covariate.labels = c("Male
        "Age", "Imagined (ref: Real)", "Blame"), keep.stat = c("n"), digits = 3)
```

```
float_barrier()
```

Table 6: Robustness Regressions (Main + Controls)

	Dependent variable:					
	Outcome 1			Outcome 2		
	(1)	(2)	(3)	(4)	(5)	(6)
Male	0.112	0.093	0.055	0.010	−0.010	−0.131
	(0.128)	(0.133)	(0.136)	(0.159)	(0.156)	(0.142)
Age	0.002	−0.0003	0.002	−0.006	−0.008	−0.007
	(0.007)	(0.007)	(0.006)	(0.008)	(0.007)	(0.011)
Imagined (ref: Real)		−0.289			−0.312	
		(0.373)			(0.317)	
Blame			0.006			0.016***
			(0.004)			(0.003)
Constant	0.672***	0.772***	0.462*	0.653**	0.760***	0.129
	(0.214)	(0.240)	(0.248)	(0.257)	(0.252)	(0.365)
Observations	45	45	45	45	45	45
Note:						*p<0.1; **p<0.05; ***p<0.01

6 6. Exploratory: Blame - Sex Interaction

```
# Exploratory check: interaction between blame_1 and sex.  Model includes main
# effects plus interaction, with age as a control.
reg_int_out1 <- lm(outcome1 ~ sex_factor * blame_1 + age, data = analysis_main)
reg_int_out2 <- lm(outcome2 ~ sex_factor * blame_1 + age, data = analysis_main)

stargazer(reg_int_out1, reg_int_out2, type = if (knitr::is_latex_output()) "latex" else "html",
    title = "Exploratory Interaction: Sex * Blame", label = if (knitr::is_latex_output()) "tab:interacti
    se = list(sqrt(diag(sandwich::vcovHC(reg_int_out1, type = "HC3"))), sqrt(diag(sandwich::vcovHC(reg_i
        type = "HC3")))), dep.var.labels = c("Outcome 1", "Outcome 2"), covariate.labels = c("Male",
        "Blame", "Male * Blame", "Age"), keep.stat = c("n"), digits = 3, header = FALSE,
    float = TRUE, table.placement = "htbp")
```

Table 7: Exploratory Interaction: Sex * Blame

	Dependent variable:	
	Outcome 1	Outcome 2
	(1)	(2)
Male	0.443	0.295
	(0.388)	(0.214)
Blame	0.013**	0.023***
	(0.006)	(0.004)
Male * Blame	0.002	−0.007
	(0.006)	(0.010)
Age	−0.010	−0.011**
	(0.008)	(0.006)
Constant	0.243	−0.113
	(0.327)	(0.307)
Observations	45	45
Note:	*p<0.1; **p<0.05; ***p<0.01	

```
float_barrier()
```