AI vs Human Selection Process : Data Cleaning

Elham

2025-10-29

#install libraries  
library(tidyverse)

## ── Attaching core tidyverse packages ──────────────────────── tidyverse 2.0.0 ──  
## ✔ dplyr 1.1.2 ✔ readr 2.1.4  
## ✔ forcats 1.0.0 ✔ stringr 1.5.0  
## ✔ ggplot2 3.5.2 ✔ tibble 3.2.1  
## ✔ lubridate 1.9.2 ✔ tidyr 1.3.0  
## ✔ 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(dplyr)  
library(likert)

## Loading required package: xtable  
##   
## Attaching package: 'likert'  
##   
## The following object is masked from 'package:dplyr':  
##   
## recode

library(stats)  
library(lavaan)

## This is lavaan 0.6-16  
## lavaan is FREE software! Please report any bugs.

library(psych)

##   
## Attaching package: 'psych'  
##   
## The following object is masked from 'package:lavaan':  
##   
## cor2cov  
##   
## The following objects are masked from 'package:ggplot2':  
##   
## %+%, alpha

library(Hmisc)

##   
## Attaching package: 'Hmisc'  
##   
## The following object is masked from 'package:psych':  
##   
## describe  
##   
## The following objects are masked from 'package:xtable':  
##   
## label, label<-  
##   
## The following objects are masked from 'package:dplyr':  
##   
## src, summarize  
##   
## The following objects are masked from 'package:base':  
##   
## format.pval, units

library(broom)

#upload the data  
  
JAR\_Social\_Invitees\_raw <- read\_csv("JAR\_Social\_Invitees\_synthetic.csv")

## Rows: 10 Columns: 42  
## ── Column specification ────────────────────────────────────────────────────────  
## Delimiter: ","  
## chr (39): Gender, Race, Education, Atten\_AI, Atten\_HR, Org\_Attraction\_1, Org...  
## dbl (3): Condition, Age, Attention Loop  
##   
## 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.

#Clean Social\_Invitees data set  
JAR\_Social\_Invitees\_Clean <- JAR\_Social\_Invitees\_raw %>%  
 #Remove rows with NA  
 filter(!if\_any(Intent\_Engag\_1:Intent\_Engag\_4,is.na))

#clean the data  
###########################################################  
#convert character values to factor  
  
Agree\_Disagree\_Levels = c("Strongly disagree",   
 "Somewhat disagree",  
 "Neither agree nor disagree",  
 "Somewhat agree",  
 "Strongly agree")  
  
Likely\_Unlikely\_Levels = c("Very unlikely",   
 "Somewhat unlikely",   
 "Neutral",   
 "Somewhat likely",   
 "Very likely")  
  
Famailiar\_Unfamiliar\_Levels = c("Not familiar at all",   
 "Not so familiar",   
 "Somewhat familiar",   
 "Very familiar",   
 "Extremely Familiar")  
  
#for reverse coding  
Agree\_Disagree\_Levels\_Trust\_4 = c("Strongly agree",  
 "Somewhat agree",  
 "Neither agree nor disagree",  
 "Somewhat disagree",  
 "Strongly disagree")  
  
  
# change data type to factor, create new columns as numeric  
  
JAR\_Social\_Invitees <- JAR\_Social\_Invitees\_Clean %>%  
 mutate(across(Org\_Attraction\_1:Trust\_3,   
 ~ factor(., levels = Agree\_Disagree\_Levels))) %>%  
 mutate(across(Trust\_4,   
 ~ factor(., levels = Agree\_Disagree\_Levels\_Trust\_4))) %>%  
 mutate(across(Communication\_1:Consistency\_HR\_3,  
 ~ factor(., levels = Agree\_Disagree\_Levels))) %>%  
 mutate(across(Intent\_Engag\_1:Intent\_Engag\_4,  
 ~ factor(., levels = Likely\_Unlikely\_Levels))) %>%  
 mutate(across(AI\_Knowledge\_Experei\_1:AI\_Knowledge\_Experei\_5,  
 ~ factor(., levels = Famailiar\_Unfamiliar\_Levels))) %>%  
 mutate(across(c(Org\_Attraction\_1:Intent\_Engag\_4,  
 AI\_Knowledge\_Experei\_1:AI\_Knowledge\_Experei\_5),  
 ~ as.numeric(.),  
 .names = "{.col}\_num"))  
  
###########################################################  
#Create Age as numeric  
#age  
JAR\_Social\_Invitees <- JAR\_Social\_Invitees %>%   
 mutate(Age = as.numeric(Age))  
###########################################################

#Demographic Information (binary and factor version)  
  
Education\_Levels = c("Less than high school",   
 "High school degree or equivalent",   
 "Some college (if currently an undergraduate student, select this option)",   
 "Associate (2 year) degree",   
 "Bachelor's (4 year) degree",   
 "Some graduate school",   
 "Master's degree",   
 "Professional degree (e.g., JD, MD)",   
 "Doctorate (PhD)")  
  
  
#factor in right order, then numeric, then if else greater than or equal  
JAR\_Social\_Invitees <- JAR\_Social\_Invitees %>%  
 # Gender  
 mutate(Gender\_fct = factor(Gender),  
 Gender\_female = if\_else(Gender == "Female", 1, 0),  
 Gender\_male = if\_else(Gender == "Male", 1, 0),  
 # Race  
 Race\_fct = factor(Race),  
 Race\_white = if\_else(Race == "White or European American", 1, 0),  
 # Education (bachelor degree or higher)  
 Education\_fct = factor(Education,   
 levels = Education\_Levels,  
 labels = Education\_Levels),  
 Education\_num = as.numeric(Education\_fct),  
 Education\_college = if\_else(Education\_num >= "3", 1, 0))  
  
# report   
JAR\_Social\_Invitees %>%  
 dplyr::select(Gender\_fct,  
 Race\_fct,  
 Education\_fct,  
 Education\_num,  
 Education\_college) %>%  
map(table)

## $Gender\_fct  
##   
## Female Male   
## 2 3   
## Non-binary / Genderqueer / Gender fluid Prefer not to say   
## 3 2   
##   
## $Race\_fct  
##   
## Asian or Asian American Black or African American   
## 2 1   
## Latino/a/x or Hispanic Middle Eastern   
## 1 1   
## Prefer not to say White or European American   
## 1 4   
##   
## $Education\_fct  
##   
## Less than high school   
## 1   
## High school degree or equivalent   
## 0   
## Some college (if currently an undergraduate student, select this option)   
## 1   
## Associate (2 year) degree   
## 1   
## Bachelor's (4 year) degree   
## 2   
## Some graduate school   
## 0   
## Master's degree   
## 3   
## Professional degree (e.g., JD, MD)   
## 0   
## Doctorate (PhD)   
## 2   
##   
## $Education\_num  
##   
## 1 3 4 5 7 9   
## 1 1 1 2 3 2   
##   
## $Education\_college  
##   
## 0 1   
## 1 9

#number of Female and Male based on condition  
Female\_Male\_Count <- JAR\_Social\_Invitees %>%  
 group\_by(Condition) %>%  
 summarise(  
 Female\_Count = sum(Gender\_fct == "Female", na.rm = TRUE),  
 Male\_Count = sum(Gender\_fct == "Male", na.rm = TRUE))  
  
#number of "White or European American" race based on condition  
White\_European\_Count <- JAR\_Social\_Invitees %>%  
 group\_by(Condition) %>%  
 summarise(  
 White\_European\_Count = sum(Race\_fct == "White or European American", na.rm = TRUE))  
  
#number of "bachelor degree or higher" based on condition  
Education\_Count <- JAR\_Social\_Invitees %>%  
 group\_by(Condition) %>%  
 summarise(  
 Education\_Count = sum(Education\_num >= "3", na.rm = TRUE))  
  
#count the number of observations for each condition  
Condition\_Count <- JAR\_Social\_Invitees %>%  
 group\_by(Condition) %>%  
 count(Condition)

#Attention binary  
JAR\_Social\_Invitees <- JAR\_Social\_Invitees %>%  
# Attention AI binary   
 mutate(Attention\_AI\_binary = if\_else(Atten\_AI == "Personality based on vocal tone, facial expressions, and responses", 1, 0),  
  
# Attention HR binary  
 Attention\_HR\_binary = if\_else(Atten\_HR == "Communication, interpersonal skills, and job-related competencies", 1, 0))  
  
#Attention loop binary  
JAR\_Social\_Invitees <- JAR\_Social\_Invitees %>%  
 mutate(  
 Attention\_loop\_AI\_binary = if\_else(  
 Condition == 1 & `Attention Loop` == 1, 1, 0),  
 Attention\_loop\_HR\_binary = if\_else(  
 Condition == 2 & `Attention Loop` == 1, 1, 0)  
 )  
  
# NOTE: Create an Attention Score variable that combines all of the Attention metrics   
JAR\_Social\_Invitees <- JAR\_Social\_Invitees %>%   
 mutate(Attention\_AI\_score = Attention\_AI\_binary + Attention\_loop\_AI\_binary,  
 Attention\_HR\_score = Attention\_HR\_binary + Attention\_loop\_HR\_binary)  
  
  
JAR\_Social\_Invitees %>%  
 dplyr::select(Attention\_AI\_binary,  
 Attention\_HR\_binary,  
 Attention\_loop\_AI\_binary,  
 Attention\_loop\_HR\_binary,   
 Attention\_AI\_score,  
 Attention\_HR\_score) %>%  
 map(table)

## $Attention\_AI\_binary  
##   
## 0 1   
## 6 4   
##   
## $Attention\_HR\_binary  
##   
## 0 1   
## 6 4   
##   
## $Attention\_loop\_AI\_binary  
##   
## 0 1   
## 7 3   
##   
## $Attention\_loop\_HR\_binary  
##   
## 0 1   
## 8 2   
##   
## $Attention\_AI\_score  
##   
## 0 1 2   
## 5 3 2   
##   
## $Attention\_HR\_score  
##   
## 0 1 2   
## 6 2 2

JAR\_Social\_Invitees %>%  
 group\_by(Condition) %>%  
 count(`Attention Loop`)

## # A tibble: 6 × 3  
## # Groups: Condition [2]  
## Condition `Attention Loop` n  
## <dbl> <dbl> <int>  
## 1 1 1 3  
## 2 1 2 1  
## 3 1 3 2  
## 4 2 1 2  
## 5 2 2 1  
## 6 2 3 1

###########################################################

#factor analysis  
  
  
#on whole data set##############################  
Cfa\_model\_all\_data <- '  
 OrgAttraction\_cfa =~ Org\_Attraction\_1\_num + Org\_Attraction\_2\_num + Org\_Attraction\_3\_num + Org\_Attraction\_4\_num + Org\_Attraction\_5\_num + Org\_Attraction\_6\_num  
 Trust\_cfa =~ Trust\_1\_num + Trust\_2\_num + Trust\_3\_num + Trust\_4\_num  
 Communication\_cfa =~ Communication\_1\_num + Communication\_2\_num + Communication\_3\_num + Communication\_4\_num + Communication\_5\_num  
 ChancePerform\_cfa =~ Chance\_Perform\_1\_num + Chance\_Perform\_2\_num + Chance\_Perform\_3\_num + Chance\_Perform\_4\_num  
 Consistency\_cfa =~ Consistency\_AI\_1\_num + Consistency\_AI\_2\_num + Consistency\_AI\_3\_num + Consistency\_HR\_1\_num + Consistency\_HR\_2\_num + Consistency\_HR\_3\_num  
 IntentEngage\_cfa =~ Intent\_Engag\_1\_num + Intent\_Engag\_2\_num + Intent\_Engag\_3\_num + Intent\_Engag\_4\_num  
 AI\_Knowldge\_cfa =~ AI\_Knowledge\_Experei\_1\_num + AI\_Knowledge\_Experei\_2\_num + AI\_Knowledge\_Experei\_3\_num + AI\_Knowledge\_Experei\_4\_num + AI\_Knowledge\_Experei\_5\_num'  
  
JAR\_Social\_Invitees %>%   
 dplyr::select(Org\_Attraction\_1\_num:  
 AI\_Knowledge\_Experei\_5\_num) %>%   
 cfa(model = Cfa\_model\_all\_data, missing = "fiml") %>%  
 summary()

## Warning in lav\_data\_full(data = data, group = group, cluster = cluster, : lavaan WARNING: small number of observations (nobs < nvar)  
## nobs = 10 nvar = 34

## Warning in lav\_mvnorm\_missing\_h1\_estimate\_moments(Y = X[[g]], wt = WT[[g]], : lavaan WARNING:  
## The smallest eigenvalue of the EM estimated variance-covariance  
## matrix (Sigma) is smaller than 1e-05; this may cause numerical  
## instabilities; interpret the results with caution.

## Warning in lavaan::lavaan(model = Cfa\_model\_all\_data, data = ., missing = "fiml", : lavaan WARNING:  
## the optimizer warns that a solution has NOT been found!

## lavaan 0.6.16 did NOT end normally after 213 iterations  
## \*\* WARNING \*\* Estimates below are most likely unreliable  
##   
## Estimator ML  
## Optimization method NLMINB  
## Number of model parameters 123  
##   
## Number of observations 10  
## Number of missing patterns 6  
##   
##   
## Parameter Estimates:  
##   
## Standard errors Standard  
## Information Observed  
## Observed information based on Hessian  
##   
## Latent Variables:  
## Estimate Std.Err z-value P(>|z|)  
## OrgAttraction\_cfa =~   
## Org\_Attrctn\_1\_ 1.000   
## Org\_Attrctn\_2\_ 1.308 NA   
## Org\_Attrctn\_3\_ 1.059 NA   
## Org\_Attrctn\_4\_ 1.428 NA   
## Org\_Attrctn\_5\_ 1.233 NA   
## Org\_Attrctn\_6\_ 1.466 NA   
## Trust\_cfa =~   
## Trust\_1\_num 1.000   
## Trust\_2\_num 1.236 NA   
## Trust\_3\_num 1.473 NA   
## Trust\_4\_num 1.126 NA   
## Communication\_cfa =~   
## Communctn\_1\_nm 1.000   
## Communctn\_2\_nm 1.283 NA   
## Communctn\_3\_nm 0.747 NA   
## Communctn\_4\_nm 0.989 NA   
## Communctn\_5\_nm 1.464 NA   
## ChancePerform\_cfa =~   
## Chnc\_Prfrm\_1\_n 1.000   
## Chnc\_Prfrm\_2\_n 0.986 NA   
## Chnc\_Prfrm\_3\_n 1.441 NA   
## Chnc\_Prfrm\_4\_n 1.291 NA   
## Consistency\_cfa =~   
## Cnsstncy\_AI\_1\_ 1.000   
## Cnsstncy\_AI\_2\_ 1.225 NA   
## Cnsstncy\_AI\_3\_ 0.878 NA   
## Cnsstncy\_HR\_1\_ 1.378 NA   
## Cnsstncy\_HR\_2\_ 0.566 NA   
## Cnsstncy\_HR\_3\_ 1.596 NA   
## IntentEngage\_cfa =~   
## Intnt\_Engg\_1\_n 1.000   
## Intnt\_Engg\_2\_n 1.303 NA   
## Intnt\_Engg\_3\_n 1.201 NA   
## Intnt\_Engg\_4\_n 1.458 NA   
## AI\_Knowldge\_cfa =~   
## AI\_Knwldg\_E\_1\_ 1.000   
## AI\_Knwldg\_E\_2\_ 1.203 NA   
## AI\_Knwldg\_E\_3\_ 1.073 NA   
## AI\_Knwldg\_E\_4\_ 1.079 NA   
## AI\_Knwldg\_E\_5\_ 0.999 NA   
##   
## Covariances:  
## Estimate Std.Err z-value P(>|z|)  
## OrgAttraction\_cfa ~~   
## Trust\_cfa 1.543 NA   
## Communicatn\_cf 1.302 NA   
## ChancePrfrm\_cf 1.691 NA   
## Consistency\_cf 1.341 NA   
## IntentEngag\_cf 1.470 NA   
## AI\_Knowldge\_cf 1.352 NA   
## Trust\_cfa ~~   
## Communicatn\_cf 1.651 NA   
## ChancePrfrm\_cf 1.317 NA   
## Consistency\_cf 1.297 NA   
## IntentEngag\_cf 1.244 NA   
## AI\_Knowldge\_cf 1.208 NA   
## Communication\_cfa ~~   
## ChancePrfrm\_cf 1.348 NA   
## Consistency\_cf 1.621 NA   
## IntentEngag\_cf 1.346 NA   
## AI\_Knowldge\_cf 1.466 NA   
## ChancePerform\_cfa ~~   
## Consistency\_cf 1.485 NA   
## IntentEngag\_cf 1.510 NA   
## AI\_Knowldge\_cf 1.477 NA   
## Consistency\_cfa ~~   
## IntentEngag\_cf 1.411 NA   
## AI\_Knowldge\_cf 1.534 NA   
## IntentEngage\_cfa ~~   
## AI\_Knowldge\_cf 1.343 NA   
##   
## Intercepts:  
## Estimate Std.Err z-value P(>|z|)  
## .Org\_Attrctn\_1\_ 0.938 NA   
## .Org\_Attrctn\_2\_ 0.549 NA   
## .Org\_Attrctn\_3\_ 0.419 NA   
## .Org\_Attrctn\_4\_ 0.381 NA   
## .Org\_Attrctn\_5\_ 0.367 NA   
## .Org\_Attrctn\_6\_ 0.405 NA   
## .Trust\_1\_num 1.286 NA   
## .Trust\_2\_num 0.875 NA   
## .Trust\_3\_num 0.027 NA   
## .Trust\_4\_num 0.610 NA   
## .Communctn\_1\_nm 1.054 NA   
## .Communctn\_2\_nm -0.360 NA   
## .Communctn\_3\_nm 0.955 NA   
## .Communctn\_4\_nm 0.497 NA   
## .Communctn\_5\_nm 0.013 NA   
## .Chnc\_Prfrm\_1\_n 1.434 NA   
## .Chnc\_Prfrm\_2\_n 0.208 NA   
## .Chnc\_Prfrm\_3\_n 0.182 NA   
## .Chnc\_Prfrm\_4\_n 0.573 NA   
## .Cnsstncy\_AI\_1\_ 0.793 NA   
## .Cnsstncy\_AI\_2\_ 0.797 NA   
## .Cnsstncy\_AI\_3\_ 0.583 NA   
## .Cnsstncy\_HR\_1\_ 0.316 NA   
## .Cnsstncy\_HR\_2\_ 0.908 NA   
## .Cnsstncy\_HR\_3\_ 0.153 NA   
## .Intnt\_Engg\_1\_n 1.551 NA   
## .Intnt\_Engg\_2\_n 0.270 NA   
## .Intnt\_Engg\_3\_n 0.525 NA   
## .Intnt\_Engg\_4\_n 0.202 NA   
## .AI\_Knwldg\_E\_1\_ 1.086 NA   
## .AI\_Knwldg\_E\_2\_ 0.175 NA   
## .AI\_Knwldg\_E\_3\_ 0.590 NA   
## .AI\_Knwldg\_E\_4\_ 0.001 NA   
## .AI\_Knwldg\_E\_5\_ 0.644 NA   
## OrgAttractn\_cf 0.000   
## Trust\_cfa 0.000   
## Communicatn\_cf 0.000   
## ChancePrfrm\_cf 0.000   
## Consistency\_cf 0.000   
## IntentEngag\_cf 0.000   
## AI\_Knowldge\_cf 0.000   
##   
## Variances:  
## Estimate Std.Err z-value P(>|z|)  
## .Org\_Attrctn\_1\_ 2.539 NA   
## .Org\_Attrctn\_2\_ 1.849 NA   
## .Org\_Attrctn\_3\_ 1.136 NA   
## .Org\_Attrctn\_4\_ 1.554 NA   
## .Org\_Attrctn\_5\_ 1.916 NA   
## .Org\_Attrctn\_6\_ 1.235 NA   
## .Trust\_1\_num 1.847 NA   
## .Trust\_2\_num 2.115 NA   
## .Trust\_3\_num 1.993 NA   
## .Trust\_4\_num 1.885 NA   
## .Communctn\_1\_nm 2.286 NA   
## .Communctn\_2\_nm 1.590 NA   
## .Communctn\_3\_nm 2.726 NA   
## .Communctn\_4\_nm 2.501 NA   
## .Communctn\_5\_nm 1.899 NA   
## .Chnc\_Prfrm\_1\_n 2.818 NA   
## .Chnc\_Prfrm\_2\_n 2.420 NA   
## .Chnc\_Prfrm\_3\_n 1.622 NA   
## .Chnc\_Prfrm\_4\_n 0.632 NA   
## .Cnsstncy\_AI\_1\_ 2.079 NA   
## .Cnsstncy\_AI\_2\_ 1.970 NA   
## .Cnsstncy\_AI\_3\_ 1.986 NA   
## .Cnsstncy\_HR\_1\_ 1.659 NA   
## .Cnsstncy\_HR\_2\_ 1.434 NA   
## .Cnsstncy\_HR\_3\_ 1.358 NA   
## .Intnt\_Engg\_1\_n 1.117 NA   
## .Intnt\_Engg\_2\_n 1.176 NA   
## .Intnt\_Engg\_3\_n 1.574 NA   
## .Intnt\_Engg\_4\_n 0.947 NA   
## .AI\_Knwldg\_E\_1\_ 0.936 NA   
## .AI\_Knwldg\_E\_2\_ 1.801 NA   
## .AI\_Knwldg\_E\_3\_ 1.183 NA   
## .AI\_Knwldg\_E\_4\_ 0.548 NA   
## .AI\_Knwldg\_E\_5\_ 1.675 NA   
## OrgAttractn\_cf 1.676 NA   
## Trust\_cfa 1.691 NA   
## Communicatn\_cf 1.507 NA   
## ChancePrfrm\_cf 1.501 NA   
## Consistency\_cf 1.439 NA   
## IntentEngag\_cf 1.712 NA   
## AI\_Knowldge\_cf 1.318 NA

#mean of each variable based on condition  
#hist for those means  
#########################################################  
JAR\_Social\_Invitees <- JAR\_Social\_Invitees %>%  
 rowwise() %>%  
 mutate(Org\_Attraction =  
 mean(c\_across(c(Org\_Attraction\_1\_num:  
 Org\_Attraction\_6\_num)),  
 na.rm = TRUE),  
 Trust =   
 mean(c\_across(c(Trust\_1\_num:  
 Trust\_4\_num)),  
 na.rm = TRUE),  
 Communication =  
 mean(c\_across(c(Communication\_1\_num:  
 Communication\_5\_num)),  
 na.rm = TRUE),  
 Chance\_Perform =  
 mean(c\_across(c(Chance\_Perform\_1\_num:  
 Chance\_Perform\_4\_num)),  
 na.rm = TRUE),  
 Consistency =   
 mean(c\_across(c(Consistency\_AI\_1\_num:  
 Consistency\_HR\_3\_num)),  
 na.rm = TRUE),  
 Intent =   
 mean(c\_across(c(Intent\_Engag\_1\_num:  
 Intent\_Engag\_4\_num)),  
 na.rm = TRUE),  
 AI\_Knowledge =  
 mean(c\_across(c(AI\_Knowledge\_Experei\_1\_num:  
 AI\_Knowledge\_Experei\_5\_num)),  
 na.rm = TRUE))  
   
JAR\_Social\_Invitees\_means <- JAR\_Social\_Invitees %>%  
 group\_by(Condition) %>%  
 summarise(  
 mean\_org\_attraction = mean(Org\_Attraction, na.rm = TRUE),  
 mean\_trust = mean(Trust, na.rm = TRUE),  
 mean\_communication = mean(Communication, na.rm = TRUE),  
 mean\_chance\_perform = mean(Chance\_Perform, na.rm = TRUE),  
 mean\_consistency = mean(Consistency, na.rm = TRUE),  
 mean\_intent = mean(Intent, na.rm = TRUE),  
 mean\_AI\_knowledge = mean(AI\_Knowledge, na.rm = TRUE),  
 sd\_org\_attraction = sd(Org\_Attraction, na.rm = TRUE),  
 sd\_trust = sd(Trust, na.rm = TRUE),  
 sd\_communication = sd(Communication, na.rm = TRUE),  
 sd\_chance\_perform = sd(Chance\_Perform, na.rm = TRUE),  
 sd\_consistency = sd(Consistency, na.rm = TRUE),  
 sd\_intent = sd(Intent, na.rm = TRUE),  
 sd\_AI\_knowledge = sd(AI\_Knowledge, na.rm = TRUE))

# export data  
save(JAR\_Social\_Invitees, file = "JAR\_Social\_Invitees\_clean.RData")  
write\_csv(JAR\_Social\_Invitees, file = "JAR\_Social\_Invitees\_clean.csv")