

Escape Room vs. Simulated Training

Data Processing

Data was processed and cleaned by only analyzing complete cases. Additional variables containing metadata were removed from the dataset. A sum score for the variables of *Student Confidence* and for *Student Satisfaction* in learning were calculated.

```
# Load in packages
library(haven)
library(labelled)
library(dplyr,quietly = TRUE)
library(janitor)
library(huxtable)
library(broom)
library(ggplot2)
library(skimr)
library(forcats)
library(ggtext)
library(patchwork)
library(stringr)

# Custom Functions
discrete_tab <- function(data,x){
  name <-
    data |>
    select({{x}}) |>
    pull()

  tab <-
    name |>
    tabyl() |>
    select(-(starts_with("val")))|>
    # Ignore Error for Now...
    adorn_pct_formatting(,,percent) |>
    rename_with(str_to_sentence) |>
    hux() |>
    theme_article() |>
    set_align(everywhere,everywhere,".")

  tab[1,] <- c(str_to_sentence(x),"","")

  tab
}

# Load data
er <- read_sav("Escape+Room_April+2%2C+2024_10.32.sav")
```

```

# Clean Data
er_cln <-
  er |>
  clean_names() |>
  # Get Complete Cases
  filter(finished == 1) |>
  rename(
    consent = q1,
    birth = q6,
    sex = q8,
    escape_room_prior = q9,
    condition = q10,
    escape_room_win = q12
  ) |>
  # Rename to satisfaction
  rename_at(vars(contains("learning_")), ~ paste0("satisfaction_", 1:5)) |>
  # Rename to confidence
  rename_at(vars(contains("q5")), ~ paste0("confidence_", 1:8)) |>
  rowwise() |>
  mutate(
    satisfaction_sum = sum(c_across(satisfaction_1:satisfaction_5)),
    confidence_sum = sum(c_across(confidence_1:confidence_8))
  ) |>
  ungroup()

```

Exploratory Hypothesis 1

Is there a difference between Testing Type (Simulation or Escape Room) on Student Satisfaction with Learning?

An independent-samples t-test revealed no statistically significant difference between the standard Simulation Learning ($M = 23.9$, $SD = 1.76$) and the Escape Room ($M = 23.7$, $SD = 2.54$), $t(32) = .235$, $p = .816$.

```

# T-Tests
# EH1: Difference between Testing Type and Satisfaction
t.test(data = er_cln, satisfaction_sum ~ condition, var.equal = TRUE) |>
  tidy() |>
  rename(
    MDiff = estimate,
    Simulation = estimate1,
    `Escape Room` = estimate2,
    t = statistic,
    df = parameter
  ) |>
  mutate(
    `CI[l1,uu]` = paste0("[", conf.low |> round(2), ",",

```

```

      conf.high |> round(2),"]")
) |>
select(-conf.low,-conf.high,-method,-alternative) |>
relocate(p.value, .after = last_col()) |>
hux() |>
theme_article()

```

MDiff	Simulation	Escape Room	t	df	CI[ll,uu]	p.value
0.176	23.9	23.7	0.235	32	[-1.35,1.71]	0.816

Exploratory Hypothesis 2

Is there a difference between Testing Type (Simulation or Escape Room) on Student Confidence with Learning?

An independent-samples t-test revealed no statistically significant difference between the standard Simulation Learning (M = 37.2, SD = 3.03) and the Escape Room (M = 37.8, 3.38), $t(32) = -.48$, $p = .634$.

```

# EH2: Difference between Testing Type and Confidence
t.test(data = er_cln, confidence_sum ~ condition) |>
tidy() |>
rename(
  MDiff = estimate,
  Simulation = estimate1,
  `Escape Room` = estimate2,
  t = statistic,
  df = parameter
) |>
mutate(
  `CI[ll,uu]` = paste0("[",conf.low |> round(2),",",
    conf.high |> round(2),"]")
) |>
select(-conf.low,-conf.high,-method,-alternative) |>
relocate(p.value, .after = last_col()) |>
hux() |>
theme_article()

```

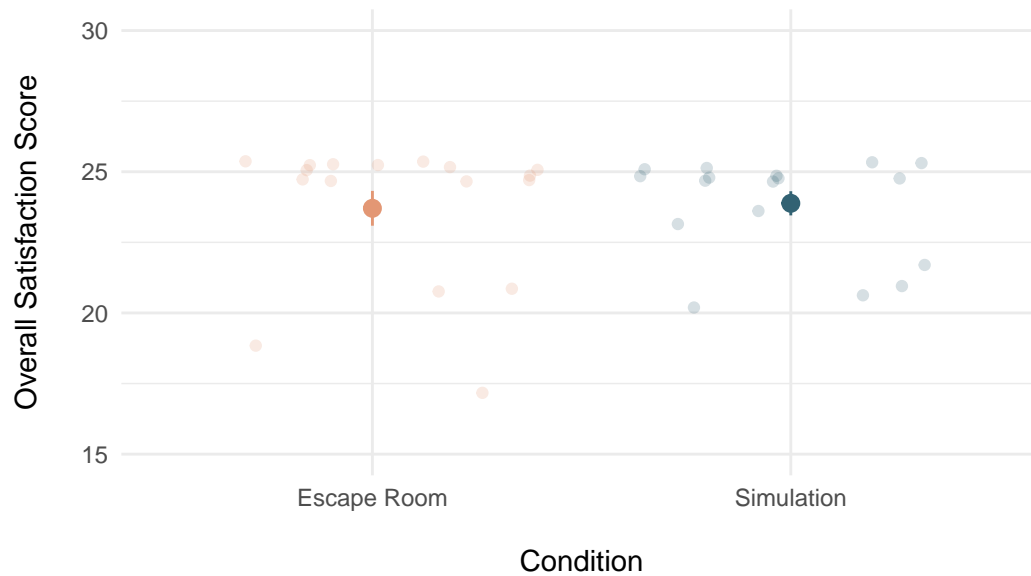
MDiff	Simulation	Escape Room	t	df	CI[ll,uu]	p.value
-0.529	37.2	37.8	-0.481	31.6	[-2.77,1.72]	0.634

Data Visualizations

The graphs below represent the average value participants in both the Escape Room condition and the Simulation condition and their overall rating on Satisfaction with Learning and Confidence in Learning respectively.

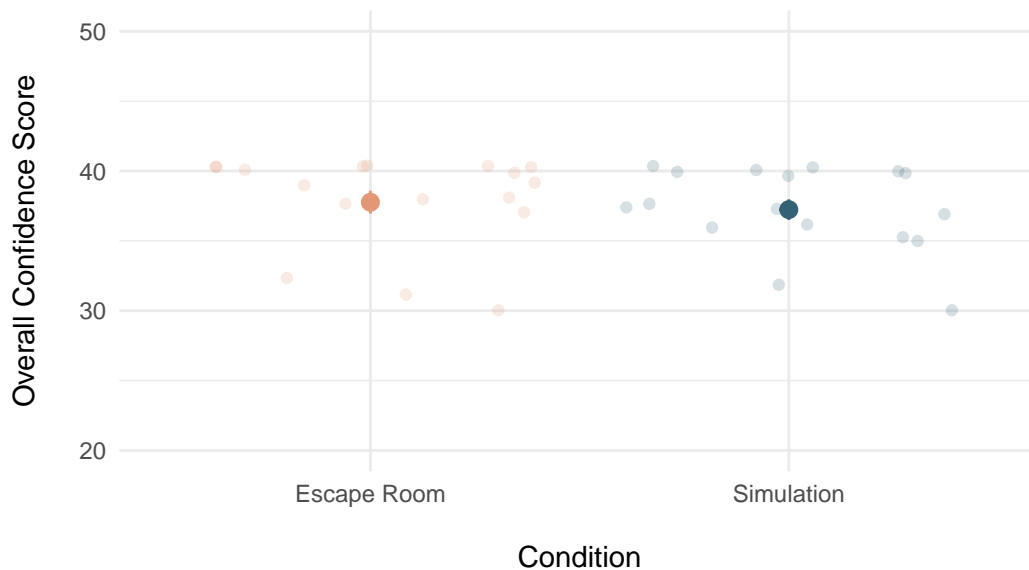
```
# Visualizations
er_cln |>
mutate(
  condition = ifelse(condition == 1, "Simulation", "Escape Room")
) |>
ggplot(aes(condition, satisfaction_sum, color = condition)) +
geom_jitter(alpha = .2) +
stat_summary(
  fun.data = "mean_se",
  geom = "pointrange",
  size = .5
) +
theme_minimal() +
labs(
  x = "\nCondition",
  y = "Overall Satisfaction Score\n",
  title = "Level of Satisfaction with Learning did not significantly differ <br> between <span st
) +
coord_cartesian(ylim = c(15,30)) +
theme(
  legend.position = "none",
  plot.title.position = "plot",
  plot.title = element_markdown(size = 12)
) +
scale_color_manual(values = c("#E39774", "#326273"))
```

Level of Satisfaction with Learning did not significantly differ between **Escape Room** and **Standard Simulation Paradigm**



```
er_cln |>
mutate(
  condition = ifelse(condition == 1, "Simulation", "Escape Room")
) |>
ggplot(aes(factor(condition), confidence_sum, color = condition)) +
  geom_jitter(alpha = .2) +
  stat_summary(
    fun.data = "mean_se",
    geom = "pointrange"
  ) +
  theme_minimal() +
  labs(
    x = "\nCondition",
    y = "Overall Confidence Score\n",
    title = "Level of Confidence with Learning did not significantly differ <br> between <span styl
  ) +
  coord_cartesian(ylim = c(20, 50)) +
  theme(
    legend.position = "none",
    plot.title.position = "plot",
    plot.title = element_markdown()
  ) +
  scale_color_manual(values = c("#E39774", "#326273"))
```

Level of Confidence with Learning did not significantly differ between **Escape Room** and **Standard Simulation Paradigm**



Exploratory Hypothesis 3

Confidence in Learning and Satisfaction in Learning will be positively correlated.

Results show a strong positive relationship between overall confidence in learning and overall satisfaction in learning, $r(32) = .81$, $p < .001$ [.66,.90]

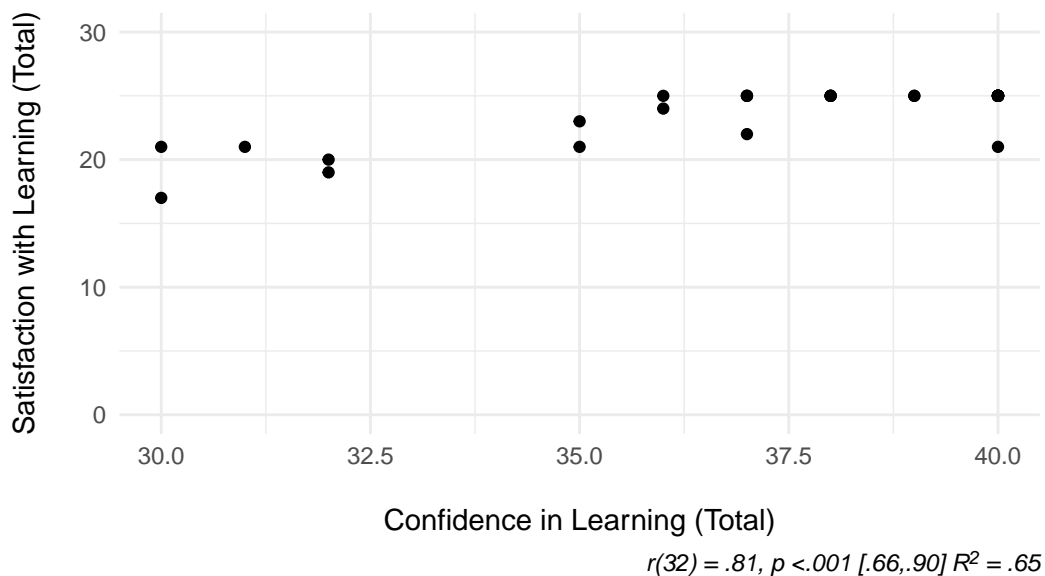
```
# Correlation Test
cor.test(er_cln$confidence_sum, er_cln$satisfaction_sum) |>
  tidy() |>
  rename(
    r = estimate,
    t = statistic,
    df = parameter
  ) |>
  mutate(
    `CI[l1,uu]` = paste0("[", conf.low |> round(2), ",",
                        conf.high |> round(2), "]" )
  ) |>
  select(-conf.low, -conf.high, -method, -alternative) |>
  relocate(p.value, .after = last_col()) |>
  hux() |>
  theme_article()
```

```
# Scatterplot
er_cln |>
```

r	t	df	CI[l1,uu]	p.value
0.817	8	32	[0.66,0.9]	3.92e-09

```
ggplot(aes(confidence_sum, satisfaction_sum)) +
  geom_point() +
  theme_minimal() +
  labs(
    x = "\nConfidence in Learning (Total)",
    y = "Satisfaction with Learning (Total)\n",
    title = "Students Confident in their learning were more <br>likely to be Satisfied with t",
    caption = "r(32) = .81, p <.001 [0.66,.90] R<sup>2</sup> = .65"
  ) +
  theme(
    plot.title.position = "plot",
    plot.title = element_markdown(),
    plot.caption = element_markdown(face = "italic")
  ) +
  ylim(0,30)
```

Students **Confident** in their learning were more likely to be **Satisfied** with their learning



Numeric Variables

```
# All Quantitative Variables with Histograms
er_cln |>
  select(where(is.numeric)) |>
  select(!consent:condition) |>
  skim() |>
  select(-skim_type) |>
  select(!contains(".p")) |>
  hux() |>
  theme_article()
```

Demographics

```
# Demographics
demo <-
  er_cln |>
  select(birth,sex) |>
  mutate(
    # Get Labels of Demographic variables
    Sex = sjlabelled::get_labels(er_cln$sex)[er_cln$sex],
    Birth = sjlabelled::get_labels(er_cln$birth)[er_cln$birth]
  )

# Apply Custom Function
sex <- discrete_tab(demo,"Sex")

age <- discrete_tab(demo,"Birth")

sex |>
  add_rows(age) |>
  # Add Header Row
  insert_row("Variable","N","Percent") |>
  set_top_border(row = 1:3,1:3) |>
  set_align(col = 1, value = "left") |>
  set_align(1,1,"center") |>
  set_bottom_border(row = nrow(all), col = ncol(all), value = .4)
```

skim_variable	n_missing	complete_rate	numeric.mean	numeric.sd	numeric.hist
status	0	1	0	0	
progress	0	1	100	0	
duration_in_seconds	0	1	614	2.12e+03	
finished	0	1	1	0	
escape_room_prior	3	0.912	1.81	0.402	
escape_room_win	14	0.588	1.3	0.47	
satisfaction_1	0	1	4.76	0.496	
satisfaction_2	0	1	4.79	0.41	
satisfaction_3	0	1	4.74	0.567	
satisfaction_4	0	1	4.76	0.496	
satisfaction_5	0	1	4.74	0.567	
confidence_1	0	1	4.68	0.535	
confidence_2	0	1	4.82	0.387	
confidence_3	0	1	4.76	0.496	
confidence_4	0	1	4.85	0.359	
confidence_5	0	1	4.74	0.511	
confidence_6	0	1	4.79	0.41	
confidence_7	0	1	4.74	0.511	
confidence_8	0	1	4.12	1.07	
satisfaction_sum	0	1	23.8	2.16	
confidence_sum	0	1	37.5	3.17	

Variable	N	Percent
Sex		
Female	31	91.2%
Male	3	8.8%
Birth		
1965-1980	1	2.9%
1981-1996	4	11.8%
1997-2012	29	85.3%