Evaluating the Impact of Text-Based & Image-Enhanced Reviews on Consumer Purchase Intent

BA820: Business Experimentation and Causal Methods

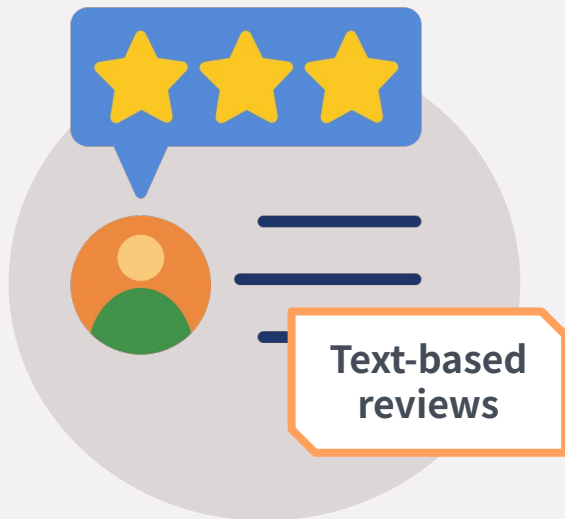Group 2- Hui Gao, Hyunjin (Jin) Yu, Quan Nguyen, Wei-An Huang

Online Reviews vs. Buying Decisions

Online reviews influence our shopping choices, but does their format affect our decision to buy?
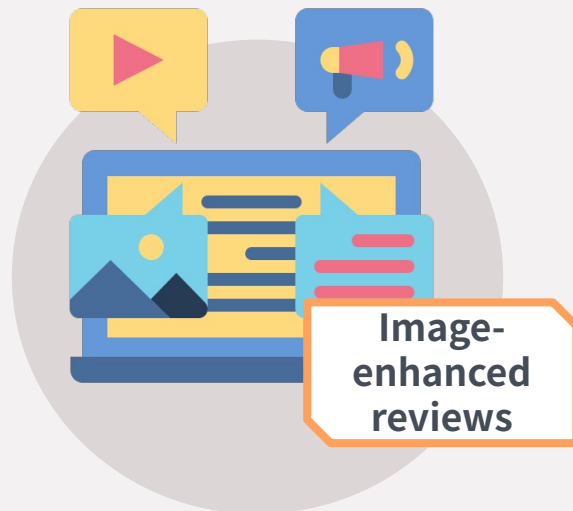
How the Written Way Matters?

✔ **Deeper insights into user experiences**

✔ **Provides a visual check of the product authenticity**

Text-based reviews

Image-enhanced reviews

✘ **Time-consuming to read, may include unhelpful details**

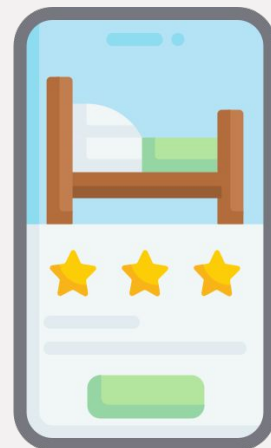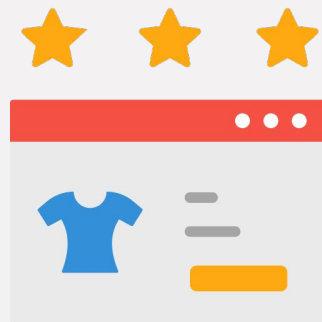✘ **Low-quality images reduce purchase intent**

Our Guesses: Do Images Really Drive Sales?

H_0 (Null Hypothesis):
There is no significant difference in purchase intent between text-only reviews & image-enhanced reviews.

H_1 (Alternative Hypothesis):
Consumers are more likely to purchase a product when the review includes images compared to text-only reviews.

Process Flow

1. Randomization by Participant
2. Automated Assignment via a Link
3. Between-Subjects Design

| Product selection | Survey design | Participants | Randomization | Control/ Treatment | Survey distribution | Data cleaning and analysis |

Randomly choose 6 Best-sellers products from Amazon website include different categories

📄**Control-** Text-based reviews
🖼️**Treatment-** Image-enhanced reviews

Experimental Design
How we display the reviews

📑 Control Group
"Text-based reviews" -Viewed product reviews containing only written text.

Customer reviews

"We've used these filters for a few years now, they work well for our house. We live on a dirt road, so change them no later than monthly. Good air flow, decent value. "

🖼️ Treatment Group
"Image-enhanced reviews" -Viewed product reviews containing both text descriptions and images.

Customer reviews

"We've used these filters for a few years now, they work well for our house. We live on a dirt road, so change them no later than monthly. Good air flow, decent value. "

BREATHE SIMPLY

breathe fresh
SIMPLY FILTERS

Experimental Design

- **Gender**
- **Purchase Experience**
- **Product Familiarity**

Covariates

Independent Variables

Dependent Variables

- **Whether received an image-enhanced review or not**

- **Purchase Likelihood**

Survey Design

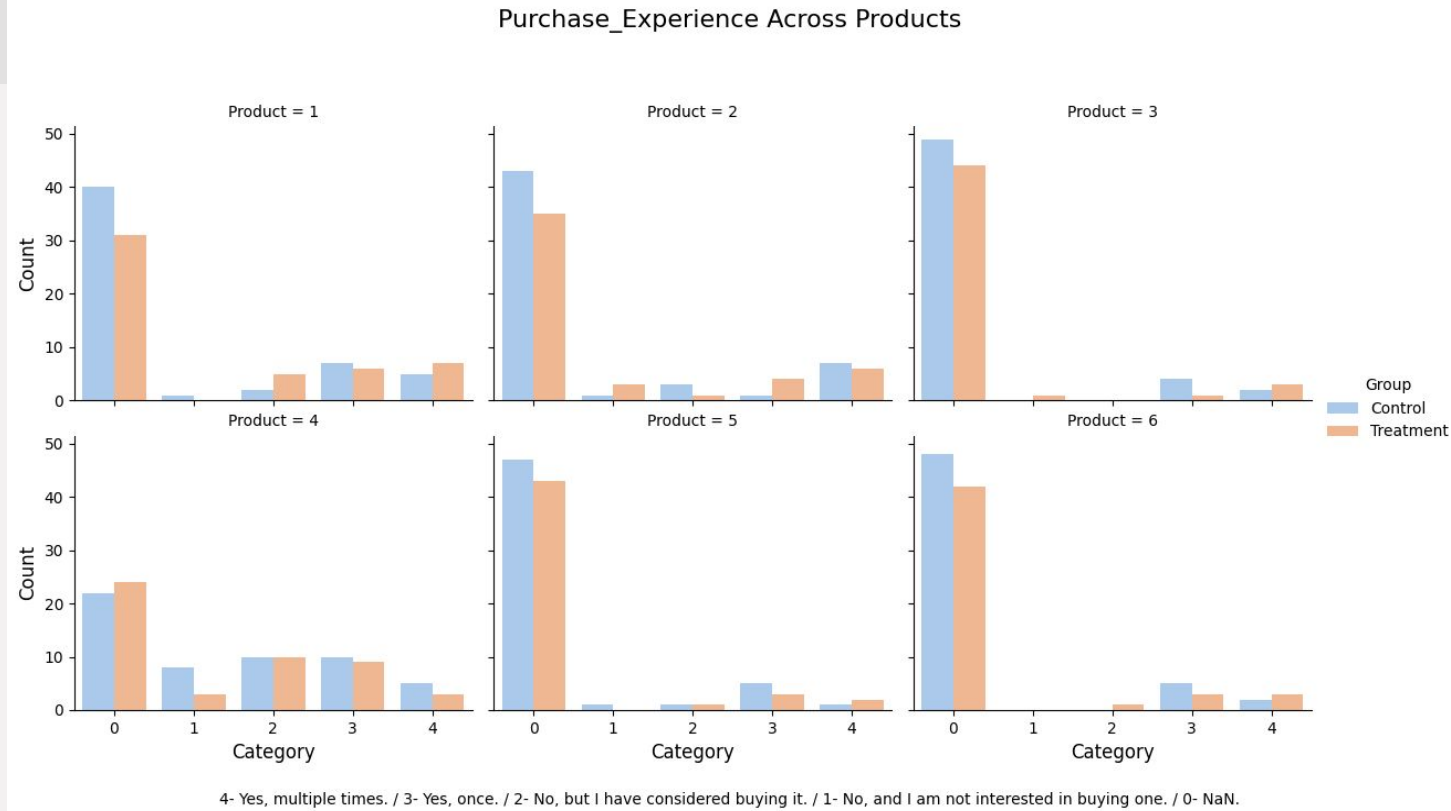| Question	Category
Are you familiar with this product?	Product Familiarity
If yes, Have you purchased this type of product before?	Purchase Experience
How trustworthy do you find this review?	Trust Score
Based on this review, how likely are you to purchase this product?	Purchase Likelihood
Does this review make you feel more confident about the product?	Confidence Score
Did you carefully read the review shown to you?	Read Text Carefully
Did you carefully examine the image in the review?	Examined Image
Imagine a review that includes images. In general, do you think reviews with images feel more authentic?	Image Authenticity
In your opinion, if a review included an image, how do you think it would affect your perception of the product?	Image Influence Perception
What aspect of the review influenced your trust the most?	Trust Influence Factor
What's your gender?	Gender

Data Overview- Product Familiarity
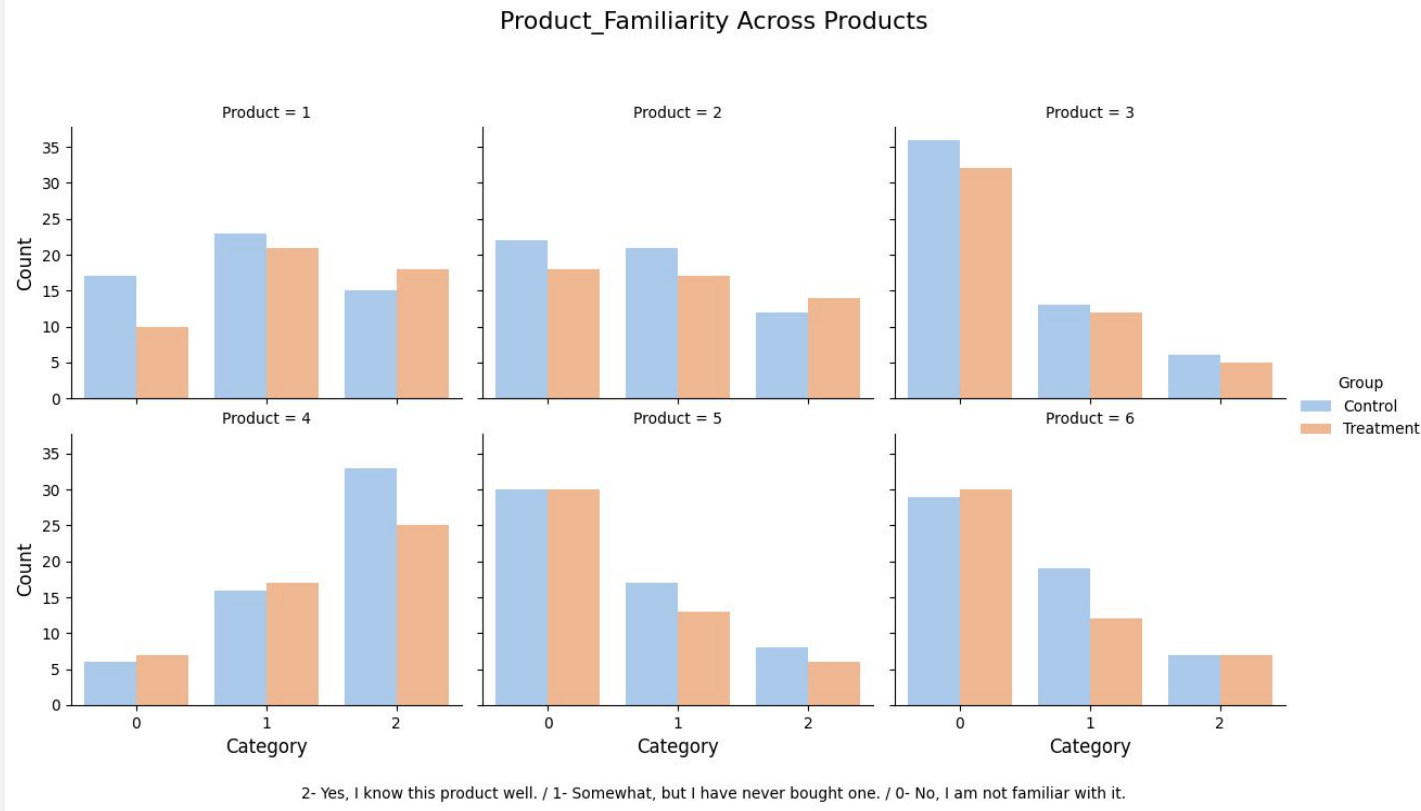
Product_Familiarity Across Products

1. Home & Kitchen
2. Clothing & Accessories
3. Books
4. Electronics
5. Tools & Home
6. Automotive

Data Overview- Purchase Experience

Purchase_Experience Across Products

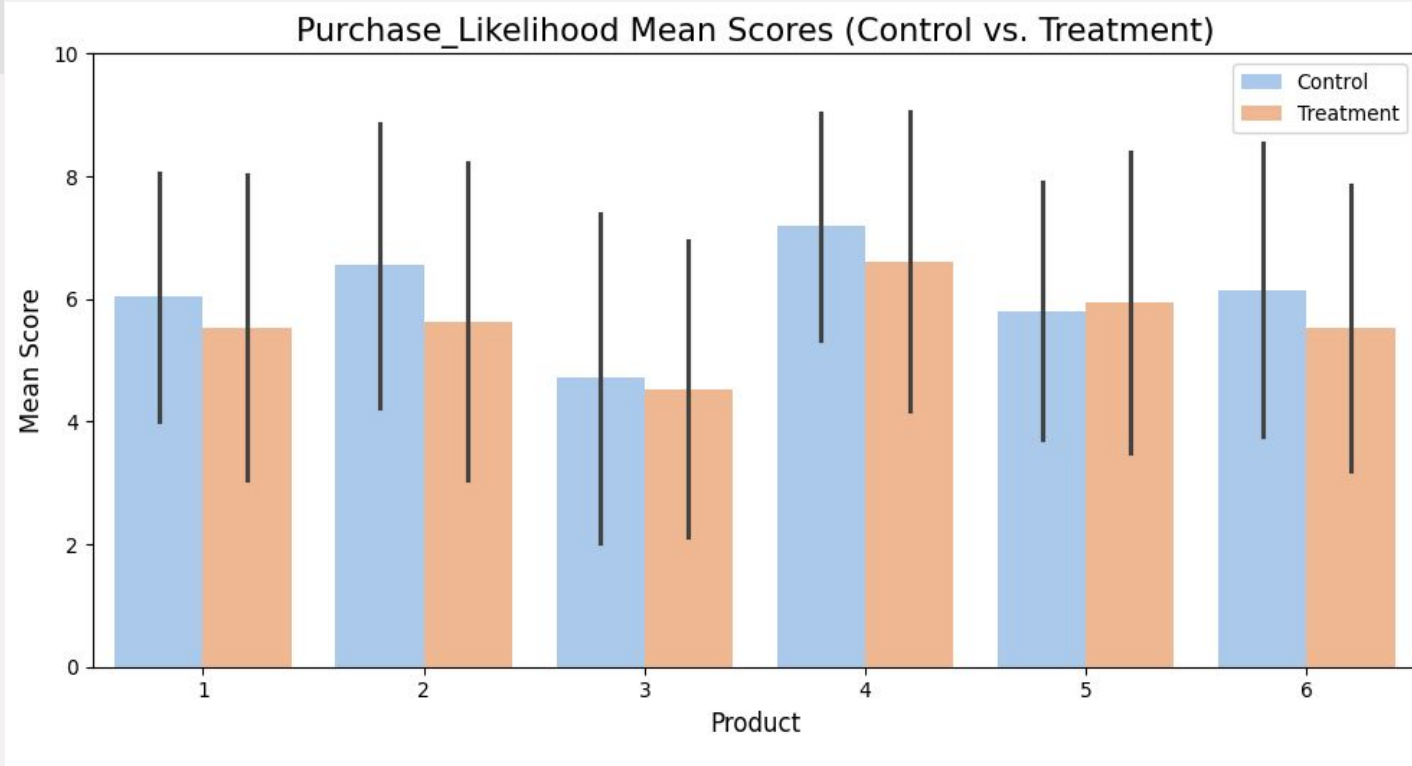4- Yes, multiple times. / 3- Yes, once. / 2- No, but I have considered buying it. / 1- No, and I am not interested in buying one. / 0- NaN.

1. Home & Kitchen
2. Clothing & Accessories
3. Books
4. Electronics
5. Tools & Home
6. Automotive

Data Overview- Purchase Likelihood

Purchase_Likelihood Mean Scores (Control vs. Treatment)

1. Home & Kitchen
2. Clothing & Accessories
3. Books
4. Electronics
5. Tools & Home
6. Automotive

Analysis Results

Main Analysis: Pooled Regression Model

▪ **Model Performance and Results**

```
                      OLS Regression Results
================================================================
Dep. Variable:    Purchase_Likelihood   R-squared:          0.126
Model:                          OLS   Adj. R-squared:       0.113
Method:               Least Squares   F-statistic:          9.826
Date:              Thu, 06 Mar 2025   Prob (F-statistic): 3.94e-14
Time:                      21:22:10   Log-Likelihood:     -1397.4
No. Observations:               624   AIC:                  2815.
Df Residuals:                   614   BIC:                  2859.
Df Model:                         9
Covariance Type:          nonrobust
```

**R-squared 0.126
F-statistic 9.83**

Variables	Results
Gender	✘
Product Familiarity	Significant
Purchase Experience	✘

Analysis Results

Interaction Effects (Group * Product)

No significant interaction effect for products

☐ Separate regressions for each product are unnecessary

```
                          OLS Regression Results
==============================================================================
Dep. Variable:     Purchase_Likelihood   R-squared:                   0.132
Model:                            OLS    Adj. R-squared:              0.112
Method:                 Least Squares    F-statistic:                 6.599
Date:                Thu, 06 Mar 2025    Prob (F-statistic):       1.49e-12
Time:                        21:39:56    Log-Likelihood:            -1395.3
No. Observations:                 624    AIC:                         2821.
Df Residuals:                     609    BIC:                         2887.
Df Model:                          14
Covariance Type:            nonrobust
==============================================================================
                        coef     std err        t      P>|t|    [0.025    0.975]
------------------------------------------------------------------------------
Intercept              5.4394      0.446    12.206     0.000     4.564     6.315
C(Product)[T.2]        0.6069      0.437     1.387     0.166    -0.252     1.466
C(Product)[T.3]       -0.9863      0.443    -2.229     0.026    -1.855    -0.117
C(Product)[T.4]        0.7889      0.442     1.783     0.075    -0.080     1.658
C(Product)[T.5]        0.0108      0.440     0.025     0.980    -0.852     0.874
C(Product)[T.6]        0.3556      0.440     0.809     0.419    -0.508     1.219
Group                 -0.6375      0.453    -1.408     0.160    -1.527     0.252
Group:C(Product)[T.2] -0.3380      0.637    -0.531     0.596    -1.589     0.913
Group:C(Product)[T.3]  0.4703      0.637     0.738     0.461    -0.781     1.722
Group:C(Product)[T.4]  0.1584      0.638     0.248     0.804    -1.095     1.411
Group:C(Product)[T.5]  0.8402      0.638     1.317     0.188    -0.412     2.093
Group:C(Product)[T.6]  0.0713      0.638     0.112     0.911    -1.181     1.324
Product_Familiarity    0.6361      0.200     3.183     0.002     0.244     1.028
Purchase_Experience    0.0363      0.113     0.321     0.748    -0.186     0.258
Gender                -0.0315      0.184    -0.171     0.864    -0.393     0.330
==============================================================================
Omnibus:                       14.939   Durbin-Watson:                 2.147
Prob(Omnibus):                  0.001   Jarque-Bera (JB):             10.707
Skew:                          -0.207   Prob(JB):                    0.00473
Kurtosis:                       2.509   Cond. No.                       34.8
==============================================================================
```

Analysis Results

Covariates	Mean (Control)	Mean (Treatment)	t-stat.	p-value	Conclusion
Product_Familiarity	0.96	1.16	-1.340	0.183	Balanced
Purchase_experience	0.84	1.14	-1.027	0.307	Balanced
Gender	1.47	1.67	-2.005	0.048	Almost Balanced

Analysis Results

Statistical Power & Cohen's D

Product	Mean (Control)	Mean (Treatment)	Mean Difference (Treatment - Control)	Cohen's D	Statistical Power
1	6.04	5.53	-0.506	0.225	0.205
2	6.55	5.64	-0.913	0.374	0.470
3	4.71	4.53	-0.178	0.070	0.064
4	7.18	6.61	-0.570	0.265	0.268
5	5.80	5.94	0.139	-0.061	0.061
6	6.15	5.53	-0.615	0.261	0.260

For participants with high purchase likelihood (≥6) Z = 2.379, p = 0.017

Pre-Experiment Randomization Check - Proportion Z-test

Limitations

- **The small sample size may make it difficult to detect meaningful differences, and low statistical power increases the risk of Type II errors.**

- **Differences in gender distribution and image examination behavior between groups may have influenced the results.**

- **The study was conducted in a controlled environment, but real-world online shopping is influenced by various external factors.**

- **The impact of review formats may vary by product type, with image-based reviews being more influential for certain categories.**

Conclusion

1. Images in reviews do not significantly impact purchase likelihood. Prior product familiarity is a stronger predictor of purchase decisions.

2. Review format effectiveness varies by product type. Some products benefit more from image-enhanced reviews than others.

3. Review format alone does not drive purchases. Businesses should focus on enhancing product familiarity and ensuring high-quality, reliable reviews tailored to product categories.

Thank You!

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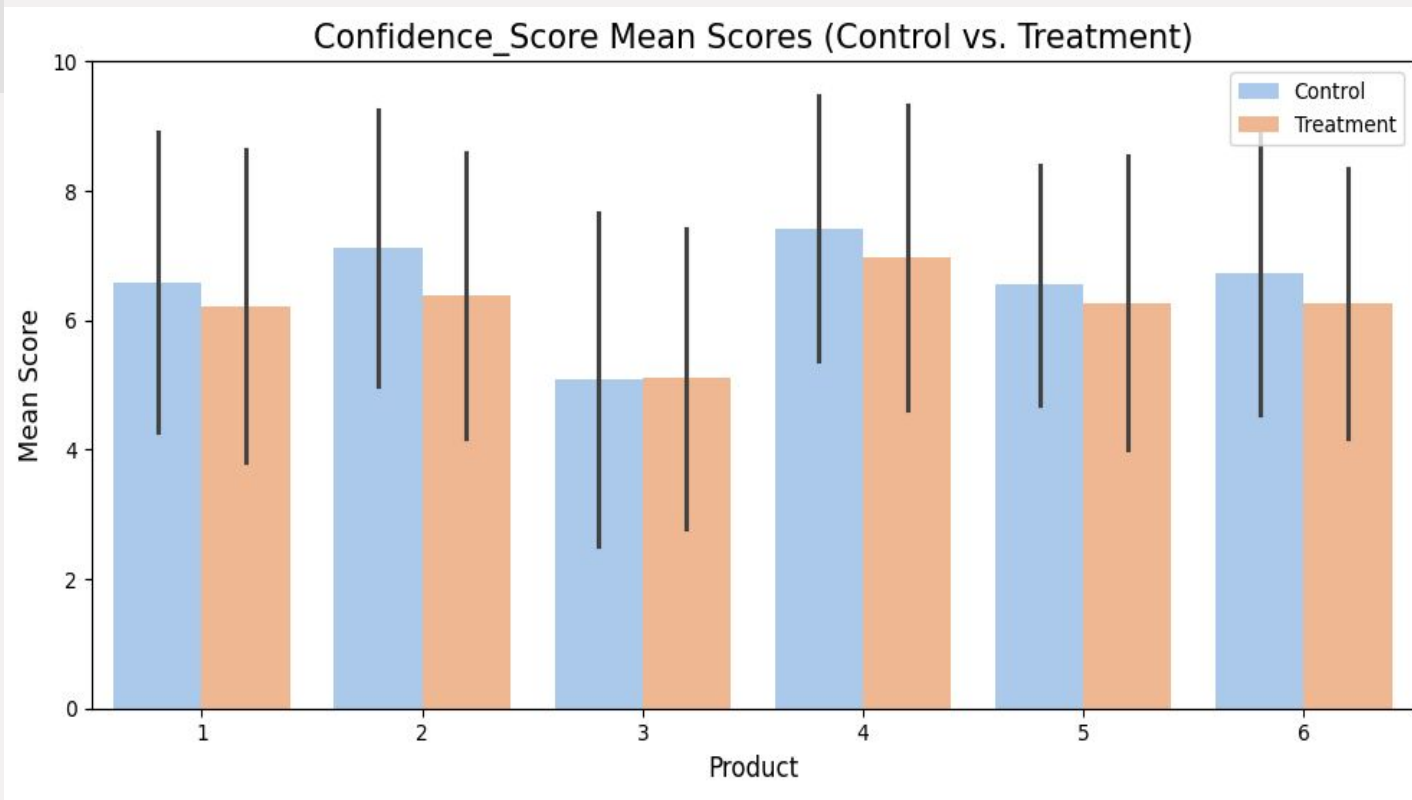
Selected Products

1. Home & Kitchen- Amazon Basics Microfiber Bed Sheets
2. Clothing & Accessories-Hanes Men's Fleece Pullover
3. Books - The Let Them Theory (Hardcover)
4. Electronics-Apple AirTag (4 Pack)
5. Tools & Home Improvement-Simply 20x20x1 Air Filter (MERV 8)
6. Automotive - Rain-X Latitude 2-in-1 Wiper Blades

Data Overview- Trust Score
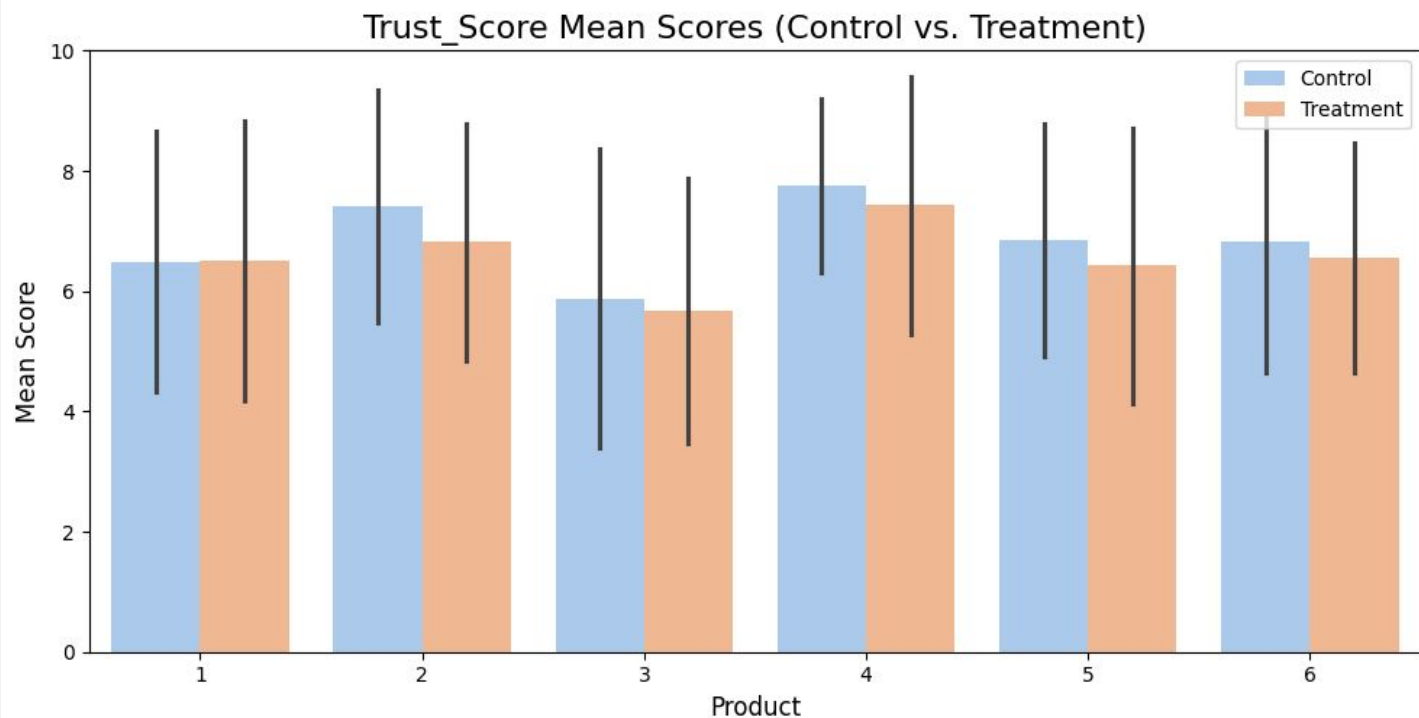
Trust_Score Mean Scores (Control vs. Treatment)

1. Home & Kitchen
2. Clothing & Accessories
3. Books
4. Electronics
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6. Automotive

Data Overview- Confidence Score

Confidence_Score Mean Scores (Control vs. Treatment)

1. Home & Kitchen
2. Clothing & Accessories
3. Books
4. Electronics
5. Tools & Home
6. Automotive