Key Highlights

- Customers prefer to click category—cosmetics.

- Compare to desktop, the score expects to increase 0.2 by using mobile.

- Photo Post ads are more attractive to customers.

- New design of category eCom significantly increases average clickPerDollar in Young group.
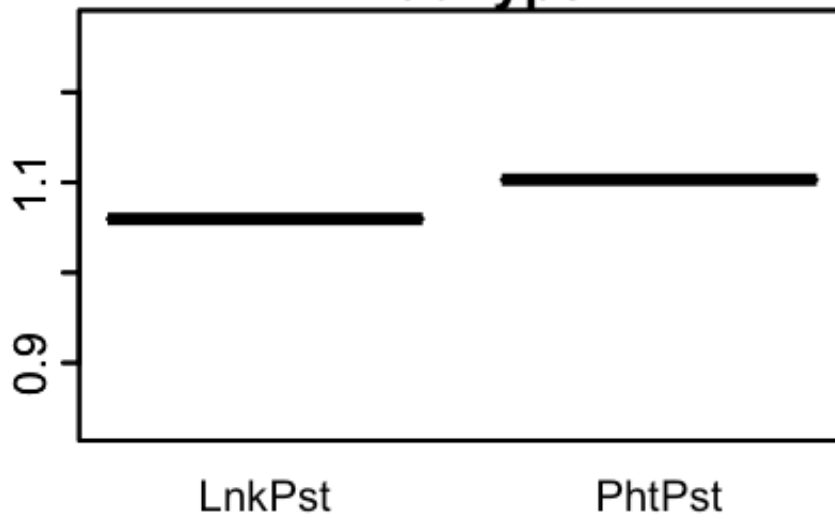
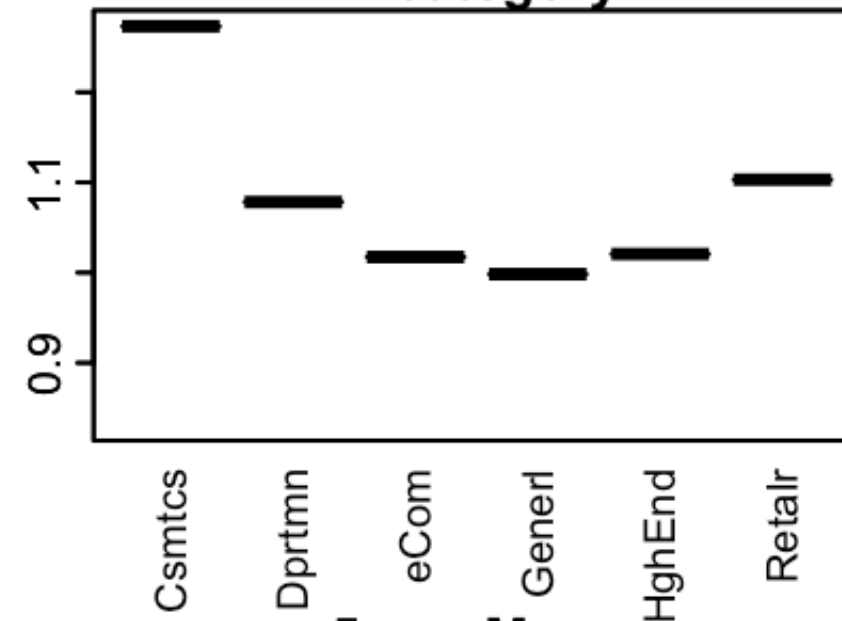- New design of category eCom significantly decreases average clickPerDollar in group age 44.5 and 52

MARS Model on Five Major Factors in Original Dataset

score   earth(score~., data=df_earth)
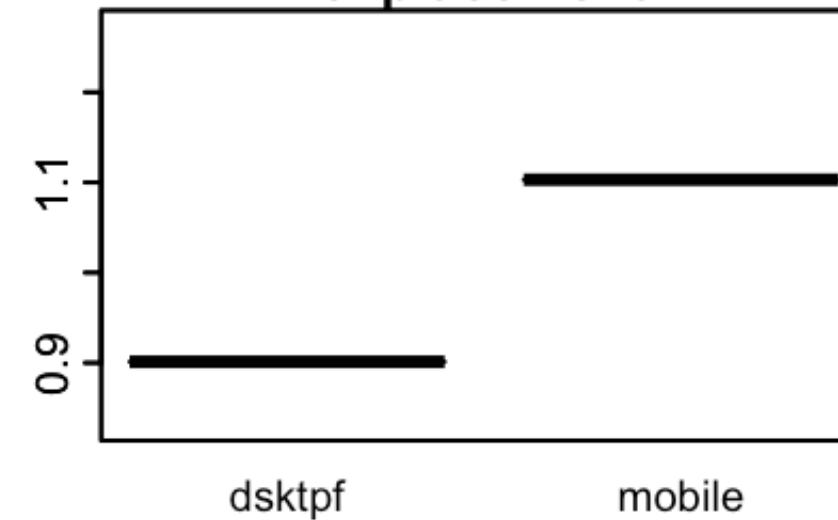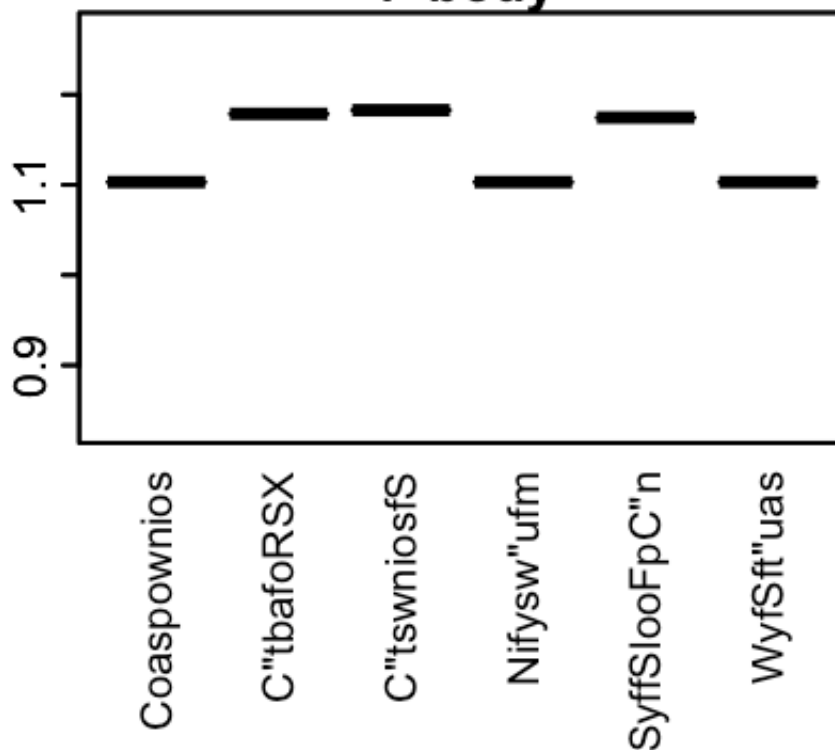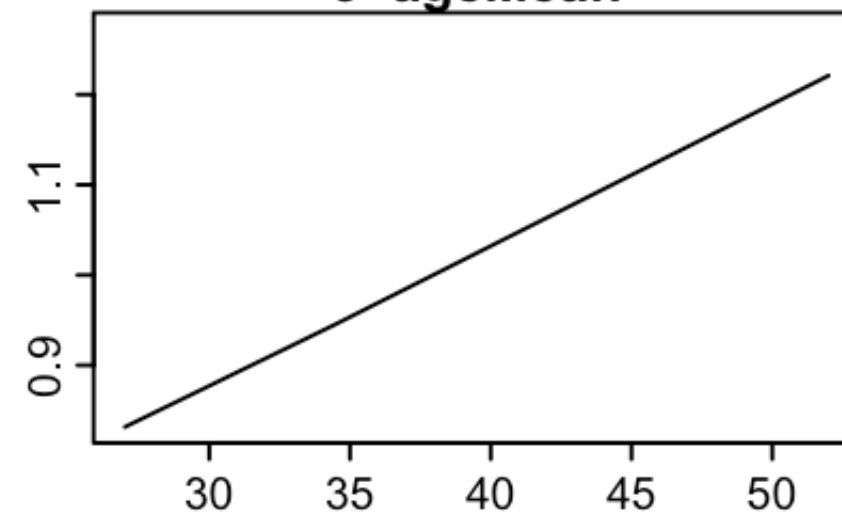

- x-axis: factors
- y-axis: score

Individual Behavior and Results

- AdType: Photo Post
- Category: Cosmetics
- Placement: mobile
- Body: Click "Like" to see what's new in our stores for Spring!!
- AgeMean: Older customer

Relationship between Score and Factors

- *Linear Regression Model to Predict Score depends on factors: adType, category, placement, keywords, body, ageMean*

	Estimate Coefficients
Intercept	0.3363
factor(adType): Photo Post	0.04437
factor(category): eCom	-0.2559
factor(placement): mobile	0.2019
factor(body): C"tswniosfS	0.08046
ageMean	0.01559

- *Default value in category is cosmetics. All other categories cause negative impact on number of score.*

Average ClickPerDollar in Each Age Group on Category
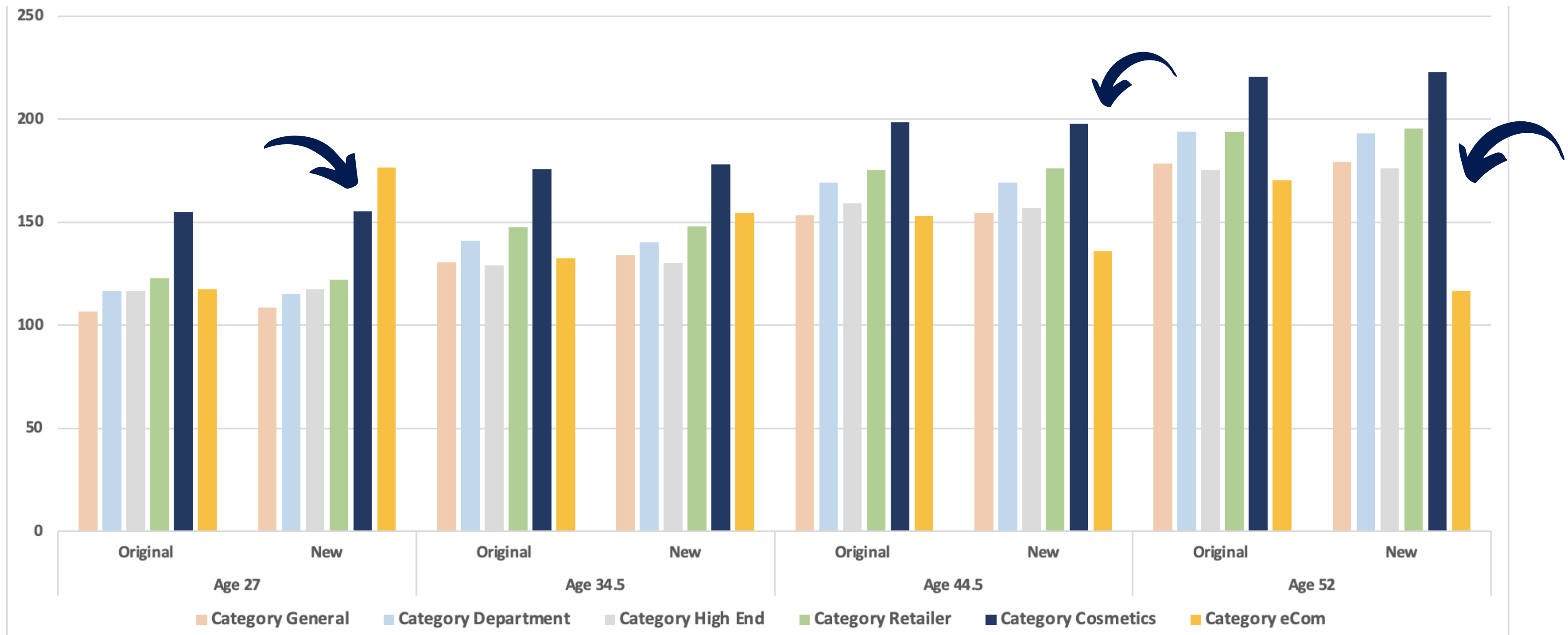
- **With a newly designed eCom ads, younger customer (age 27) increases on average clickPerDollar by 59. Older customers show no interest to new eCom ads.**

Average ClickPerDollar in Each Age Group on Body

	Age 27		Age 34.5		Age 44.5		Age 52	
	Original	New	Original	New	Original	New	Original	New
C"tbafoRSX	134.2552	137.2841	155.6851	157.076	179.5911	177.4725	197.6461	196.8436
Nifysw"ufm	117.5747	124.0912	141.2758	144.2239	166.1686	167.7753	184.5559	176.8094
Coaspowinos	116.5561	124.1774	135.2722	141.2526	162.8974	159.5589	184.5209	183.5043
SyffSlooFpC'n	130.2943	132.1738	150.5984	150.3906	175.9042	173.8259	200.0918	198.9149
WyfSft"uas	121.8358	128.0351	136.412	140.0033	168.4332	163.953	181.3556	173.4772
C"tswniosfS	131.4851	141.6451	155.1494	156.861	177.5839	174.8002	200.1809	190.9488

- **The body with the highest average clickPerDollar that appears most frequently is C"tbafoRSX; lowest average clickPerDollar is Coaspowinos**

CLICK HERE

- *C"tbafoRSX： Click "Like" to become a fan of Retail Store X!*
- *Nifysw"ufm： Need inspiration for your spring wardrobe? "Like" us for more!*
- *Coaspowinos： Check out a sneak peak of what's new in our stores!*
- *SyffSlooFpC'n： Share your favorite fresh Spring looks on our Facebook page. Click "Like" now!*
- *WyfSft"uas: What's your favorite Spring fashion trend? "Like" us and share!*
- *C"tswniosfS: Click "Like" to see what's new in our stores for Spring!!*

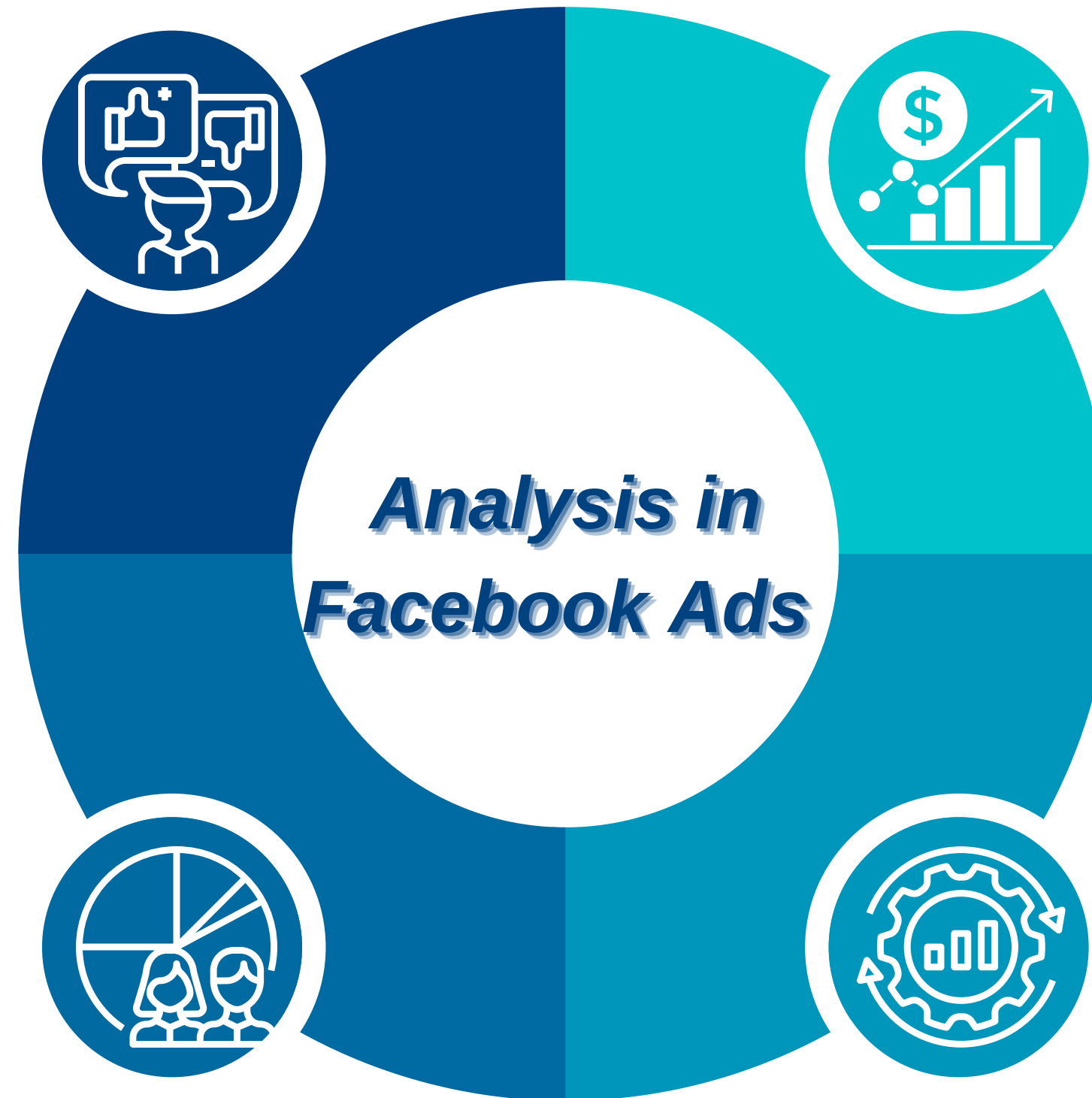# Conclusion & Recommendation

People Behavior

- **Age 27**
- **Age 34.5**
- **Age 44.5**
- **Age 52**

Increase score in original datasets by 0.81

Segementation

Analysis in Facebook Ads

Score Insights

- *Photo Post*
- *Mobile*
- *Cosmetics*
- *Click "Like" to see what's new in our stores for Spring!!*
- *Click "Like" to become a fan of Retail Store X!*

Ads Optimization

Appendix

```
> fit <- lm(score ~ factor(adType) + factor(category) + factor(placement) +
+              factor(keywords) + factor(body)+ ageMean, data = df)
> anova(fit)
Analysis of Variance Table

Response: score
                 Df Sum Sq Mean Sq   F value    Pr(>F)
factor(adType)    1 16.959  16.959  2939.9080 < 2.2e-16 ***
factor(category)  5 36.927   7.385  1280.3065 < 2.2e-16 ***
factor(placement) 1 42.238  42.238  7322.1699 < 2.2e-16 ***
factor(keywords)  24  0.809   0.034     5.8412 < 2.2e-16 ***
factor(body)       5  6.663   1.333   231.0203 < 2.2e-16 ***
ageMean            1 96.063  96.063 16652.8758 < 2.2e-16 ***
Residuals       4393 25.341   0.006
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	3.363e-01	9.537e-03	35.258	< 2e-16	***
factor(adType)Photo Post	4.437e-02	6.603e-03	6.720	2.05e-11	***
factor(category)Department	-1.952e-01	3.758e-03	-51.949	< 2e-16	***
factor(category)eCom	-2.559e-01	4.518e-03	-56.635	< 2e-16	***
factor(category)General	-2.744e-01	5.212e-03	-52.658	< 2e-16	***
factor(category)High End	-2.526e-01	3.603e-03	-70.112	< 2e-16	***
factor(category)Retailer	-1.704e-01	3.583e-03	-47.561	< 2e-16	***
factor(placement)mobile	2.019e-01	2.487e-03	81.178	< 2e-16	***
factor(keywords)#Almay, #Clinique, #CoverGirl, #Maybelline, #Sephora, mac cosmetics	-7.917e-03	5.052e-03	-1.567	0.1172	
factor(keywords)#Amazon.com, #EBay	-2.526e-03	1.101e-02	-0.229	0.8186	
factor(keywords)#American Eagle Outfitters	-1.202e-03	5.044e-03	-0.238	0.8116	
factor(keywords)#Ann Taylor (clothing retailer)	-1.973e-02	1.091e-02	-1.809	0.0706	.
factor(keywords)#Anthropologie	-7.342e-03	1.234e-02	-0.595	0.5518	
factor(keywords)#Banana Republic (clothing retailer)	-1.726e-04	1.101e-02	-0.016	0.9875	
factor(keywords)#Bebe stores	8.314e-05	1.147e-02	0.007	0.9942	
factor(keywords)#Burlington Coat Factory	6.251e-03	1.146e-02	0.545	0.5856	
factor(keywords)#Dillard's	-3.780e-03	1.165e-02	-0.325	0.7456	
factor(keywords)#Fashion	1.313e-02	1.135e-02	1.157	0.2475	
factor(keywords)#Gap (clothing retailer)	-4.447e-03	1.178e-02	-0.377	0.7058	
factor(keywords)#Kate Spade	2.762e-03	1.123e-02	0.246	0.8058	
factor(keywords)#Kmart	-1.346e-02	1.166e-02	-1.154	0.2485	
factor(keywords)#Kohl's	-9.901e-03	1.213e-02	-0.816	0.4146	
factor(keywords)#Lucky Brand Jeans	-1.003e-03	4.777e-03	-0.210	0.8338	
factor(keywords)#Lululemon Athletica	-1.044e-02	4.941e-03	-2.114	0.0346	*
factor(keywords)#Macy's	-3.452e-03	1.180e-02	-0.293	0.7699	
factor(keywords)#Nordstrom	6.173e-03	1.198e-02	0.515	0.6063	
factor(keywords)#Old Navy	-1.370e-02	1.193e-02	-1.148	0.2509	
factor(keywords)#Sears	1.272e-03	1.110e-02	0.115	0.9088	
factor(keywords)#Shopping	-2.373e-03	4.780e-03	-0.496	0.6197	
factor(keywords)#Talbots	5.583e-05	1.080e-02	0.005	0.9959	
factor(keywords)#Urban Outfitters	-1.133e-02	1.109e-02	-1.021	0.3072	
factor(keywords)#Zappos.com	6.103e-03	1.231e-02	0.496	0.6200	
factor(body)Click ""Like"" to become a fan of Retail Store X!	7.644e-02	4.314e-03	17.719	< 2e-16	***
factor(body)Click ""Like"" to see what's new in our stores for Spring!!	8.046e-02	3.874e-03	20.768	< 2e-16	***
factor(body)Need inspiration for your spring wardrobe? ""Like"" us for more!	-1.939e-04	3.855e-03	-0.050	0.9599	
factor(body)Share your favorite fresh Spring looks on our Facebook page. Click ""Like"" now!	7.222e-02	3.838e-03	18.814	< 2e-16	***
factor(body)What's your favorite Spring fashion trend? ""Like"" us and share!	3.041e-03	3.836e-03	0.793	0.4279	
ageMean	1.559e-02	1.208e-04	129.046	< 2e-16	***

Appendix

		Age 27		Age 34.5		Age 44.5		Age 52	
		Original	New	Original	New	Original	New	Original	New
adType	Photo Post	131.8771	139.0543	152.0727	155.1456	178.6201	176.2054	199.6603	195.6058
	Link Post	112.7587	117.0943	132.2948	134.1564	157.8206	155.9118	175.6875	169.819

		Age 27		Age 34.5		Age 44.5		Age 52	
		Original	New	Original	New	Original	New	Original	New
Category	General	106.8131	108.4583	130.6414	134.044	153.2315	154.6342	178.3448	179.1332
	Department	116.7187	115.0926	140.9879	140.28	169.0839	169.233	194.0855	193.2445
	High End	116.5976	117.3705	129.1414	130.0241	159.3199	156.7773	175.4552	175.9803
	Retailer	122.6828	122.1827	147.753	148.0063	175.3408	176.0894	194.0045	195.4698
	Cosmetics	155.0857	155.2787	175.5773	177.985	198.3894	197.6554	220.5837	222.9954
	eCom	117.4046	176.4282	132.6841	154.3901	152.9691	135.8668	170.3592	116.6939

		Original	New	Original	New	Original	New	Original	New
Placement	mobile	140.1233	146.4428	161.8151	163.8201	187.7962	185.247	207.5652	203.0741
	desktopfeed	107.8152	113.6934	124.2828	127.7244	150.7656	148.9168	168.6753	163.6685

		Age 27		Age 34.5		Age 44.5		Age 52	
		Original	New	Original	New	Original	New	Original	New
Body	C"tbafoRSX	134.2552	137.2841	155.6851	157.076	179.5911	177.4725	197.6461	196.8436
	Nifysw"ufm	117.5747	124.0912	141.2758	144.2239	166.1686	167.7753	184.5559	176.8094
	Coaspowinos	116.5561	124.1774	135.2722	141.2526	162.8974	159.5589	184.5209	183.5043
	SyffSlooFpC'n	130.2943	132.1738	150.5984	150.3906	175.9042	173.8259	200.0918	198.9149
	WyfSft"uas	121.8358	128.0351	136.412	140.0033	168.4332	163.953	181.3556	173.4772
	C"tswniosfS	131.4851	141.6451	155.1494	156.861	177.5839	174.8002	200.1809	190.9488

Appendix

	adType	category	placement	keywords	body	ageMean	clickPerDollar	score
550	Photo Post	Cosmetics	mobile	#Lucky Brand Jeans	Click ""Like"" to see what's new in our stores for Spring!!	52	270.9878	1.625927
3504	Photo Post	Cosmetics	mobile	#Lucky Brand Jeans	Click ""Like"" to see what's new in our stores for Spring!!	52	269.3344	1.616006
552	Photo Post	Cosmetics	mobile	#Lucky Brand Jeans	Click ""Like"" to see what's new in our stores for Spring!!	52	266.4661	1.598796
1404	Link Post	Cosmetics	mobile	#Amazon.com, #EBay	Click ""Like"" to see what's new in our stores for Spring!!	52	265.7692	1.594615
3723	Photo Post	Cosmetics	mobile	#Lululemon Athletica	Click ""Like"" to see what's new in our stores for Spring!!	52	263.7281	1.582369