Main Research Question: How do pick-up lines and a person's scent influence relationship initiation?
Dataset: "PickUpLines.sav"

All the answers (except the ones about mean scores) **need to be justified**, e.g if you say that there is homogeneity of variance, provide evidence for your claim, if you transformed a variable, explain why.

RQ1: Is there any evidence to suggest that the cute-direct pick-up approach will lead to more relationship receptivity than the direct-direct approach?

1. What is your dependent variable?
    Relationship receptivity
2. What is(are) your independent variable(s)?
    Cute-direct pick-up and direct-direct approach (Pickup approach)
3. Is there independence of observations?
    Yes. The observation of one variable (cute -direct pick up) does not affect the other one (direct-direct pickup).Durbin-Watson test shows value of 1.864 which is within the range 1.5 and 2.5 Hence this concludes that there is independence of observation.
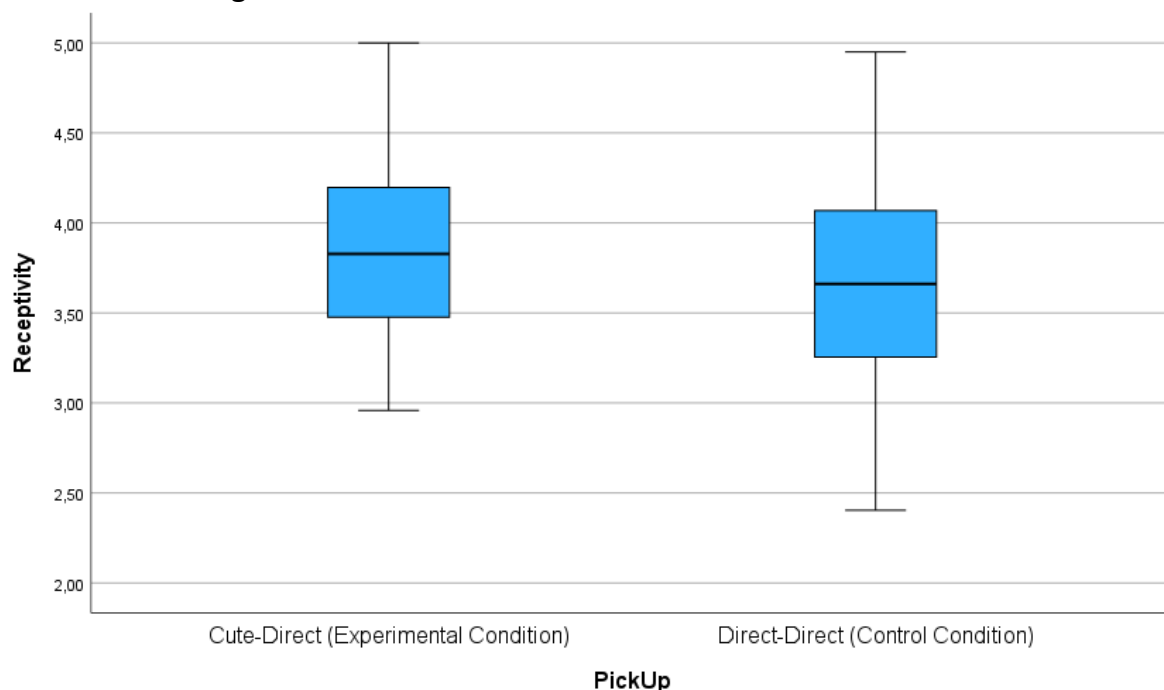
Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,192[a]	,037	,032	,52244	1,864

a. Predictors: (Constant), PickUp
b. Dependent Variable: Receptivity

4. Are there any significant outliers?
    No. The diagram below shows the results from the test.

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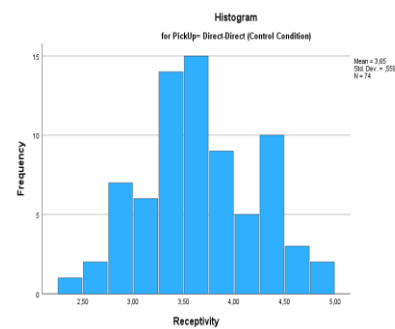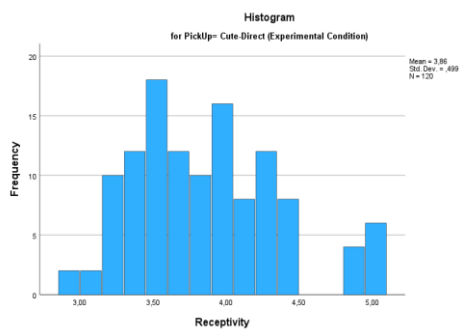5. How is your dependent variable distributed in each cell?
Dependent variable Receptivity is not normally distributed with cute direct pickup line as it shows the sig value=<0.001 which is below 0.05. Whilst the Direct-direct pickup line shows a sig value=0.871 which is greater than 0.05 hence it is normally distributed.

Tests of Normality

	PickUp	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Receptivity	Cute-Direct (Experimental Condition)	,102	120	,004	,958	120	<,001
	Direct-Direct (Control Condition)	,072	74	,200[*]	,991	74	,871

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Histogram
for PickUp= Cute-Direct (Experimental Condition)
Mean = 3,86
Std. Dev. = ,499
N = 120

Histogram
for PickUp= Direct-Direct (Control Condition)
Mean = 3,65
Std. Dev. = ,559
N = 74

6. Do you need to perform any transformations?
No, the distributions are slightly normally distributed and mean values are close to each other and we can use linear Regression or one way ANOVA analyse this hence there is no need to perform any transformation.

Descriptives

PickUp			Statistic	Std. Error
Receptivity	Cute-Direct (Experimental Condition)	Mean	3,8634	,04554
		95% Confidence Interval for Mean — Lower Bound	3,7733	
		95% Confidence Interval for Mean — Upper Bound	3,9536	
		5% Trimmed Mean	3,8439	
		Median	3,8274	
		Variance	,249	
		Std. Deviation	,49883	
		Minimum	2,96	
		Maximum	5,00	
		Range	2,04	
		Interquartile Range	,75	
		Skewness	,536	,221
		Kurtosis	-,252	,438
	Direct-Direct (Control Condition)	Mean	3,6545	,06496
		95% Confidence Interval for Mean — Lower Bound	3,5250	
		95% Confidence Interval for Mean — Upper Bound	3,7839	
		5% Trimmed Mean	3,6512	
		Median	3,6610	
		Variance	,312	
		Std. Deviation	,55880	
		Minimum	2,40	
		Maximum	4,95	
		Range	2,55	
		Interquartile Range	,81	
		Skewness	,095	,279
		Kurtosis	-,442	,552

7. Is there homogeneity or heterogeneity of variance?
There is homogeneity of variance since the diagram below shows a Levene's test results with a p-value of 0.282 which is greater than 0.05 hence we have a homogeneity of variance.

Tests of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Receptivity	Based on Mean	1,166	1	192	,282
	Based on Median	1,171	1	192	,281
	Based on Median and with adjusted df	1,171	1	190,153	,281
	Based on trimmed mean	1,192	1	192	,276

8. What is the mean score of receptivity in the experimental condition?
**Mean=3.86**

Report

Receptivity

PickUp	Mean	N	Std. Deviation
Cute-Direct (Experimental Condition)	3,8634	120	,49883
Direct-Direct (Control Condition)	3,6545	74	,55880
Total	3,7837	194	,53093

9. What is the mean score of receptivity in the control condition?
Mean=3.65
10. What is your answer to RQ1? Report on the findings (no less than 150 words). Don't forget to mention the assumptions.
The scatter plot also shows that there is no relationship between the 2 variables Pickup line and relationship receptivity.
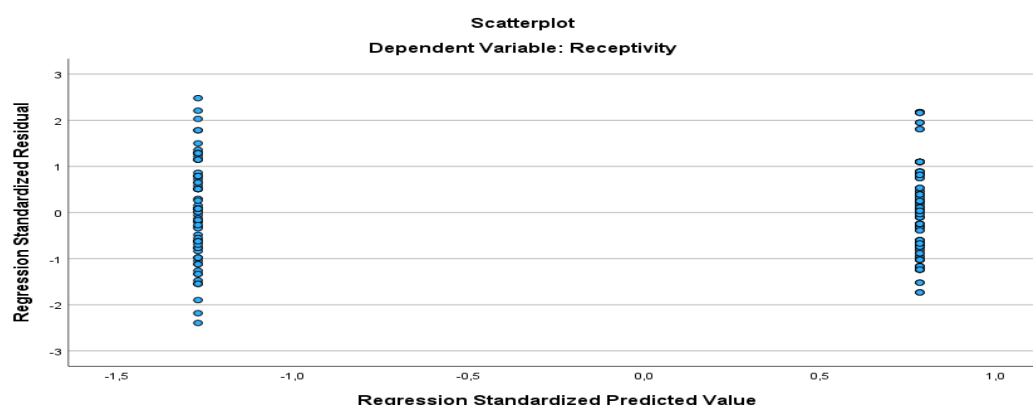
Scatterplot
Dependent Variable: Receptivity

There is statistical evidence that cute-direct pick-up approach will lead to more relationship receptivity than the direct-direct approach. As results shows r=-1.73 which is negligible correlation and the p-value =0.16 for the 2 tailed test.
Assumptions:
-No significant outliers

● **Independence of observations (within each sample)**
● **The dependent variable (approximately) normally distributed for each group of the independent variable (one-way ANOVA is**
● **Homogeneity of variances between groups (i.e. the variance is equal in each group of your independent variable) – Levene's test > 0.05**
-Data are measured at least at the interval level
They all positively skewed.
Null hypothesis: mean for cute-direct pickup approach = mean for direct-direct approach
Alternative hypothesis: mean for cute-direct pickup approach > mean for direct-direct approach
Ho: uc = ud
Ha: uc >ud
The p-value one tail= 0.16/2 = 0.08 which is greater than 0.05 hence we reject the Ho and accept the Ha and conclude that it is True that cute-direct pick-up approach will lead to more relationship receptivity than the direct-direct approach.

Correlations

			PickUp	Receptivity
Spearman's rho	PickUp	Correlation Coefficient	1,000	-,173[*]
		Sig. (2-tailed)	.	,016
		N	194	194
	Receptivity	Correlation Coefficient	-,173[*]	1,000
		Sig. (2-tailed)	,016	.
		N	194	194

*. Correlation is significant at the 0.05 level (2-tailed).

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1,999	1	1,999	7,324	,007[b]
	Residual	52,405	192	,273		
	Total	54,405	193			

a. Dependent Variable: Receptivity
b. Predictors: (Constant), PickUp

$F_{(1,192)}$ = 7,324, p < 0.039 and scent 37% (R^2 = 0.37) of the explained variability in

relationship receptivity. The regression equation: predicted relationship receptivity =

4.072+ (-0,209 x scent).

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	4,072	,113		36,014	<,001
	PickUp	-,209	,077	-,192	-2,706	,007

a. Dependent Variable: Receptivity

RQ2: Is there any evidence to suggest that the presence of androstadienone spray will lead to more relationship receptivity than no spray?

11. What is your dependent variable?
    Receptivity
12. What is(are) your independent variable(s)?
    androstadienone spray and no spray (Scent)
13. Is there independence of observations?
    Yes, the observation of one variable (androstadienone spray) does not affect the other one variable (no spray). Durbin-Watson test shows a p-value=1.809 which is within the range of 1.5-2.5 hence we conclude that there is independence of observations.
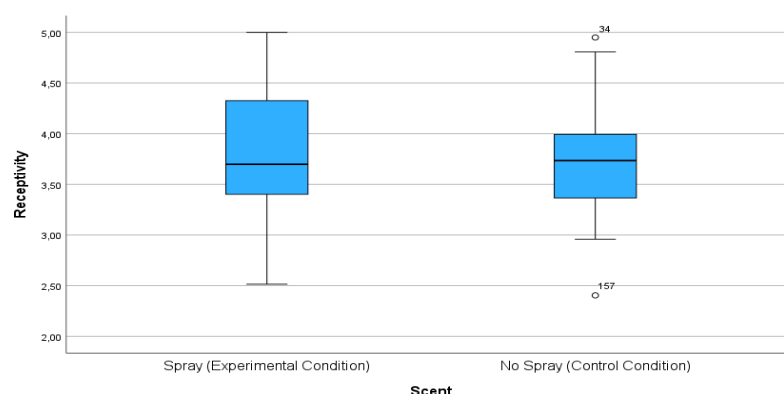
Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,149[a]	,022	,017	,52641	1,809

a. Predictors: (Constant), Scent
b. Dependent Variable: Receptivity

14. Are there any significant outliers? **No, no spray variable has outliers 34 and 157 but however they are not significant outliers.**

15. How is your dependent variable distributed in each cell?
The dependent variable is not normally distributed in all the cells as shown on the diagram below the Shapiro-wilk test shows the p-value=0.036 which is less than 0.05 hence they are all not normally distributed.

Tests of Normality

Scent		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Receptivity	Spray (Experimental Condition)	,114	104	,002	,974	104	,036
	No Spray (Control Condition)	,094	90	,048	,970	90	,036

a. Lilliefors Significance Correction

16. Do you need to perform any transformations?

No. the p values in Shapiro test are 0.036 which is slightly not normal and also we can proceed to analyse the data with one way anova or linear regression hence there is no need to perform transformation.

17. Is there homogeneity or heterogeneity of variance?

There is heterogeneity because the diagram below shows a p- value p <0.001 which is less than 0.05 hence there is no homogeneity so there is heterogeneity.

Tests of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Receptivity	Based on Mean	15,814	1	192	<,001
	Based on Median	12,753	1	192	<,001
	Based on Median and with adjusted df	12,753	1	169,624	<,001
	Based on trimmed mean	15,758	1	192	<,001

18. What is the mean score of receptivity in the experimental condition? **3.86**

19. What is the mean score of receptivity in the control condition? **3.7**
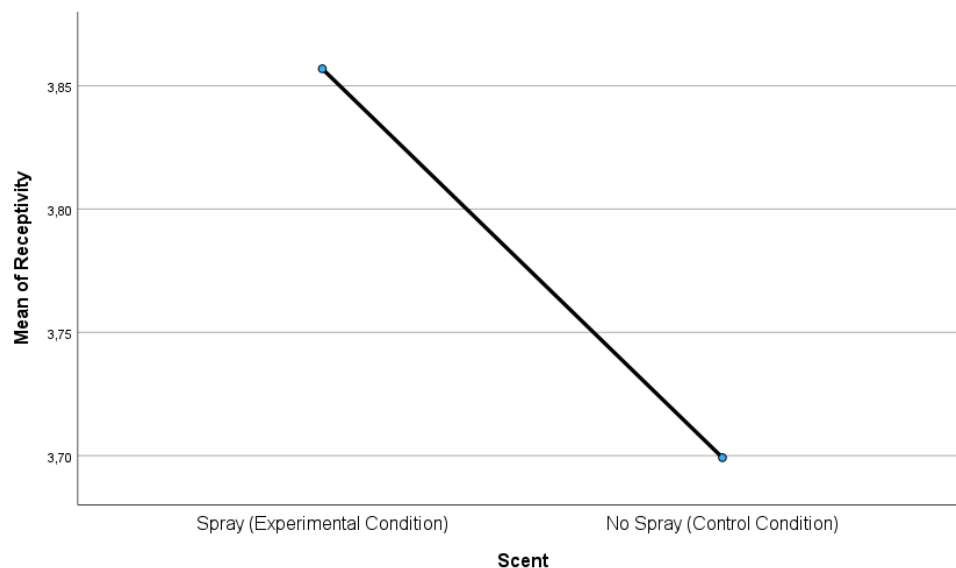
20. What is your answer to RQ2? Report on the findings (no less than 150 words). Don't forget to mention the assumptions.

There is no statistical evidence that the presence of androstadienone spray will lead to more relationship receptivity than no spray. As results shows r=-0.133 which is a negative correlation and the p-value =0.064 for the 2 tailed test.

Correlations

			Scent	Receptivity
Spearman's rho	Scent	Correlation Coefficient	1,000	-,133
		Sig. (2-tailed)	.	,064
		N	194	194
	Receptivity	Correlation Coefficient	-,133	1,000
		Sig. (2-tailed)	,064	.
		N	194	194

Null hypothesis: mean for androstadienone spray = mean for no spray
Alternative hypothesis: mean for androstadienone spray > mean for no spray
Ho: us = un
Ha: us>un
The p-value one tail= 0.064/2 = 0.032 which is less than 0.05 hence we accept the Ho and reject the Ha and conclude that the presence of androstadienone spray will not lead to more relationship receptivity than no spray.

Since our distributions are not normal for both cases then we use One way ANOVA with the following Assumptions:
-No significant outliers
● Independence of observations (within each sample)
● The dependent variable (approximately) normally distributed
for each group of the independent variable (one-way ANOVA)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1,200	1	1,200	4,331	,039[b]
	Residual	53,205	192	,277		
	Total	54,405	193			

a. Dependent Variable: Receptivity
b. Predictors: (Constant), Scent

A linear regression established that presence of androstadienone spray could not statistically significantly lead to more relationship receptivity, $F(1,192) = 4.331$, $p < 0.039$

and scent 22% (*R2* = 0.22) of the explained variability in relationship receptivity. The regression equation: predicted relationship receptivity = 4.015+ (-1.58 x scent).

RQ3: Is there any evidence to suggest that the impact of the androstadienone spray on attractiveness effect will be enhanced by the pick-up approach?

    21. What is your dependent variable?
        Attractiveness effects (Receptivity)
    22. What is(are) your independent variable(s)?
        Scent and pick-up approach
    23. Is there independence of observations?

Yes, the observation of one variable scent does not affect the other variable pick-up hence there is independence of observation. The Durbin-Watson test shows a p-value=1.866 which is within the range 1.5 and 2.5 hence there is independence of observation.
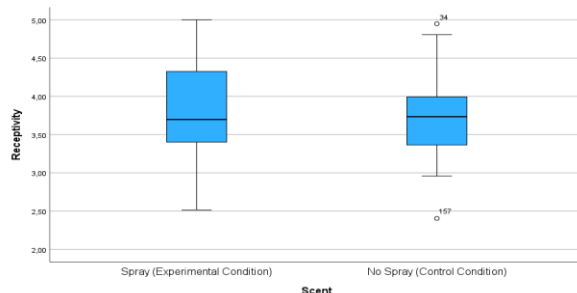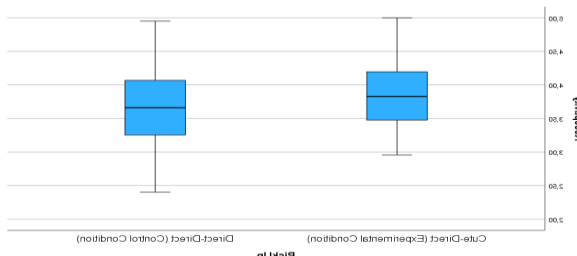
Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,254[a]	,065	,055	,51618	1,866

a. Predictors: (Constant), Scent, PickUp
b. Dependent Variable: Receptivity

    24. Are there any significant outliers?
        No, there are no significant outlier.

    25. How is your dependent variable distributed in each cell?
Receptivity is not normally distributed with cute -direct spray as Shapiro-wilk test show a p-value= 0.01 which is less than 0.05
Receptivity is normally distributed with cute-direct no spray as Shapiro-wilk test show a p-value=0.62 which is greater than 0.05.
Receptivity is normally distributed with direct-direct spray as Shapiro-wilk test show a p-value=0.12 which is greater than 0.05.
Receptivity is normally distributed with direct-direct no spray as Shapiro-wilk test show a p-value=0.435 which is greater than 0.05

Tests of Normality

PickUp	Scent	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.

Cute-Direct (Experimental Condition)	Recep tivity	Spray (Experimental Condition)	,124	60	,022	,947	60	,011
		No Spray (Control Condition)	,126	60	,020	,962	60	,062
Direct-Direct (Control Condition)	Recep tivity	Spray (Experimental Condition)	,122	44	,096	,959	44	,120
		No Spray (Control Condition)	,110	30	,200*	,966	30	,435

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

26. Do you need to perform any transformations?
No, because 3 of the p-values in Shapiro test above are above 0.05 and one element is just slightly not normally distributed and also two way ANOVA lows us to proceed.
27. Is there homogeneity or heterogeneity of variance?
There is heterogeneity the diagram below shows a p- value p <0.001 which is less than 0.05 hence there is no homogeneity so there is heterogeneity.

Levene's Test of Equality of Error Variances[a,b]

		Levene Statistic	df1	df2	Sig.
Receptivity	Based on Mean	5,837	3	190	<,001
	Based on Median	5,529	3	190	,001
	Based on Median and with adjusted df	5,529	3	162,170	,001
	Based on trimmed mean	5,830	3	190	<,001

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Dependent variable: Receptivity

b. Design: Intercept + PickUp + Scent + PickUp * Scent

N.B. If group sample sizes are equal or approximately equal and large, there is normality and the ratio of the largest group variance to the smallest group variance is less than 3, the two-way ANOVA is somewhat robust to heterogeneity of variance in these circumstances (Jaccard, 1998).

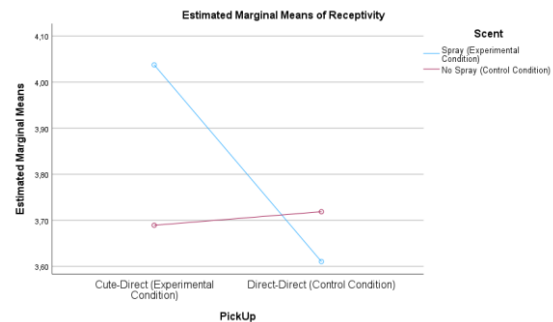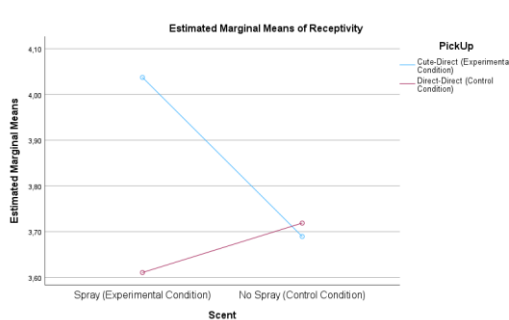Reminder: Standard deviation is square root of variance ($SD = \sqrt{Variance}$).

28. Is there any interaction between the two factors?

Yes, the diagram Tests of Between-Subject Effects shows the Significance value of interaction effect of 0.003 which is less than 0,05. The Plot inspection shows crossing of the 2 factors which concludes that interaction is statistically significant.

Tests of Between-Subjects Effects

Dependent Variable: Receptivity

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	5,844[a]	3	1,948	7,621	<,001	,107
Intercept	2535,858	1	2535,858	9921,823	<,001	,981
PickUp	1,768	1	1,768	6,916	,009	,035
Scent	,644	1	,644	2,520	,114	,013
PickUp * Scent	2,329	1	2,329	9,113	,003	,046
Error	48,561	190	,256			
Total	2831,811	194				
Corrected Total	54,405	193				

a. R Squared = ,107 (Adjusted R Squared = ,093)

29. What is your answer to RQ3? Report on the findings (no less than 200 words). Don't forget to mention the assumptions. You can use η^2 instead of ω^2.

Yes, there is evidence that androstadienone spray has an impact on attractiveness effect can be enhanced by the pick- up approach. As the cute-direct approach with androstadienone spray gives a p-value =<0.001 whilst the Direct-direct approach with androstadienone spray gives a p-value=0.367 which is greater than 0.001 for cute-direct approach. as much as scent on its own has p-value =0.64 if we use cute-direct pick up with

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scent the p -value falls to 0.001 giving us the lowest relationship initiation. Whilst when we use direct-direct pick up the p- value =0.367 which gives us the highest chances of relationship initiation. Hence, we conclude that yes pick up approach can enhance androstadienone spray on attractiveness effect as pick up approach causes a positive and negative impact which are Direct-Direct which is positive as it gives us the highest   p-value=0.367 and cute direct which is negative impact as it gives us the least p-value=0.001

Pairwise Comparisons

Dependent Variable: Receptivity

PickUp	(I) Scent	(J) Scent	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
						Lower Bound	Upper Bound
Cute-Direct (Experimental Condition)	Spray (Experimental Condition)	No Spray (Control Condition)	,348[*]	,092	<,001	,166	,530
	No Spray (Control Condition)	Spray (Experimental Condition)	-,348[*]	,092	<,001	-,530	-,166
Direct-Direct (Control Condition)	Spray (Experimental Condition)	No Spray (Control Condition)	-,108	,120	,367	-,344	,128
	No Spray (Control Condition)	Spray (Experimental Condition)	,108	,120	,367	-,128	,344

Based on estimated marginal means

*. The mean difference is significant at the ,05 level.

b. Adjustment for multiple comparisons: Bonferroni.

A two-way ANOVA was conducted to examine the impact of androstadienone spray on attractiveness effect if it will be enhanced by the pick-up approach.
Residual analysis was performed to test for the assumptions of the two-way ANOVA. Outliers were assessed by inspection of a boxplot, normality was assessed using Shapiro-Wilk's normality test for each cell of the design and homogeneity of variances was assessed by Levene's test. There were no outliers, residuals were normally distributed ($p > .05$) for control condition as the p-value= 0.367 whilst for Experimental Condition p=<,0.001 hence no normal distribution. The is heterogeneity of variances (p = <0.001).

There was a statistically significant interaction between scent and pick-up approach on attractiveness effect, $F(1, 190)$ = 9,113, p = 0.003, partial η2 = 0.046 which indicates medium effect. Therefore, an analysis of simple main impact of pick-up approach on was performed with statistical significance receiving a Bonferroni adjustment and being accepted at the p = 0.05 level. There was a
statistically significant difference in mean (Attractiveness effects) scores for Cute-direct Pick up to either androstradienone spray or no spray level, F(1, 190) = 14,225, p<0.001, partial η2 = 0.7 indicating large effect , as for direct-direct pickup to either androstradienone spray or no spray level , F(1, 190) = 0.817, p=0.367, partial η2 = 0.04 indicates medium effect.

Tests of Between-Subjects Effects

Dependent Variable: Receptivity

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	5,844[a]	3	1,948	7,621	<,001	,107

Intercept	2535,858	1	2535,858	9921,823	<,001	,981
PickUp	1,768	1	1,768	6,916	,009	,035
Scent	,644	1	,644	2,520	,114	,013
PickUp * Scent	2,329	1	2,329	9,113	,003	,046
Error	48,561	190	,256			
Total	2831,811	194				
Corrected Total	54,405	193				

a. R Squared = ,107 (Adjusted R Squared = ,093)

Pairwise Comparisons

Dependent Variable: Receptivity

PickUp	(I) Scent	(J) Scent	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b] Lower Bound	Upper Bound
Cute-Direct (Experimental Condition)	Spray (Experimental Condition)	No Spray (Control Condition)	,348*	,092	<,001	,166	,530
	No Spray (Control Condition)	Spray (Experimental Condition)	-,348*	,092	<,001	-,530	-,166
Direct-Direct (Control Condition)	Spray (Experimental Condition)	No Spray (Control Condition)	-,108	,120	,367	-,344	,128
	No Spray (Control Condition)	Spray (Experimental Condition)	,108	,120	,367	-,128	,344

Based on estimated marginal means

*. The mean difference is significant at the ,05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Univariate Tests

Dependent Variable: Receptivity

PickUp		Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Cute-Direct (Experimental Condition)	Contrast	3,636	1	3,636	14,225	<,001	,070
	Error	48,561	190	,256			
Direct-Direct (Control Condition)	Contrast	,209	1	,209	,817	,367	,004
	Error	48,561	190	,256			

Each F tests the simple effects of Scent within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

All pairwise comparisons were run for each simple main effect with reported 95% confidence intervals and *p*-values. Bonferroni-adjusted within each simple main effect. Mean Difference "Experimental Condition" scores for spray and no spray, were 0,348 (*SD* = 0.092), -0.348(*SD* = 3.0.92) respectively. While, the mean difference for "Control Condition" scores for spray and no spray, were -1.08 (*SD* = 0.12), 108(*SD* = 0.12) respectively. Direct-direct Scent had a statistically significantly lower mean difference "Receptivity" score than Cute-Direct Scent score, 0.348, 95% CI [0.166, 0.530], *p* = <.001, and direct-direct Scent, 0.108, 95% CI [-0,128,0,344], *p* < .0367.

30. Answer the main research question by taking the above findings into account (no less than 200 words). Don't forget to mention the assumptions.
From the R01 we found out that there is statistical evidence that cute-direct pick-up approach will lead to more relationship receptivity than the direct-direct approach r=-1.73 which is negligible correlation and the p-value =0.16 for the 2 tailed test. Whilst, in RQ2 we

found out that the presence of androstadienone spray could not statistically significantly lead to more relationship receptivity shown with r=-0.133 which is a negative correlation and the p-value =0.064 for the 2 tailed test.

However, on RQ3 We found out the p-value for cute-direct(pickup) with scent p-value=<0.001 while direct-direct pick up with scent p-value=0.367 which is greater than that of cute direct pick up. Hence, we conclude that pick-up line and person's scent yes influence relationship initiation as we get a p-value= 0.16 and 0.64 respectively and both values are above 0.05 for the 2 tailed test. However, when we did a TWO-WAY ANOVA we found out that cute pick up scent has p -value =0.001 while direct-direct scent has a p-value=0.367. Thus, as much as scent on its own has p-value =0.64 if we use cute-direct pick up with scent the p -value falls to 0.001 giving us the lowest relationship initiation. Whilst when we use direct-direct pick up the p- value =0.367 which gives us the highest chances of relationship initiation with Cute-direct Pick up to scent level, $F(1, 190) = 14,225$, $p<0.001$, partial $\eta 2 = 0.7$ indicating large effect , as for direct-direct pickup to scent , $F(1, 190) = 0.817$, $p=0.367$, partial $\eta 2 = 0.04$ indicating medium effect.

Pairwise Comparisons

Dependent Variable: Receptivity

PickUp	(I) Scent	(J) Scent	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b] Lower Bound	Upper Bound
Cute-Direct (Experimental Condition)	Spray (Experimental Condition)	No Spray (Control Condition)	,348*	,092	<,001	,166	,530
	No Spray (Control Condition)	Spray (Experimental Condition)	-,348*	,092	<,001	-,530	-,166
Direct-Direct (Control Condition)	Spray (Experimental Condition)	No Spray (Control Condition)	-,108	,120	,367	-,344	,128
	No Spray (Control Condition)	Spray (Experimental Condition)	,108	,120	,367	-,128	,344

Based on estimated marginal means

*. The mean difference is significant at the ,05 level.

b. Adjustment for multiple comparisons: Bonferroni.