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ms5105 Assignment 01

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Q1: Does having children at home has association with smoking habits ?

Statistical test: Chi-Square test.
Why: Because both variables, children at home (yes/no) and smoking status (smoker/non-smoker), are categorical.

Results:

child * smoker Crosstabulation

			smoker		
			YES	NO	Total
child	YES	Count	24	160	184
		% within child	13.0%	87.0%	100.0%
		% within smoker	28.2%	45.7%	42.3%
		% of Total	5.5%	36.8%	42.3%
	NO	Count	61	190	251
		% within child	24.3%	75.7%	100.0%
		% within smoker	71.8%	54.3%	57.7%
		% of Total	14.0%	43.7%	57.7%
Total		Count	85	350	435
		% within child	19.5%	80.5%	100.0%
		% within smoker	100.0%	100.0%	100.0%
		% of Total	19.5%	80.5%	100.0%

- Among respondents with children, 13% are smokers, while 87% are non-smokers.
- Among those without children, 24.3% are smokers, while 75.7% are non-smokers.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.561[a]	1	.003		
Continuity Correction[b]	7.860	1	.005		
Likelihood Ratio	8.871	1	.003		
Fisher's Exact Test				.003	.002
Linear-by-Linear Association	8.541	1	.003		
N of Valid Cases	435				

- The p-value (0.003) < 0.05, means there is a statistically significant association between having children at home and smoking habits.

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	-.140	.003
	Cramer's V	.140	.003
N of Valid Cases		435	

- Phi value (-0.140) indicates small negative association.
- Cramer's V (0.140) indicates weak significant association.

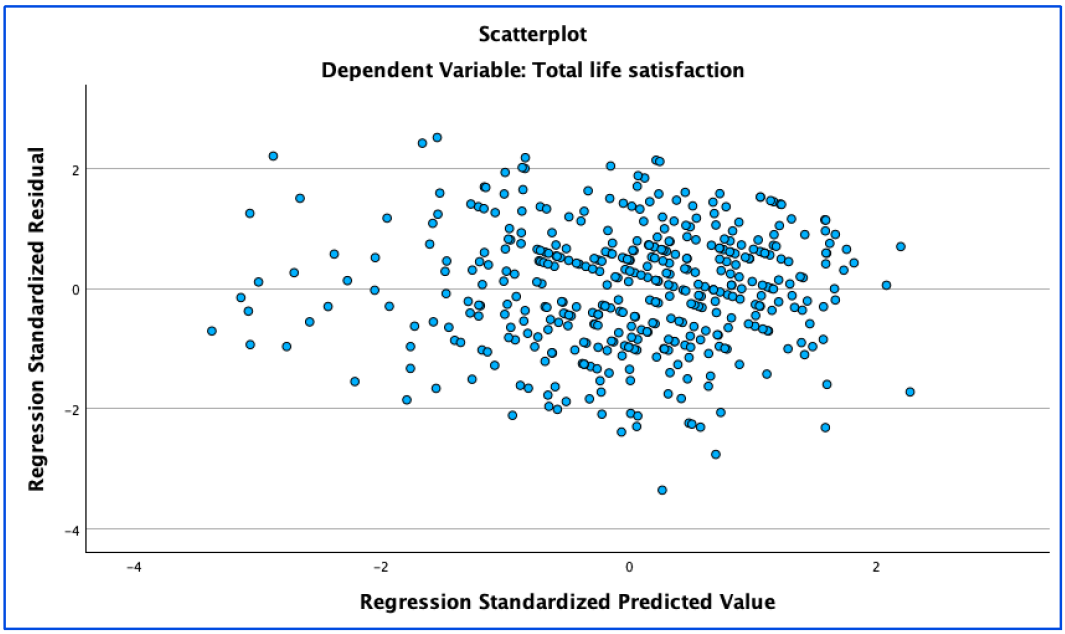
Conclusion: Yes having children at home has association with smoking habits, Individuals with children are less likely to smoke compared to those without children.

Q2: Can Total Optimism, Total Self-esteem and Total Perceived Stress predict Total Life Satisfaction?

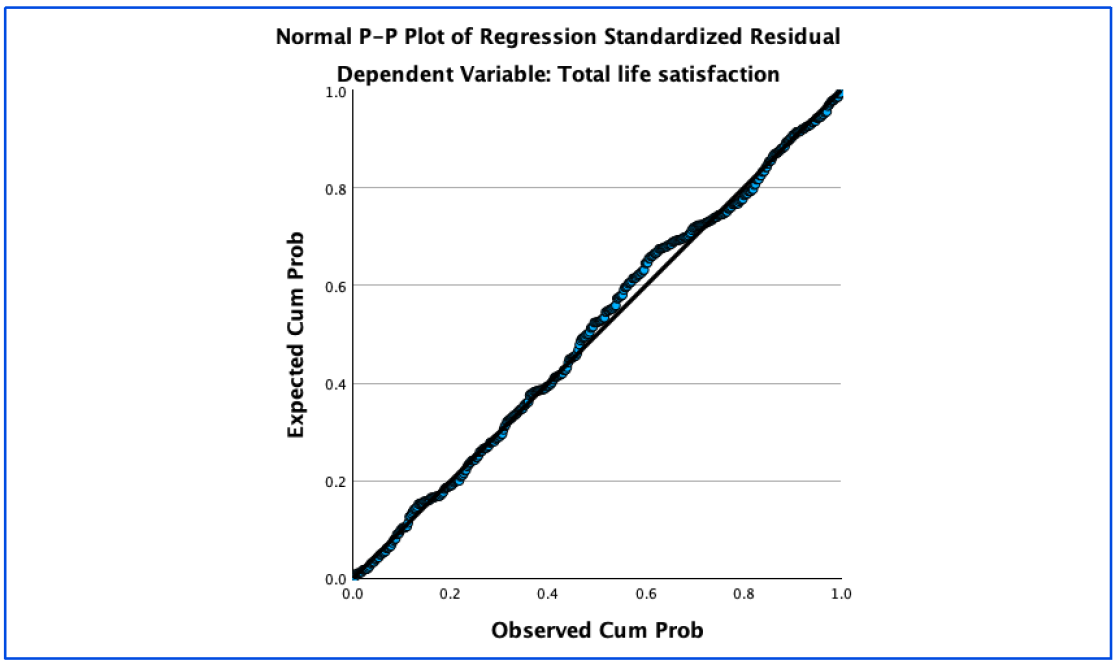
Statistical test: Multiple regression.
Why: All Independent Variable (Total Optimism, Total Self-Esteem, and Total Perceived Stress) and Dependent variable (Total Life Satisfaction) are continuous.

Diagnostics:

The following assumptions were checked before interpretation of results:



- The scatterplot of standardized residuals against predicted values shows no obvious pattern, supporting the assumption of linearity.



- The Normal P-P Plot of standardized residuals indicates that the residuals are approximately normally distributed, as the points closely follow the diagonal line.

Coefficients[a]

Model		95.0% Confidence Interval for B	Correlations			Collinearity Statistics	
		Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	20.025					
	Total Optimism	.529	.487	.242	.201	.641	1.561
	Total Self esteem	.382	.492	.179	.147	.551	1.816
	Total perceived stress	-.191	-.493	-.251	-.209	.641	1.561

- VIF values are all below 10 (1.561 to 1.816), and tolerance values are above 0.1, indicating no multicollinearity among predictors.

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	8.86	31.43	22.36	4.003	430
Std. Predicted Value	-3.373	2.267	.000	1.000	430
Standard Error of Predicted Value	.271	1.072	.507	.153	430
Adjusted Predicted Value	9.00	31.62	22.36	4.002	430
Residual	-18.421	13.855	.000	5.473	430
Std. Residual	-3.354	2.523	.000	.996	430
Stud. Residual	-3.374	2.535	.000	1.001	430
Deleted Residual	-18.644	13.998	-.001	5.529	430
Stud. Deleted Residual	-3.416	2.552	.000	1.004	430
Mahal. Distance	.043	15.349	2.993	2.576	430
Cook's Distance	.000	.036	.003	.004	430
Centered Leverage Value	.000	.036	.007	.006	430

a. Dependent Variable: Total life satisfaction

- As this model can be highly influenced by outliers, Cook's Distance values are checked that are all below 1, indicating no highly influential outliers.

Results:

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics			
					R Square Change	F Change	df1	df2
1	.590[a]	.348	.344	5.493	.348	75.955	3	426

- R^2 = 0.348: The model explains 34.8% of the variance in Total Life Satisfaction.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6874.702	3	2291.567	75.955	<.001[b]
	Residual	12852.426	426	30.170		
	Total	19727.128	429			

- The regression model is statistically significant F=75.955,p<0.001, indicating that the predictors collectively explain a significant portion of the variance in Total Life Satisfaction.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B
		B	Std. Error	Beta			Lower Bound
1	(Constant)	13.541	3.299		4.104	<.001	7.056
	Total Optimism	.383	.074	.251	5.137	<.001	.236
	Total Self esteem	.251	.067	.198	3.757	<.001	.120
	Total perceived stress	-.302	.057	-.261	-5.344	<.001	-.413

- Total Optimism (B=0.383, p<0.001) has a significant positive effect on Total Life Satisfaction.
- Total Self-Esteem (B=0.251, p<0.001) also has a significant positive effect.
- Total Perceived Stress (B=−0.302, p<0.001) has a significant negative effect, meaning higher stress leads to lower life satisfaction.

Conclusion: The Total Optimism, Total Self-Esteem, and Total Perceived Stress collectively can predict Total Life Satisfaction. Optimism and Self-Esteem positively contribute to life satisfaction. Perceived Stress negatively impacts life satisfaction.

Q3: Is there a significant difference in total life satisfaction based having children at home or not?

Statistical test: Independent Samples T-Test.
Why: Because Total Life Satisfaction is a continuous variable. Independent Variable: Children at Home is a categorical variable with two independent groups: Yes and No.

Assumption: The dependent variable (Total Life Satisfaction) should be approximately normally distributed within each group.

Results:

Group Statistics

	child	N	Mean	Std. Deviation	Std. Error Mean
Total life satisfaction	YES	184	23.00	6.641	.490
	NO	251	21.91	6.848	.432

- Respondents with children (M=23.00) reported slightly higher life satisfaction compared to those without children (M=21.91).

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Significance One-Sided p
Total life satisfaction	Equal variances assumed	.055	.815	1.664	433	.048
	Equal variances not assumed			1.672	401.112	.048

- F=0.055, p=0.815, p-value is greater than 0.05, indicates assumption of equal variances is met, confirms the variances between the two groups are equal.

Independent Samples Test

		t-test for Equality of Means			
		Significance Two-Sided p	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower
Total life satisfaction	Equal variances assumed	.097	1.092	.656	-.198
	Equal variances not assumed	.095	1.092	.653	-.192

- t=1.664, p=0.097, p-value is greater than 0.05, the Independent Samples T-Test reveals no significant difference in Total Life Satisfaction between individuals who have children at home and those who do not.

Conclusion: There is no significant difference in total life satisfaction on basis of having children at home or not.

Q4: Does Total life satisfaction differ based on the level of education?

Statistical test: One-Way ANOVA
Why: Dependent Variable (Total Life Satisfaction) is continuous, and Independent Variable (Education Level) is a categorical variable with more than two groups.

Assumption: The dependent variable (Total Life Satisfaction) should be approximately normally distributed within each group.

Result:

Tests of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Total life satisfaction	Based on Mean	.424	4	431	.792
	Based on Median	.329	4	431	.859
	Based on Median and with adjusted df	.329	4	420.837	.859
	Based on trimmed mean	.394	4	431	.813

- p = 0.792: As p>0.05, the assumption of homogeneity of variances is met.

ANOVA

Total life satisfaction

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	421.589	4	105.397	2.328	.056
Within Groups	19512.968	431	45.274		
Total	19934.557	435			

- The difference in Total Life Satisfaction across education levels is **not statistically significant** as p=0.056 (p>0.05)

Conclusion: The total life satisfaction does not differ on the basis of level of education.

Q5: Does Total life satisfaction differ on the basis of the marital status and gender?

Statistical test: Two Way ANOVA
Why: Dependent Variable (Total Life Satisfaction) is continuous, and Independent Variable (marital status and gender) are categorical variables. It allows us Investigate the main effects of both independent variables and examine the interaction effect to see if the effect of one independent variable depends on the levels of the other.

Assumption: The dependent variable (Total Life Satisfaction) should be approximately normally distributed within each group.

Results:

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

		Levene Statistic	df1	df2	Sig.
Total life satisfaction	Based on Mean	.650	14	421	.822
	Based on Median	.682	14	421	.792
	Based on Median and with adjusted df	.682	14	406.232	.792
	Based on trimmed mean	.628	14	421	.842

- p = 0.822 (p>0.05), the assumption of homogeneity of variances is met.

Tests of Between-Subjects Effects

Dependent Variable: Total life satisfaction

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1819.835[a]	14	129.988	3.021	<.001	.091
Intercept	71093.201	1	71093.201	1652.260	<.001	.797
sex	18.739	1	18.739	.436	.510	.001
marital	1222.930	7	174.704	4.060	<.001	.063
sex * marital	140.090	6	23.348	.543	.776	.008
Error	18114.722	421	43.028			

Total	238281.000	436				
Corrected Total	19934.557	435				

- F=4.060, p<0.001: Marital Status significantly affects Total Life Satisfaction.
- F=0.436, p=0.510: No significant main effect of Gender on Life Satisfaction.
- F=0.543, p=0.776: The interaction between Marital Status and Gender is not significant, indicates that the effect of Marital Status on Life Satisfaction is consistent across genders.

Multiple Comparisons

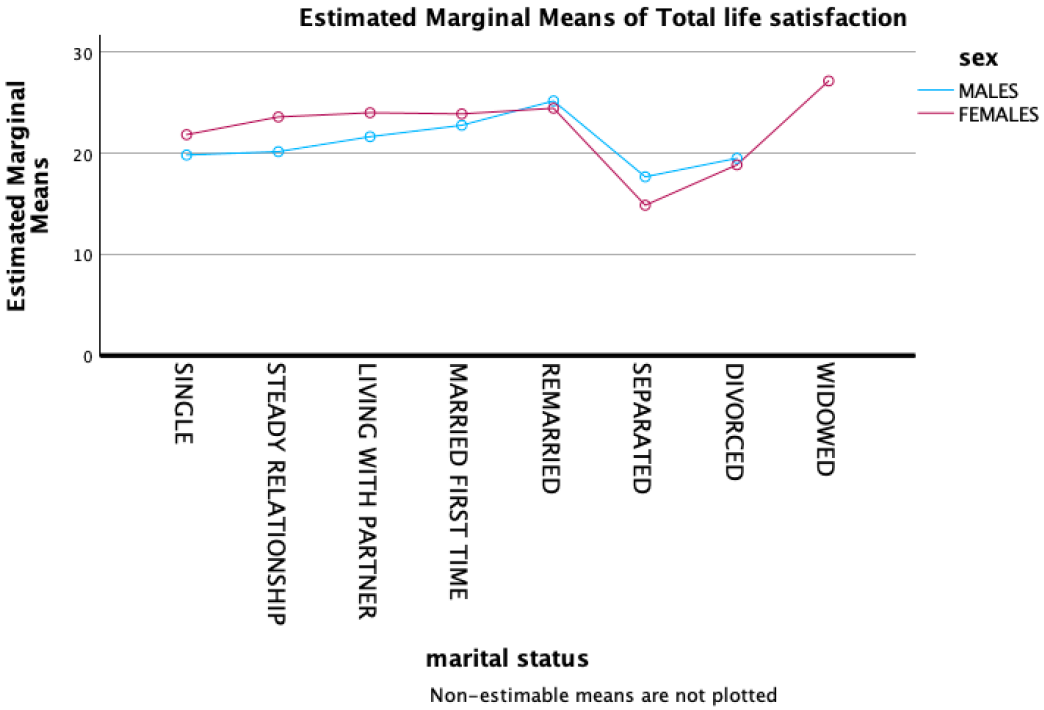
Dependent Variable: Total life satisfaction
Tukey HSD

					95% Confidence Interval	
(I) marital status	(J) marital status	Mean Difference (I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
SINGLE	STEADY RELATIONSHIP	-1.51	1.256	.930	-5.34	2.31
	LIVING WITH PARTNER	-1.88	1.268	.815	-5.75	1.98
	MARRIED FIRST TIME	-2.52*	.802	.038	-4.96	-.08
	REMARRIED	-3.87	1.359	.087	-8.01	.27
	SEPARATED	5.17	2.172	.255	-1.45	11.78
	DIVORCED	1.91	1.485	.905	-2.62	6.43
	WIDOWED	-6.28	2.561	.220	-14.08	1.53
STEADY RELATIONSHIP	SINGLE	1.51	1.256	.930	-2.31	5.34
	LIVING WITH PARTNER	-.37	1.536	1.000	-5.05	4.31
	MARRIED FIRST TIME	-1.00	1.180	.990	-4.60	2.59
	REMARRIED	-2.35	1.612	.827	-7.26	2.55
	SEPARATED	6.68	2.338	.084	-.44	13.80
	DIVORCED	3.42	1.719	.490	-1.82	8.66
	WIDOWED	-4.76	2.704	.646	-13.00	3.47
LIVING WITH PARTNER	SINGLE	1.88	1.268	.815	-1.98	5.75
	STEADY RELATIONSHIP	.37	1.536	1.000	-4.31	5.05
	MARRIED FIRST TIME	-.63	1.193	.999	-4.27	3.00
	REMARRIED	-1.98	1.622	.925	-6.92	2.96
	SEPARATED	7.05	2.345	.056	-.09	14.19
	DIVORCED	3.79	1.729	.358	-1.47	9.06
	WIDOWED	-4.39	2.710	.737	-12.65	3.86
MARRIED FIRST TIME	SINGLE	2.52*	.802	.038	.08	4.96
	STEADY RELATIONSHIP	1.00	1.180	.990	-2.59	4.60
	LIVING WITH PARTNER	.63	1.193	.999	-3.00	4.27
	REMARRIED	-1.35	1.290	.967	-5.28	2.58
	SEPARATED	7.68*	2.129	.008	1.20	14.17
	DIVORCED	4.42*	1.422	.041	.09	8.76
	WIDOWED	-3.76	2.525	.813	-11.45	3.93
REMARRIED	SINGLE	3.87	1.359	.087	-.27	8.01
	STEADY RELATIONSHIP	2.35	1.612	.827	-2.55	7.26
	LIVING WITH PARTNER	1.98	1.622	.925	-2.96	6.92
	MARRIED FIRST TIME	1.35	1.290	.967	-2.58	5.28
	SEPARATED	9.03*	2.395	.005	1.74	16.33
	DIVORCED	5.78*	1.796	.030	.30	11.25
	WIDOWED	-2.41	2.753	.988	-10.80	5.98
SEPARATED	SINGLE	-5.17	2.172	.255	-11.78	1.45
	STEADY RELATIONSHIP	-6.68	2.338	.084	-13.80	.44
	LIVING WITH PARTNER	-7.05	2.345	.056	-14.19	.09
	MARRIED FIRST TIME	-7.68*	2.129	.008	-14.17	-1.20
	REMARRIED	-9.03*	2.395	.005	-16.33	-1.74
	DIVORCED	-3.26	2.469	.891	-10.78	4.26
	WIDOWED	-11.44*	3.233	.010	-21.29	-1.60
DIVORCED	SINGLE	-1.91	1.485	.905	-6.43	2.62
	STEADY RELATIONSHIP	-3.42	1.719	.490	-8.66	1.82
	LIVING WITH PARTNER	-3.79	1.729	.358	-9.06	1.47
	MARRIED FIRST TIME	-4.42*	1.422	.041	-8.76	-.09
	REMARRIED	-5.78*	1.796	.030	-11.25	-.30
	SEPARATED	3.26	2.469	.891	-4.26	10.78
	WIDOWED	-8.18	2.818	.074	-16.77	.40
WIDOWED	SINGLE	6.28	2.561	.220	-1.53	14.08
	STEADY RELATIONSHIP	4.76	2.704	.646	-3.47	13.00
	LIVING WITH PARTNER	4.39	2.710	.737	-3.86	12.65

	MARRIED FIRST TIME	3.76	2.525	.813	-3.93	11.45
	REMARRIED	2.41	2.753	.988	-5.98	10.80
	SEPARATED	11.44*	3.233	.010	1.60	21.29
	DIVORCED	8.18	2.818	.074	-.40	16.77

- Significant differences are observed between certain marital status groups, Married (First Time) individuals report significantly higher life satisfaction than Single or Divorced individuals.

Profile Plots



- The profile plot illustrates the estimated marginal means of Total Life Satisfaction across Marital Status and Gender, Life satisfaction varies significantly by Marital Status, while gender differences within each marital status are minimal.

Conclusion: Yes Life satisfaction significantly differs across marital statuses, married individuals report higher life satisfaction than Single or Divorced individuals. But no significant difference in life satisfaction between males and females, same for interaction between marital status and gender.