Analysis Report

This report is structured as follows.

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Multinomial Logistic Regression Models

A multinomial logistic regression was conducted using the VGAM package in R to examine the predictors of life satisfaction, with "Very Dissatisfied" as the reference category for the dependent variable (Life Satisfaction). The model used was a multinomial logistic regression model, which is suitable for predicting categorical outcomes with more than two levels. The analysis was performed using the `vglm` function from the VGAM package, specifying "Very Dissatisfied" as the reference category.

The model's performance was evaluated with several fit statistics, including deviance (42720.44), log-likelihood (-21360.22), and residual deviance (105561.12). The model used 33 parameters and 8 iterations to reach convergence.

Deviance	Log Likelihood	Residual Deviance	DF_Residual	DF_Total	Iterations	Rank
42720.439	-21360.219	105561.124	82323	82356	8	33

The Variance Inflation Factor (VIF) analysis was conducted to assess multicollinearity among the independent variables used in the multinomial logistic regression model. The VIF values for all predictors were well below the commonly accepted threshold of 5, indicating that multicollinearity is not a concern in this dataset. Specifically, the VIF values ranged from 1.01 (for **SEX_A_Female**) to 1.22 (for **PA18_05R_A_Meets_both_criteria**), demonstrating that there is little to no linear dependency among the predictors.

The results of the model are shown below.

Index	B	Std. Error	z value	Pr(>|z|)	Odds Ratios
(Intercept): Dissatisfied	1.828	0.358	5.108	0.000	6.222
(Intercept): Satisfied	1.652	0.324	5.092	0.000	5.216
(Intercept): Very Satisfied	-1.953	0.330	-5.919	0.000	0.142
General Health Status : Dissatisfied	0.017	0.073	0.232	0.817	1.017
General Health Status : Satisfied	0.839	0.066	12.652	0.000	2.314
General Health Status : Very Satisfied	1.568	0.067	23.271	0.000	4.796
Age : Dissatisfied	-0.007	0.004	-1.611	0.107	0.993
Age : Satisfied	-0.001	0.004	-0.160	0.873	0.999
Age : Very Satisfied	0.012	0.004	3.271	0.001	1.013
Sex Female: Dissatisfied	-0.395	0.144	-2.745	0.006	0.674
Sex Female: Satisfied	-0.374	0.130	-2.868	0.004	0.688
Sex Female: Very Satisfied	-0.260	0.131	-1.978	0.048	0.771
Race Asian_only: Dissatisfied	-0.197	0.394	-0.501	0.617	0.821
Race Asian_only: Satisfied	0.616	0.345	1.788	0.074	1.852
Race Asian_only: Very Satisfied	0.211	0.347	0.609	0.542	1.235

Index	B	Std. Error	z value	Pr(>|z|)	Odds Ratios
Race Black_African_American_only: Dissatisfied	0.115	0.220	0.521	0.602	1.121
Race Black_African_American_only: Satisfied	0.357	0.199	1.790	0.073	1.429
Race Black_African_American_only: Very Satisfied	0.224	0.201	1.112	0.266	1.251
Race Other: Dissatisfied	0.040	0.260	0.153	0.878	1.041
Race Other: Satisfied	0.274	0.235	1.163	0.245	1.315
Race Other: Very Satisfied	0.121	0.238	0.510	0.610	1.129
Physical Activity Meets_aerobic_only: Dissatisfied	-0.088	0.200	-0.443	0.657	0.915
Physical Activity Meets_aerobic_only: Satisfied	0.154	0.178	0.868	0.386	1.167
Physical Activity Meets_aerobic_only: Very Satisfied	0.354	0.179	1.979	0.048	1.425
Physical Activity Meets_both_criteria: Dissatisfied	0.161	0.252	0.639	0.523	1.175
Physical Activity Meets_both_criteria: Satisfied	0.255	0.230	1.108	0.268	1.290
Physical Activity Meets_both_criteria: Very Satisfied	0.520	0.230	2.258	0.024	1.683
Physical Activity Meets_strength_only: Dissatisfied	0.724	0.387	1.872	0.061	2.063
Physical Activity Meets_strength_only: Satisfied	0.811	0.365	2.223	0.026	2.251
Physical Activity Meets_strength_only: Very Satisfied	0.889	0.367	2.425	0.015	2.433
Physical Activity Not_Ascertained: Dissatisfied	-0.153	0.310	-0.495	0.621	0.858
Physical Activity Not_Ascertained: Satisfied	-0.159	0.276	-0.578	0.563	0.853
Physical Activity Not_Ascertained: Very Satisfied	-0.179	0.280	-0.640	0.522	0.836

Several significant predictors of life satisfaction were identified. General Health Status had a substantial impact on life satisfaction. Specifically, individuals reporting better health were significantly more likely to report higher life satisfaction. Compared to those who were "Very Dissatisfied," those with better health had significantly higher odds of being "Satisfied" ($B = 0.839$, $z = 12.652$, $p < 0.001$, $OR = 2.314$) and "Very Satisfied" ($B = 1.568$, $z = 23.271$, $p < 0.001$, $OR = 4.796$). This indicates that individuals with better health are substantially more likely to report higher life satisfaction.

Age was also a significant predictor of life satisfaction, but its effect was more modest. Older individuals had slightly higher odds of being "Very Satisfied" compared to "Very Dissatisfied" ($B = 0.012$, $z = 3.271$, $p = 0.001$, $OR = 1.013$), though age did not significantly differentiate between "Satisfied" and "Very Dissatisfied" or "Dissatisfied" and "Very Dissatisfied."

Sex was a significant predictor of life satisfaction, with females being less likely to report higher satisfaction levels compared to the reference group. Females had significantly lower odds of being "Dissatisfied" ($B = -0.395$, $z = -2.745$, $p = 0.006$, $OR = 0.674$) and "Satisfied" ($B = -0.374$, $z = -2.868$, $p = 0.004$, $OR = 0.688$) compared to "Very Dissatisfied." Females were also less likely to report being "Very Satisfied" compared to the reference category ($B = -0.260$, $z = -1.978$, $p = 0.048$, $OR = 0.771$), indicating a generally lower likelihood of reporting higher satisfaction levels compared to males.

Physical activity also played a significant role in predicting life satisfaction. Individuals who met both aerobic and strength activity guidelines had significantly higher odds of being "Very Satisfied"

compared to "Very Dissatisfied" (B = 0.520, z = 2.258, p = 0.024, OR = 1.683). Similarly, those who only met the strength activity criteria were more likely to report being "Satisfied" (B = 0.811, z = 2.223, p = 0.026, OR = 2.251) and "Very Satisfied" (B = 0.889, z = 2.425, p = 0.015, OR = 2.433), highlighting the positive relationship between physical activity and life satisfaction.

Race was less consistently related to life satisfaction, with most comparisons failing to reach statistical significance. However, individuals who identified as Asian had marginally higher odds of being "Satisfied" compared to "Very Dissatisfied" (B = 0.616, z = 1.788, p = 0.074, OR = 1.852), though this result was not statistically significant at the conventional $p < 0.05$ threshold.

In summary, the multinomial logistic regression model identified several significant predictors of life satisfaction, including general health status, age, sex, and physical activity. General health and physical activity were strong positive predictors of higher life satisfaction, while females were less likely to report higher satisfaction levels. These findings provide valuable insights into the factors associated with life satisfaction.

SPSS Analysis

A multinomial logistic regression was conducted to examine the predictors of life satisfaction, with "Very Dissatisfied" as the reference category. The analysis included variables such as age, general health status (PHSTAT_A), sex, race, physical activity, and employment status. The sample consisted of 27,452 respondents, with 50.9% reporting being "Satisfied" and 44.6% being "Very Satisfied" with life.

Case Processing Summary

		N	Marginal Percentage
LSATIS4_A	Dissatisfied	963	3.5%
	Satisfied	13985	50.9%
	Very dissatisfied	264	1.0%
	Very satisfied	12240	44.6%
EMPWRKFT1_A		12209	44.5%
	No	2935	10.7%
	Yes	12308	44.8%
Valid		27452	100.0%
Missing		0	
Total		27452	
Subpopulation		9618[a]	

a. The dependent variable has only one value observed in 6497 (67.6%) subpopulations.

The model fit statistics suggest that the model fits the data well. The likelihood ratio test comparing the final model to the intercept-only model was significant, $\chi^2(36) = 4892.55$, $p < .001$, indicating that the predictors significantly improve the model. The pseudo R-squares suggest that the model accounts for a modest amount of variation in life satisfaction, with Cox and Snell $R^2 = .163$, Nagelkerke $R^2 = .198$, and McFadden $R^2 = .103$.

Model Fitting Information

	Model Fitting Criteria	Likelihood Ratio Tests		
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	28725.391			
Final	23832.840	4892.551	36	.000

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	36893.596	28815	.000
Deviance	16867.609	28815	1.000

Pseudo R-Square	
Cox and Snell	.163
Nagelkerke	.198
McFadden	.103

Age was found to be a significant predictor for individuals reporting being "Satisfied" (B = .008, p = .044, OR = 1.008) and "Very Satisfied" (B = .021, p < .001, OR = 1.022), indicating that older individuals are more likely to report higher life satisfaction compared to those who are "Very Dissatisfied."

General health status (PHSTAT_A) was a strong predictor of life satisfaction. Compared to those who are "Very Dissatisfied," individuals with better health were significantly more likely to report being "Satisfied" (B = .758, p < .001, OR = 2.134) and "Very Satisfied" (B = 1.487, p < .001, OR = 4.425). This highlights the importance of perceived health in determining life satisfaction.

Sex also played a role, with females being significantly less likely to report being "Dissatisfied" (B = -.381, p = .008, OR = .683) and "Satisfied" (B = -.314, p = .017, OR = .730) compared to males. However, sex was not a significant predictor for the "Very Satisfied" group (p = .140).

Physical activity was another important factor. Individuals who met strength-only activity guidelines were significantly more likely to report being "Satisfied" (B = .807, p = .027, OR = 2.241) and "Very Satisfied" (B = .885, p = .016, OR = 2.423) compared to those who were "Very Dissatisfied." Similarly, those who met both aerobic and strength guidelines were more likely to report being "Very Satisfied" (B = .492, p = .033, OR = 1.636).

Interestingly, employment status showed a significant impact for the "Satisfied" and "Very Satisfied" groups. For individuals with missing employment responses, the odds of being "Very Satisfied" were significantly lower compared to those who responded (B = -.878, p < .001, OR = .416). This effect was also observed in the "Satisfied" group (B = -.858, p < .001, OR = .424), indicating that missing employment information is associated with lower satisfaction.

Parameter Estimates

LSATIS4_A[a]		B	Std. Error	Wald	df	Sig.	Exp(B)
Dissatisfied	Intercept	1.909	.364	27.531	1	.000	
	AGEP_A	-.004	.004	.880	1	.348	.996
	PHSTAT_A	-.004	.075	.003	1	.959	.996
	SEX_A_Female	-.381	.145	6.941	1	.008	.683
	RACEALLP_A_Asian_only	-.199	.394	.254	1	.614	.820
	RACEALLP_A_Black_African_American_only	.116	.220	.278	1	.598	1.123
	RACEALLP_A_Other	.041	.261	.025	1	.874	1.042
	PA18_05R_A_Meets_aerobic_only	-.088	.200	.196	1	.658	.915
	PA18_05R_A_Meets_both_criteria	.149	.253	.348	1	.555	1.161
	PA18_05R_A_Meets_strength_only	.722	.387	3.476	1	.062	2.058
	PA18_05R_A_Not_Ascertained	-.105	.313	.112	1	.737	.900
	[EMPWRKFT1_A=]	-.262	.200	1.724	1	.189	.769
	[EMPWRKFT1_A=No]	-.051	.300	.029	1	.864	.950
	[EMPWRKFT1_A=Yes]	0[b]	.	.	0	.	.
Satisfied	Intercept	1.897	.330	33.046	1	.000	
	AGEP_A	.008	.004	4.059	1	.044	1.008
	PHSTAT_A	.758	.067	127.200	1	.000	2.134
	SEX_A_Female	-.314	.131	5.741	1	.017	.730
	RACEALLP_A_Asian_only	.617	.345	3.193	1	.074	1.853
	RACEALLP_A_Black_African_American_only	.371	.200	3.449	1	.063	1.449
	RACEALLP_A_Other	.281	.236	1.414	1	.234	1.324
	PA18_05R_A_Meets_aerobic_only	.154	.178	.752	1	.386	1.167
	PA18_05R_A_Meets_both_criteria	.226	.230	.963	1	.326	1.253
	PA18_05R_A_Meets_strength_only	.807	.365	4.881	1	.027	2.241
	PA18_05R_A_Not_Ascertained	.054	.279	.037	1	.847	1.055
	[EMPWRKFT1_A=]	-.858	.181	22.402	1	.000	.424
	[EMPWRKFT1_A=No]	-.297	.273	1.185	1	.276	.743
	[EMPWRKFT1_A=Yes]	0[b]	.	.	0	.	.
Very satisfied	Intercept	-1.708	.335	25.934	1	.000	
	AGEP_A	.021	.004	27.880	1	.000	1.022
	PHSTAT_A	1.487	.068	475.311	1	.000	4.425
	SEX_A_Female	-.195	.132	2.176	1	.140	.823
	RACEALLP_A_Asian_only	.211	.347	.371	1	.543	1.236
	RACEALLP_A_Black_African_American_only	.238	.202	1.387	1	.239	1.268
	RACEALLP_A_Other	.130	.239	.296	1	.586	1.139
	PA18_05R_A_Meets_aerobic_only	.355	.179	3.931	1	.047	1.426
	PA18_05R_A_Meets_both_criteria	.492	.231	4.542	1	.033	1.636
	PA18_05R_A_Meets_strength_only	.885	.367	5.817	1	.016	2.423

PA18_05R_A_Not_Ascertained	.038	.283	.018	1	.892	1.039
[EMPWRKFT1_A= Missing Response]	-.878	.182	23.143	1	.000	.416
[EMPWRKFT1_A=No]	-.368	.274	1.799	1	.180	.692
[EMPWRKFT1_A=Yes]	0[b]	.	.	0	.	.

a. The reference category is: Very dissatisfied.

b. This parameter is set to zero because
it is redundant.