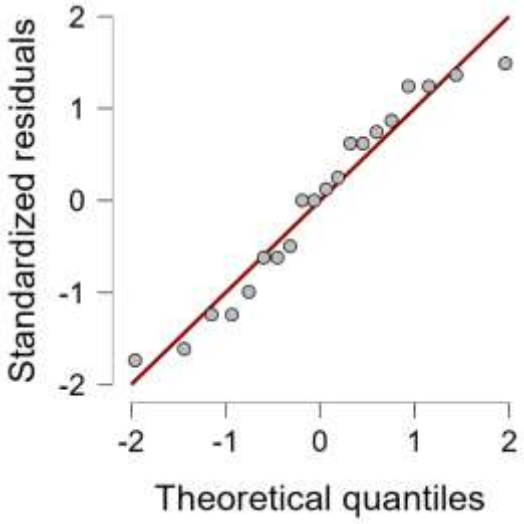
CHECK THE ASSUMPTIONS

Q-Q Plot



Utilizing Q-Q Plot to interpret our normality, shows that the data points closely follow the red line, indicating that the residuals are approximately normally distributed. Thus, this subject for assumption of normality is met.

Assumption Checks

Test for Equality of Variances (Levene's)

F	df1	df2	p
0.322	3.000	16.000	0.809

Analyzing our Variances using Levene's Test, with our p-value = 0.809 shows that there are no significant findings across the groups. Thus, this satisfied the assumption of homogeneity of variances.

Additionally, the assumption of independence is met because each participant's data was collected without influencing others. This means that the results from one participant do not affect the results of another.

ANOVA

ANOVA - Weight Loss (kg)

Cases	Sum of Squares	df	Mean Square	F	p	η^2_p	ω^2
Diet Type	7.442	1	7.442	228.985	< .001	0.935	0.240
Exercise Intensity	22.898	1	22.898	704.554	< .001	0.978	0.740
Diet Type ✻ Exercise Intensity	0.008	1	0.008	0.246	0.627	0.015	0.000
Residuals	0.520	16	0.033				

Note. Type III Sum of Squares

With an F-value of 228.985 and a p-value less than 0.001, the two-way ANOVA showed significant main effects for both Diet Type, demonstrating that this factor has a significant impact on weight reduction. With an F-value of 704.554 and a p-value less than 0.001, exercise intensity also had a significant effect, indicating that increased exercise intensity results in more weight reduction. The influence of diet on weight loss is independent of exercise intensity, as seen by the lack of a significant interaction between food type and exercise intensity.

Post Hoc Tests

Standard (LSD)

Post Hoc Comparisons - Diet Type ✻ Exercise Intensity

		Mean Difference	SE	t	p_{tukey}
(Low-Carb Low Intensity)	(Low-Fat Low Intensity)	1.180	0.114	10.349	< .001
	(Low-Carb High Intensity)	-2.180	0.114	-19.120	< .001
	(Low-Fat High Intensity)	-0.920	0.114	-8.069	< .001
(Low-Fat Low Intensity)	(Low-Carb High Intensity)	-3.360	0.114	-29.469	< .001
	(Low-Fat High Intensity)	-2.100	0.114	-18.418	< .001
(Low-Carb High Intensity)	(Low-Fat High Intensity)	1.260	0.114	11.051	< .001

Note. P-value adjusted for comparing a family of 4

Post Hoc Comparisons - Diet Type

		Mean Difference	SE	t	p_{tukey}
(Low-Carb)	(Low-Fat)	1.220	0.081	15.132	< .001

Note. Results are averaged over the levels of: Exercise Intensity

Post Hoc Comparisons - Exercise Intensity

		Mean Difference	SE	t	p_{tukey}
Low Intensity	High Intensity	-2.140	0.081	-26.543	< .001

Note. Results are averaged over the levels of: Diet Type

Analyzing our post-hoc, shows that the comparisons have p-values less than.001, which indicates great statistical significance. The Low-Carb High Intensity group lost much less weight than the Low-Fat Low Intensity group, however those on the Low-Carb Low Intensity diet lost significantly more weight than those on the Low-Fat Low Intensity diet. Furthermore, compared to low intensity exercise, high intensity exercise resulted in much more weight reduction, indicating that exercise intensity and diet type have a major impact on weight loss outcomes.

Simple Main Effects

Simple Main Effects - Exercise Intensity

Level of Diet Type	Sum of Squares	df	Mean Square	F	p
Low-Carb	11.881	1	11.881	365.569	< .001
Low-Fat	11.025	1	11.025	339.231	< .001

INTERPRET THE RESULTS (F-statistics, p-values, and effect sizes for the main effects and interaction)

According to the simple main effects analysis exercising affects he weight reduction for both diet types. As such, participants on the Low-Carb diet had an F-statistic of 365.569, while those on the Low-Fat diet had an F-statistic of 339.231, both with p-values less than.001. This implies that variations in exercise intensity have a significant effect on weight loss results independent of the kind of food.

Additionally, the analysis utilized a Q-Q plot to confirm the assumption of normality, showing that the residuals were approximately normally distributed. Levene's test indicated no significant variance across groups, satisfying the homogeneity of variances assumption. A two-way ANOVA revealed significant main effects for both Diet Type and Exercise Intensity on weight loss, with F-values of 228.985 and 704.554, respectively, and no significant interaction effect. Post-hoc comparisons indicated significant differences, with the Low-Carb High Intensity group losing less weight than the Low-Fat Low Intensity group, while those on the Low-Carb Low Intensity diet lost significantly more weight. Additionally, high intensity exercise led to greater weight reduction compared to low intensity, demonstrating the significant influence of both diet type and exercise intensity on weight loss outcomes.