What Does Self-Reported Likability for Fruit and Vegetables Tell Us About Skin Carotenoid Levels?

Kurtis Hauck , Madison Hauck, Damon Joyner, Heidi Wengreen; Utah State University, Logan, UT

UtahState University
DEPARTMENT OF BIOLOGY

Introduction

In most cases, individuals who have a higher likeability of fruits and vegetables will consume more and reap health-related benefits because of it. However, other factors influence how the body digests, absorbs, and metabolizes the beneficial nutrients found in fruits and vegetables. Biomarkers, like carotenoids are measurable indicators of some biological state or condition. They can be helpful in understanding the relationships between dietary intake of nutrients and the other factors that may influence how a nutrient is being used in the body. Other factors known to influence skin carotenoids include body composition, exposure to environmental pollutants, or illness.

Carotenoids give the bright red, orange, and yellow hues to many commonly consumed fruits and vegetables and can be used to track overall fruit and vegetable intake in an individual. Carotenoids are powerful antioxidant agents with properties that lower your risk of cardiovascular diseases, diabetes, and certain types of cancer. They also improve vision and skin protection.

Objective

The objective of this study is to determine whether or not self-reported likeability of fruits and vegetables affects skin carotenoid levels. The data collected for this study was taken from a school-based intervention aimed at getting children to eat more fruits and vegetables. However, the focus of the data here will be the cross-sectional correlations between children's self-reported likeability of fruits and vegetables and their skin carotenoid concentrations. The hypothesis is that children who report they enjoy eating fruits and vegetables will have higher skin carotenoid concentrations than children who report that they do not. A secondary objective is to identify any other factors that may also influence Carotenoid levels.
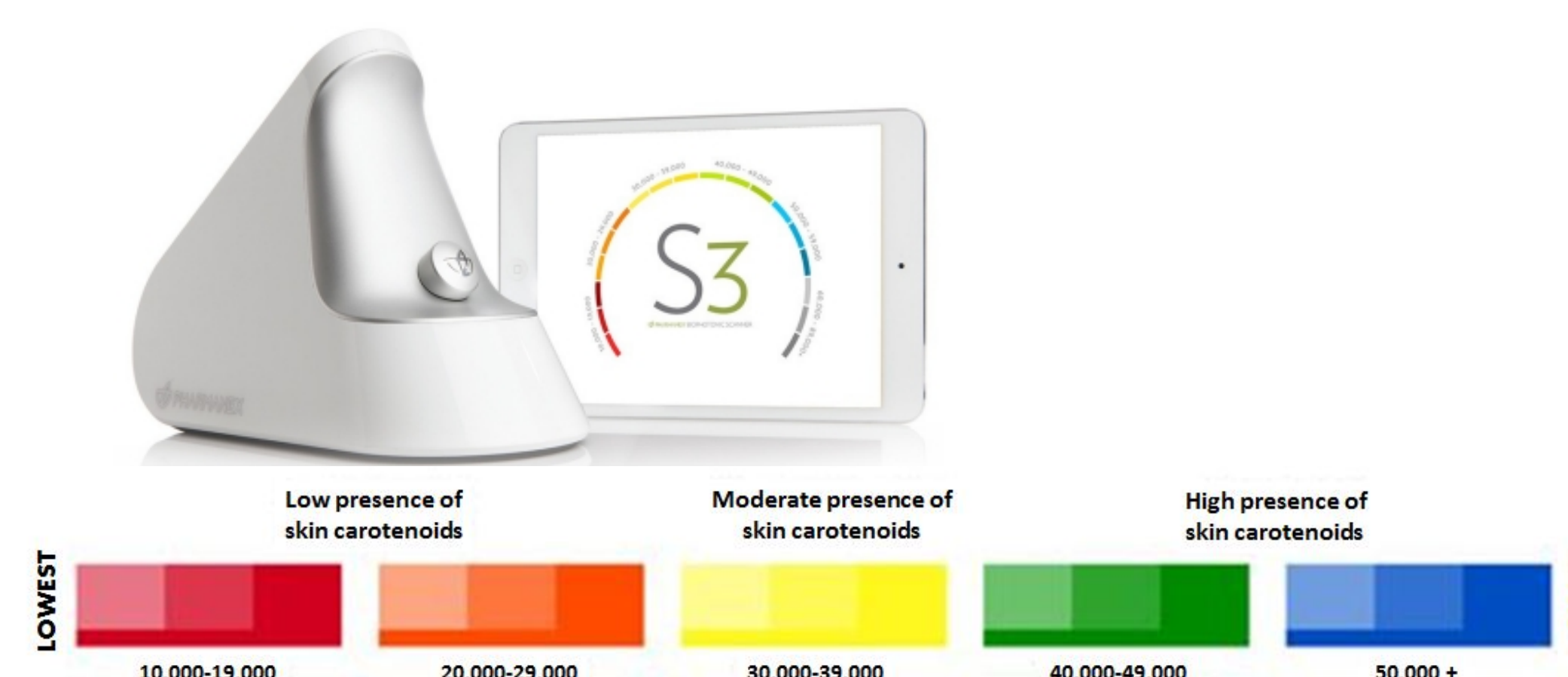
Table 1. Demographics (N = 367)

	School 1	School 2	P-value
Gender			0.59
Male	94 (50.5%)	90 (49.5%)	
Female	92 (49.5%)	91 (50.5%)	
Weight (kg)	31	31	0.86
Height (cm)	133	132	0.50
Skin carotenoid conc.	31671	29477	0.15
Self-reported likeability of vegetables	44.9	44.0	0.26

Methods

340 children from two different elementary schools took part in the study (Table 1). All of the procedures used in the project were approved by USU's IRB. Parents provided consent for their child to participate and children provided assent.

The data collection began with taking the biometric data (height, weight, ect.) from each child, followed by a survey to assess each child's likeability of 14 specific fruits and vegetables. Each of the 14 likeability questions were rated on a scale of 1 ("Don't like") to 4 ("Strongly like"). The highest score possible was 56 points, meaning the child "strongly liked" all 14 of the possible fruits and vegetables.

In addition, all of the children surveyed had their carotenoid levels measured using a biophotonic scanner. The Biophotonic Scanner (NuSkin, LLC) is the size of a small household appliance. It uses raman spectroscopy to measure the concentration of carotenoids in the palm of the child's hand. Raman spectroscopy is the process of using Raman scattering of monochromatic light to identify low frequencies of vibration between a photon and a molecule. These movements can be picked up using a laser that reads the changes in energy levels. This can be used to assess the overall levels of carotenoids in the tissues of the skin.

| LOWEST	Low presence of skin carotenoids	Moderate presence of skin carotenoids	High presence of skin carotenoids	HIGHEST
	10,000-19,000	20,000-29,000	30,000-39,000	40,000-49,000	50,000 +

Results

The mean likeability and carotenoid levels can be seen in the data table below (Table 2). As seen in the scatter plot to the right (Graph 1), there is an overall positive correlation between self-assessed Likability and the measured carotenoid levels.

Mean differences by group were assessed using Analysis of Variance. The correlation coefficient was r= 0.288, p < 0.001. P values < 0.05 were considered statistically significant.

Table 2. Likeability & Carotenoid Levels

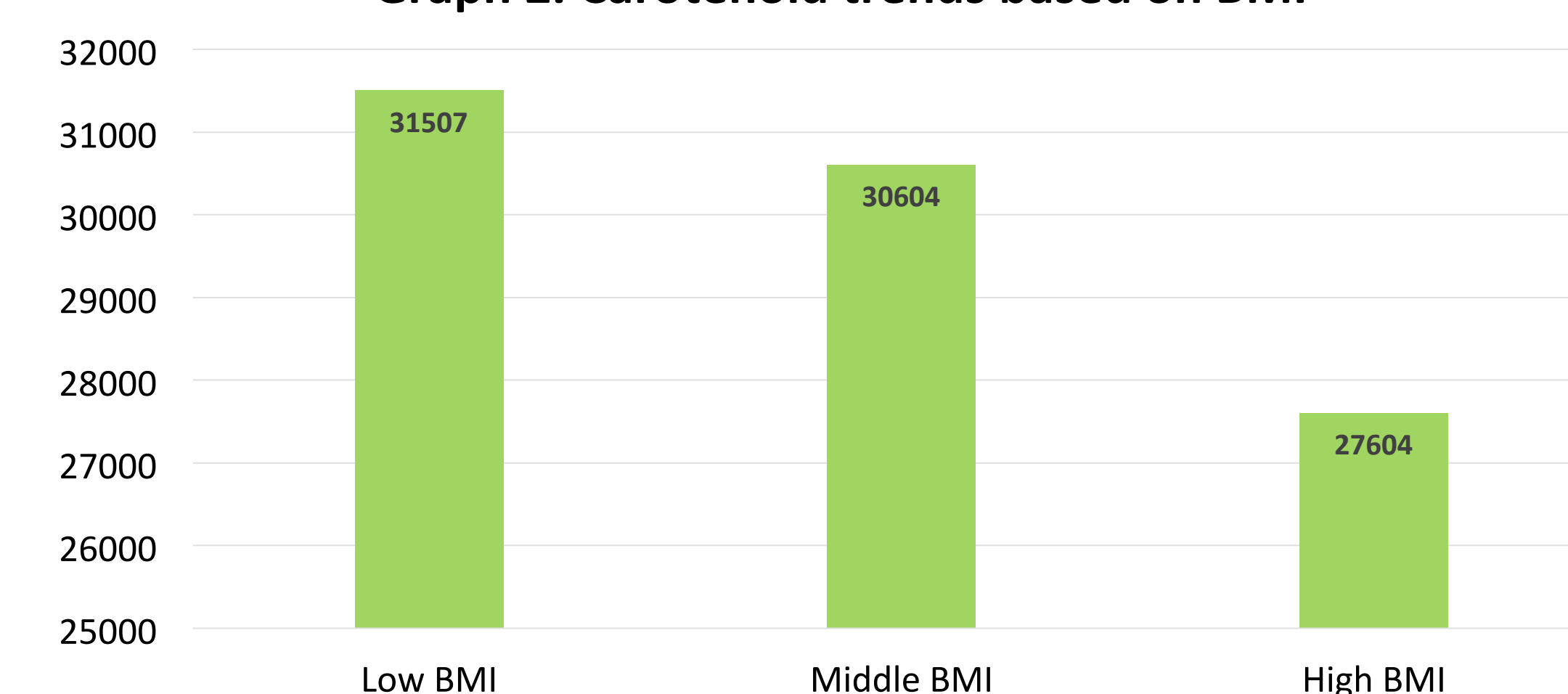|	Likability	Carotenoid
Children (N)	387	340
Mean	44.34	30299
Median	45.00	28629
Std. Deviation	7.974	13359
Minimum	17	10000
Maximum	56	69125

Graph 1. Correlation between Likability and Carotenoid levels
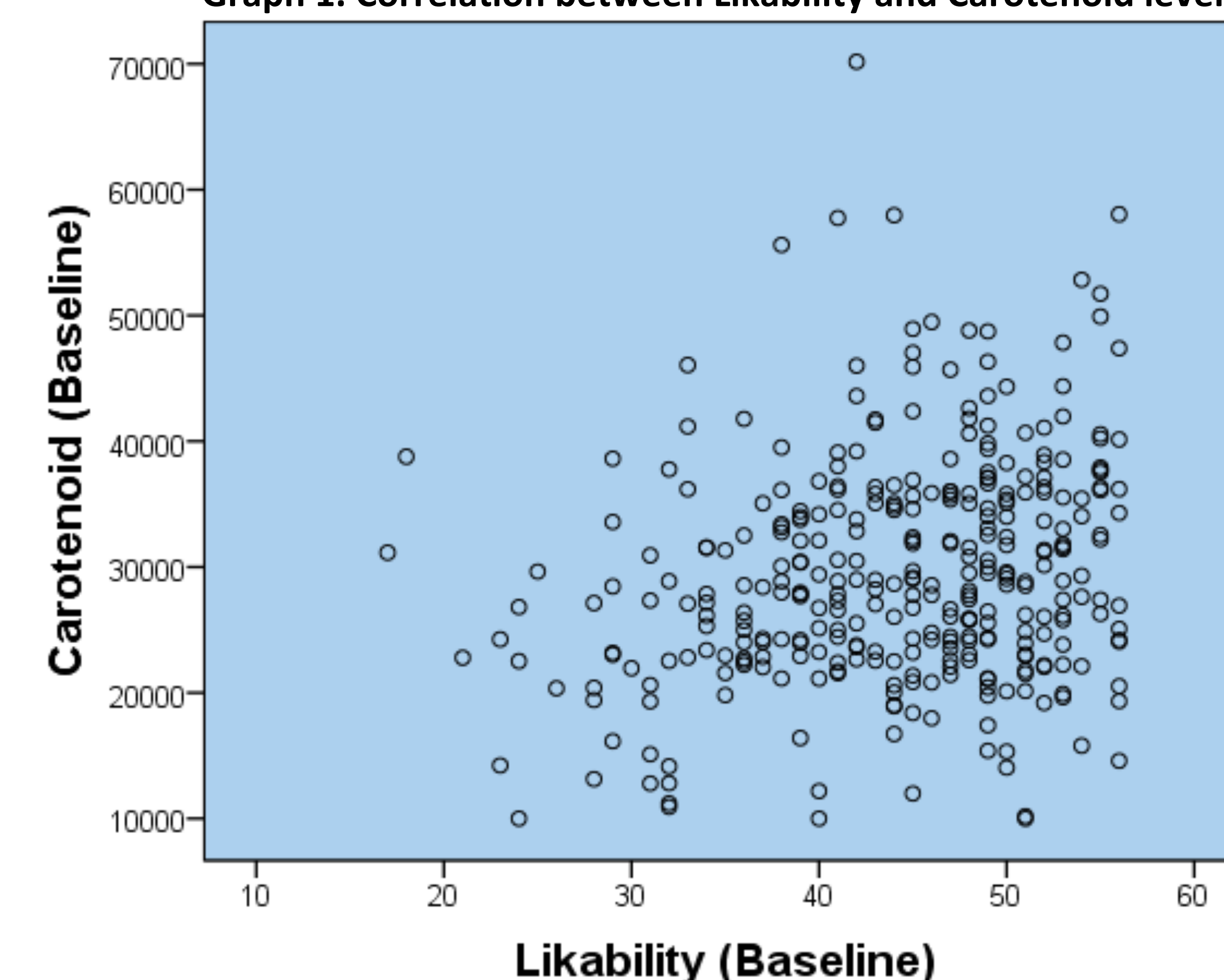
Other factors tested to see if they influenced overall carotenoid levels were grade, sex, and BMI. Neither grade nor sex were associated with skin carotenoid score. However, BMI brought different results. BMI was calculated from measured height and weight and categorized into tertiles of the distribution, as seen in graph 2. Those in the highest BMI tertile had an average of 27604 units, while the tertile with the lowest BMI averaged 31507 units.

Mean skin carotenoids, but not mean likeability, differed by BMI category. (F = 4.873, p < 0.001, F = 0.421, p >0.05, respectively; see Graph 2)

Graph 2. Carotenoid trends based on BMI

Low BMI	Middle BMI	High BMI
31507	30604	27604

Conclusion

Self-reported likeability is positively correlated with skin carotenoid scores in elementary school children. Those that report higher overall likeability of fruits and vegetables tend to have a higher carotenoid level than those who reported a low FV likeability. Helping children to enjoy eating fruits and vegetables more will help them reap the benefits including those than come with having higher skin carotenoid levels. Helping children also lower their BMI may increase those benefits.