

# This or That: A Content Analysis on Whey Protein Powders

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## ABSTRACT

Whey protein powder is a common and popular protein supplement, consumed regularly by those engaged in the health and fitness category. However, due to the variety of whey protein powders available, different appearances on its packaging but all with similar effects, consumers may be swayed by the extrinsic factors of the products packaging. Therefore, this research analyzed marketing strategies: specifically, how the extrinsic factors of whey protein powders correlate with consumer appeal. Despite prior research on product packaging and consumer appeal, whey protein powders are a specific product category that lacks research. A non-experimental, mixed methods, content analysis was utilized where the extrinsic factors of 149 Whey protein powders, sold on Walmart.com, were documented. Online ratings were utilized to determine consumer appeal. Statistical tests were conducted for data analysis, which contributed to the formation of valid conclusions. Basic conclusions include that logo inclusion and placement does influence consumer appeal. From this study, marketers and brand managers of protein powders who are involved with the development process of whey protein powder packaging may be influenced. If stakeholders understand what makes a product appealing, the protein powder packaging can be designed accordingly, resulting in the generation of more revenue and profit.

## Introduction

Gym culture and the health and wellness industry has spiked the public's interest in supplements because they promote muscle growth and repair. One of the most popular products is whey protein powders, which is booming with a market valued at \$5.83 billion (Grand View Research, 2024). This has led to such a glut of products to choose from that anyone walking up and down the aisles of their local GNC could be easily overwhelmed. Is there any way to know which product is better than another? Marketing teams work overtime brainstorming how to help consumers make that decision by reaching for the whey protein powder wrapped in the most eye-catching packaging. The following analysis investigated the relationship between the external packaging and, with data from previous studies as a base, evaluated how those extrinsic factors influence consumers' belief in a product's quality. In order to verify consumer response to the product, credible online customer ratings of whey protein powder packaging were used. The driving research question behind this analysis was: How do the variations of extrinsic packaging components of whey protein powders sold on Walmart.com affect consumer appeal based on online customer ratings?

## Literature Review

### Product Packaging and Extrinsic Factors Associated with Consumer Appeal

Studies show that the appearance of a product at first glance influences consumer appeal. This was a central notion investigated in the study titled "Place the Logo High or Low? Using Conceptual Metaphors of Power in

Packaging Design,” which detailed how researchers examined the spatial relationship between where a logo is placed on a product and its impact on consumer purchase. While logo visibility was already established as an influence on consumer purchase, these researchers made the correlation between where the logo was placed on the product and consumer purchase. Specifically, they found that “consumers intuitively link the concept of power with height” (Sundar & Noseworthy, 2023, p. 138). They concluded that consumers respond better to logos that were positioned higher up on the packaging because the height of that visual field infers the concepts of power, goodness, and even morality (Sundar & Noseworthy, 2023, p. 2). Though this study was specific to chocolate candies and coffee, it is nonetheless strategic information for companies to use when aiming to “capitalize on their brand’s standing in the marketplace” (Sundar & Noseworthy, 2023, p. 2). These conclusions can be applied generally to all products with logos including whey protein powders, as the data shows that any product with a logo that is placed higher will appeal to more consumers, leading to more purchases.

Studies also show that the presence of a picture on a product influences its appeal to consumers. Building on prior research that showed “package form, function, and appearance can have a powerful effect on consumers’ responses to a product” (Underwood & Klein, 2002, p. 59), researchers in 2002 evaluated the relationship between the presence of an image on packaging and appeal. They found that images communicate information that impacts consumers’ beliefs about a brand and concluded that consumers were more positive about brands that had pictures. This “provides evidence that consumers use packaging, an extrinsic cue, to infer intrinsic product attributes” (Underwood & Klein, 2002, p. 58). This link between images and positive consumer response is broadly applicable, which is why it is included in this evaluation of the consumer selection process of whey protein powders.

In fact, the presence and location of images on a product’s packaging has been shown to influence consumer appeal across all products. A team of four researchers aimed to discover more about what most influences consumer purchase by engaging 250 participants in a self-reported questionnaire about their perceptions of color, material, graphics, size, and shape of product packaging in general. The fact that their query was not specific to a particular product lends broader use to the results, which was that an image that is identifiable to a “brand can help to draw the attention of consumers [and] help to influence the consumers’ purchase intention” (Yeo et al., 2020, p. 859). Similarly to Underwood and Klein (2002), Sundar and Noseworthy (2014), this study underscored how image placement and location on a product’s packaging can influence consumer perception about that product.

Furthermore, location of imagery impacts consumers’ impression of a product’s smell and weight. Similarly to Underwood and Klein (2002), a study conducted in 2013 titled “Light as a Feather: Effects of Packaging Imagery on Sensory Product Impressions and Brand Evaluation” focused on imagery placement, but their product of focus was powdered washing detergents. They found that, similar to the Sundar and Noseworthy (2014), visuals impact “brand image formation and consumer preference” (van Rompay et al., 2014, p. 397). Specifically, consumers preferred visuals in the top left versus the bottom right and rated products with those placements higher because they linked location of visuals with the smell and weight of that product. This led the researchers to conclude that the position of images on packaging not only influenced consumer perspectives on a product’s smell but that, when the image was located on the bottom right, participants perceived the product as heavier. This further underscores the influence of packaging on consumer perceptions of a product, which is useful information across a spectrum of consumer products, including whey protein.

Another extrinsic factor of products that impacts consumer appeal is shape. In a 2022 conference paper titled “Influence of Packaging Design on the Quality Perception of Chocolate Products,” researchers discussed how their study of chocolate bar packaging demonstrated that consumers equated yellow, pink, and rounded edges with sweetness, black with bitterness, triangular shapes with saltiness, and that, overall, the average consumer preferred a rounded shape to more angular-shaped packaging. Further, they established that “the hue of the colour (sic) can be associated with certain taste properties or can impact the intensity of the product’s taste

when consuming the product" (Dolic et al., 2022, p. 548). The link established in this study between color and appeal is why color was added as an important extrinsic factor to consider in this analysis.

Additional studies of how shape competes to gain consumer attention focused on the relationship between round, square, and curved product packaging and purchase. In a 2021 study titled "Visual Design Elements of Product Packaging: Implications for Consumers' Emotions, Perceptions of Quality, and Price," participants were shown three different shapes of water bottles—round, square, and curved—and then asked to select the one they preferred. Overwhelmingly, 72.7% of respondents preferred the curved shape compared to 15.2% who preferred the round shape, with only 12.1% who preferred the square bottle. This led the researchers to conclude that "the shape of the packaging has an effect on customer attributes given to a brand" (Chitturi et al., 2021, p. 2). This compelling link between how a product's shape influences perception and ultimately purchase is why the shape of a product's packaging was added as another extrinsic factor in this analysis.

Shape and color are two extrinsic factors that also explain why certain products are chosen for purchase over others. A decade before Chitturi et al. (2021) and Dolic et al. (2022) analyzed shape and color, two researchers who were analyzing a variety of elements that influence consumers' perceptions of a product determined that a brand's known image is often tied to the purchase (e.g. the shape of a Coca-Cola bottle) because it is recognizable. To further analyze what drives consumers to purchase, they offered five elements to choose from, which they termed "holistic types," and categorized as "massive, contrasting, natural, delicate, and nondescript designs" (Orth & Malkewitz, 2008, p. 64). The results were that "massive" and "contrasting" package design correlated to excitement but also low quality whereas "delicate" correlated to sophistication, "natural" correlated to high quality and healthy, and "nondescript" correlated to low impressions of quality and value. Next, they evaluated 67,000 responses to their consumer survey of product designs for wine, fragrances, cereal, detergent, soups, soft drinks, tea, eye glasses, shoes, electronic game devices, and watches and concluded that "package design conveys a strategically valued set of brand impressions, analogous to how consumers infer impressions from endorsers, advertising, and pricing" (Orth & Malkewitz, 2008, p. 74). This clear link between design and consumer opinion of quality across a broad spectrum of products can also be applied to whey protein powders, which is why this consideration was added to this study.

Astonishingly, brain function of consumer response to product packaging can be tracked to show preference. A 2010 study titled "Aesthetic package design: A behavioral, neural, and psychological investigation" focused on the appeal of package design similar to Orth & Malkewitz (2008) but took a deeper scientific look at what drives consumers, specifically analyzing "the core behavioral, neural, and psychological mechanisms when consumers experience aesthetically designed packages" (Reiman et al., p. 3). They found that when consumers were exposed to aesthetic forms of packaging, there were "significant increases in activation in the ventromedial prefrontal cortex" (Reiman et al., 2010, p. 8). This is significant information in showing how brain activity indicates a direct relationship between the visualization of aesthetically-pleasing packaging, which could explain what motivates a consumer to choose one product over another for purchase. Such data can be applied broadly to the selection process between products, including whey protein powders, so this consideration was added to this study.

## Consumer Appeal

The online system that allows consumers to select a number of stars to rate a product provides valuable information when analyzing product appeal. A study in 2020 of this system titled "Distribution Characteristics of Star Ratings in Online Consumer Reviews," discussed how researchers compared the distribution of star ratings between 11 categories of products listed on Amazon.com and Flipkart.com, an India-based e-commerce site valued at over \$20 billion (Bahree, 2018). They chose to examine the star ratings system because it offers a faster delivery system than the written reviews while also weeding out extreme reviews. What they found was

that “by seeing the star ratings, consumers alter their attitude towards products, and these ratings play a significant role in the learning process of the consumers” (Venkatesakumar et al., 2020, p. 166). Because the value of star ratings as a method to weed out extreme reviews extends to whey protein powders online, this system was added to this study.

Star ratings have also been found to offer the same quality of information as consumer reviews. Researchers in 2014 noted that these ratings are equally as good as written reviews because they convey personal experience with a product, which gives them credibility. Consumers who rely on star reviews to make their purchases noted that they provide “excellent cues for this decision as they provide a quick indication of the tone of a review” (Lak & Turetken, 2015, p. 796). Though it is commonplace to read online reviews before buying a product, “star ratings provide an excellent opportunity to measure the valence of comments without analyzing the comments themselves” (Lak & Turetken, 2014, p. 797). Because star ratings function as a second layer of screening to written reviews, they were added to this study on the consumer appeal of whey protein products.

## Gap in the Literature

Interest in the power that extrinsic factors on product packaging has on consumer appeal to the point that it leads to purchase has been a topic of market research analysis for decades. The methods of these studies consist largely of experiments and surveys that are often narrowly focused on one or two extrinsic factors instead of a comprehensive comparison of a variety of products and factors that impact consumer appeal. To this point, while studies of the extrinsic factors of chocolate bar packaging and shapes of water bottles lend important insights, no studies have ever focused on the multi-billion dollar market of whey protein powders. For this reason, this study will analyze online consumer ratings of whey protein powders on one of the world’s largest online retailers, Walmart.com, in order to gain the clearest picture of what extrinsic factors on product packaging motivates consumers to purchase one brand of whey protein powder over another. Since this is the first study of consumer appeal of extrinsic factors for this specific product, the data gained will serve to bridge a knowledge gap. Considering that protein supplements have a market valued at \$5.83 billion (Grand View Research, 2024), an examination of how consumer appeal varies based on the packaging of whey protein powder may influence brand managers, marketers, retailers of whey protein powders, and even consumers themselves.

## Methods

### Overview

A non-experimental, mixed methods, correlational content analysis was conducted on whey protein powders sold on Walmart.com. This was executed with the intent of drawing conclusions on how product packaging of whey protein powder influences consumer appeal. The materials used in this study were 148 whey protein powders found on Walmart.com, a tool for recording data (laptop), and Excel spreadsheets.

### Content Analysis Source

Walmart.com was chosen as the source for the original data in this study because of its prominence worldwide. In fact, since 2009, Walmart has been “the largest U.S. food retailer and groceries accounted for 51% of its total store sales” (Senauer & Seltzer, 2010, p. 1), and, in 2020, “Walmart became the world’s largest corporation” (Alimahomed-Wilson, 2020, p. 71). The significance of this particular store in American society is that “Walmart alone may have accounted for almost half of the 35.5 percent increase in the productivity of the U.S.

general merchandise sector between 1982 and 2002" (Bronnenberg & Ellickson, 2015, p. 114). With its popularity and easy online purchasing system, Walmart.com large was an ideal source of content analysis.

## Instrument

A chart was created on an Excel spreadsheet to document each protein powder involved in the content analysis (see Figure 1).

A	B	C	D	E	F	G	
1	Product Name	Primary Color/Colors	Number of Colors	Shape of Packaging	Type of Container	Image Prescence?	Image Location
2							
3							
4							
5							
6							
H	I	J	K	L	M		
1	Logo Presence?	Logo Location?	# Reviews	# 5 Star Ratings	# 1 Star Ratings	Ratio of 5 Star to 1 Star Ratings	
2							
3							
4							
5							
6							

**Figure 1.** Instrument in the Form of a Chart Created on Excel

## Sampling Procedure

The initial search query on Walmart.com was "protein powder" and then "whey protein type" was selected as a category filter. In order to be part of the content analysis, a product had to have at least 101 reviews. This baseline for criteria was lifted from a previous study where researchers "downloaded the first 100 reviews" (Hu & Liu, 2004, p.8) to ensure that the product had enough exposure to consumers to gather sufficient information to evaluate consumer appeal.

## Coding (Instrument Columns)

The chart created for this study has 13 different columns, with the product name in the first column so that each whey protein powder product used in the analysis is clearly identified. Qualitative extrinsic factors were listed in columns B, D, E, F, G, H, and I, and quantitative data was listed in columns C, J, K, L, and M. As mentioned in the literature review, multiple studies demonstrated that color, shape, container type, image and logo placement were all key extrinsic factors that impacted consumer appeal and purchase. Accordingly, the same categories of extrinsic factors were implemented in the analysis of the consumer appeal of whey protein powder packaging from these lists.

## Measuring Consumer Appeal

The ratio of five-star ratings to one-star ratings left on Walmart.com by people who bought and used the products was an essential and reliable tool for identifying and analyzing correlations between whey protein powder packaging and consumer appeal. This correlation was also emphasized in a white paper issued in 2019 by the

Organization for Economic Co-operation and Development, an international monitoring agency created in France in 1961 with member countries that includes the United States. Titled “Understanding online consumer ratings and reviews,” the authors argued that “ratings are non-narrative appreciations of goods and services that are projected on a scale of marks or stars (e.g. stars from 1 to 5)” (OECD, 2019, p. 6). This not only underscores how using consumer ratings as a measurement of appeal is suitable for the whey protein analysis in this study but also justifies the use of the five- to one-star ratings comparison, as the use of a range from least to most extreme values on a five-point rating scale is ideal for determining the magnitude of consumer appeal. Ratios were specifically useful because, as far back as four decades ago, studies concluded that “the instructions for magnitude estimation can induce an exponential judgment function, which causes the ratio model to give a good apparent fit” (Birnbaum, 1980, p. 316). Because of the value demonstrated in both measuring tools, they were adopted into the analysis of extrinsic factors in the purchase of whey protein powders.

## Data Collection

A total of 148 products were evaluated and the resulting statistical data documented (see Figure 2). Once the chart was completed, the raw data was ready for analysis.

	A	B	C	D	E
1	Product Name	Primary Color/Colors	Number of Colors	Shape of Packaging	Type of Container
2	Ancient Nutrition, Bone Broth Protein Vanilla 40 Servings	Blue, Black	2	Cylinder	Twistable Top
3	Swanson Original Whey Protein Powder with Vitamins Vanilla Flavor 2 lb 4.5 oz	White, Silver	2	Cylinder	Twistable Top
4	Isopure Zero Carb Protein Powder, Chocolate Mint, 25g Protein, 3 LB	Silver	1	Cylinder	Twistable Top
5	Legion Whey + Whey Isolate Protein Powder, strawberry banana, 82 Servings	Blue, Black	2	Rectangle	Ziploc
6	Dymatize Elite 100% Micellar Casein Powder, Smooth Vanilla, 25g Protein, 2 LB	White, Blue	2	Cylinder	Twistable Top

  

E	F	G	H	I
Type of Container	Image Presence?	Image Location	Logo Presence?	Logo Location
Twistable Top	no	N/A	yes	Top Middle
Twistable Top	yes	Bottom Right	yes	Top Middle
Twistable Top	no	N/A	no	N/A
Ziploc	yes	Top-Bottom Left	no	N/A
Twistable Top	yes	Bottom Right	yes	Center Left

  

J	K	L	M
# Reviews	# 5 Star Ratings	# 1 Star Ratings	Ratio of 5 Star to 1 Star Ratings
2167	1581	162	9.759259259
102	69	8	8.625
1770	1377	135	10.2
4487	3834	99	38.72727273
280	175	3	58.333333333

**Figure 2.** Example of the Documentation for the Products (First Five Products Out of 148 Total Products)

## Results

### Overview

The primary goal of the research methodology was to see if the packaging of the whey protein powders correlated with consumer appeal. This was tested by statistical analysis using the ANOVA and two-sample t-tests, which were performed through Excel. These measures were chosen based on the work of a team of researchers in 2015 who, in studying how plants interact with the environment, found that these two specific tools “help to avoid incorrect conclusions in factorial interaction studies” (Brady et al., 2015, p. 2089). Additionally, both

tools are useful in determining if there is a correlation between two variables, in this case consumer appeal and the extrinsic factor in context.

## ANOVA

ANOVA tests are only suitable for datasets that create at least three outcomes. This condition was met in this study by four extrinsic factors: “Primary Colors”, “Number of Colors”, “Image Location”, and “Logo Location”. However, due to the fact that there was significant variation among primary colors and the number of colors, the test was not applied to those categories. Additionally, there were over eight outcomes for “image location,” which rendered running an ANOVA test difficult to manage. Instead, “Image Location” was separated into horizontal and vertical locations, both with 4 categories each. However, “Logo Location” was already consolidated into four categories, so there was no need to separate that dataset (see Figure 3).

Image Horizontal Location	Image Vertical Location	Logo Location
Left	Top	Top Left
Center	Middle	Top Middle
Left	Bottom	Center Left
N/A	N/A	N/A

**Figure 3.** Table Displaying the ANOVA Test Outcomes for Each Extrinsic Factor

Horizontal location was the first extrinsic factor analyzed. On a new Excel spreadsheet, two columns were created and titled “Image Horizontal Location” and “Ratings Ratios” (see Figure 4).

	A	B
1	Image Horizontal Location	Ratings Ratios
2		
3		
4		
5		
6		
7		
8		

**Figure 4.** Columns for “Image Horizontal Location” and “Ratings Ratio”

The original raw data from the entire “Image Location” column (see Figure 5) was copied and pasted under the “Image Horizontal Location” column. Because the original data included both vertical and horizontal aspects (see Figure 5), the data needed to be re-organized to exclude all references to vertical locations, which is why the keywords top, bottom, middle, N/A were deleted. This left the main categories of left, right, center, and N/A in the “Image Horizontal Location” column (see Figure 6). Next, the ratios from the raw data were copied under “Ratings Ratios.”



	G
1	Image Location
2	Bottom Right
3	N/A
4	Bottom Right
5	Bottom Right
6	N/A
7	Bottom Center
8	Bottom Right
9	Bottom Center
10	Bottom Center
11	Center Bottom
12	Bottom Center
13	Bottom Right
14	Bottom Center
15	Bottom Right

**Figure 5.** Raw Data of the First 15 Products for “Image Location”

	A	B
1	Image Horizontal Location	Ratings Ratios
2	N/A	8.625
3	Right	10.2
4	N/A	38.72727273
5	Left	58.33333333
6	Right	37.75
7	Right	10.20689655
8	N/A	53.55555556
9	N/A	79
10	Right	79
11	Right	40.5
12	N/A	10.2
13	N/A	23.4
14	Right	38.75
15	Center	10.2

**Figure 6.** “Image Horizontal Location” Column with Only Horizontal Key Words (first 15 products)

Using the sorting tool, the data was rearranged by term so that all the categories, along with the respective ratings ratio, were grouped together. To eliminate any potential skews on the results of the ANOVA tests, potential outliers such as extremely large and small numbers were eliminated. Next, the ratios for each category were copied and pasted in an empty part of the Excel sheet according to the sorted columns top, middle, bottom and N/A (see Figure 7).



	A	B	C	D
1	Left	Center	Right	N/A
2	37.75	25.08929	21.93506	26.25926
3	6.030303	8.606061	40.5	58.33333
4	38.72727	18.71429	27.14286	18.75
5	38.75	15.92	18.66667	29.4
6	10.2	10.2	31.57143	19.5
7	10.2	7.4	27.75	7.5
8	44	10.2	21.83333	10.2
9	21.93506	10.2	10.2	53.55556
10	21.93506	10.2	33.31034	10.2
11	21.93506	10.2069	10.2	36.25
12	27.66667	21.93506	21.93506	38.5
13	23.66667	21.93506	21.93506	10.2
14	13	21.93506	21.93506	10.2
15	9.307692	21.93506	21.93506	38.72727

**Figure 7.** ANOVA Set Up for “Image Horizontal Location”

Along with the condition of at least three outcomes, datasets that will be tested by ANOVA must be independent and have a normal distribution. Accordingly, a table of summary statistics was produced, which allowed these remaining two conditions to be checked off (see Figure 8). Next, an ANOVA output table was produced, displaying information about the P- value, which would later be used to determine data significance (see Figure 9). This test was applied to the remainder of the categories: “Image Vertical Location” (see Figure 10) and “Logo Location” (see Figure 11)

	A	B	C	D	E	F	G	H
4	Standard Error	2.823166	Standard	1.832021	Standard	2.537945	Standard	1.434479
5	Median	17.87662	Median	16.5375	Median	21.93506	Median	21.93506
6	Mode	21.93506	Mode	21.93506	Mode	21.93506	Mode	21.93506
7	Standard Deviation	11.97768	Standard	10.03439	Standard	12.94103	Standard	11.56514
8	Sample Variance	143.4648	Sample Va	100.689	Sample Va	167.4703	Sample Va	133.7524
9	Kurtosis	-0.79672	Kurtosis	10.02355	Kurtosis	0.905295	Kurtosis	0.882069
10	Skewness	0.729334	Skewness	2.534995	Skewness	0.889403	Skewness	0.953892
11	Range	37.9697	Range	53.04167	Range	55.90517	Range	51.16667
12	Minimum	6.030303	Minimum	5.958333	Minimum	2.344828	Minimum	7.166667
13	Maximum	44	Maximum	59	Maximum	58.25	Maximum	58.33333
14	Sum	375.3727	Sum	509.2302	Sum	609.4053	Sum	1465.181
15	Count	18	Count	30	Count	26	Count	65

**Figure 8.** Table of Summary Statistics for the “Image Horizontal Location” Produced by Excel

SUMMARY					
Groups	Count	Sum	Average	Variance	
Left	18	375.3727	20.85404	143.4648	
Center	30	509.2302	16.97434	100.689	
Right	26	609.4053	23.43867	167.4703	
N/A	65	1465.181	22.54125	133.7524	

  

ANOVA						
Source of Variance	SS	df	MS	F	P-value	F crit
Between Groups	783.9711	3	261.3237	1.948476	0.12478	2.671676
Within Groups	18105.79	135	134.1117			
Total	18889.76	138				

**Figure 9.** ANOVA Output for “Image Horizontal Location” Produced by Excel

SUMMARY					
Groups	Count	Sum	Average	Variance	
Top	8	187.048	23.381	240.359	
Middle	8	183.018	22.8772	238.001	
Bottom	59	1282.44	21.7363	228.443	
N/A	66	1628.25	24.6704	278.055	

  

ANOVA						
Source of Variance	SS	df	MS	F	P-value	F crit
Between Groups	269.546	3	89.8486	0.35502	0.78558	2.67069
Within Groups	34671.8	137	253.079			
Total	34941.3	140				

**Figure 10.** ANOVA Output for “Image Vertical Location” Produced by Excel

SUMMARY					
Groups	Count	Sum	Average	Variance	
Center Left	20	561.317	28.0658	325.421	
N/A	37	1051.48	28.4183	451.321	
Top Left	49	966.933	19.7333	21.0276	
Top Middle	38	833.25	21.9276	362.412	

  

ANOVA						
Source of Variance	SS	df	MS	F	P-value	F crit
Between Groups	2095.27	3	698.423	2.6535	0.05102	2.66926
Within Groups	36849.1	140	263.208			
Total	38944.4	143				

**Figure 11.** ANOVA Output for “Logo Location” Produced by Excel

### Two-Sample T-Test

A two-Sample t-test, defined as “a statistical test for comparing two groups’ means” (Al-Kassab & Majeed, 2022, p. 14), was conducted for the following columns: “Shape of Packaging”, “Type of Container”, “Image Presence”, and “Logo Presence”. Extrinsic factors of “Shape of Packaging”, “Type of Container”, “Image Presence”, and “Logo Presence” had only two outcomes, respectively: cylinder or rectangle, twistable top or Ziploc, yes or no. Additionally, the two-sample t-test is performed under the assumption that all observations are independent of each other, the sample size is representative, and “the underlying population from which the samples are drawn is nearly normally distributed” (Al-Kassab & Majeed, 2022, p.14).

Container shape was the first extrinsic factor analyzed according to the two-sample t-test. On a new Excel spreadsheet, two columns were created and titled “Shape of Packaging” and “Ratings Ratio,” respectively (see Figure 12). Then, the original raw data under “Shape of Packaging” (see Figure 13) was highlighted and copied onto the new sheet under the “Shape of Packaging” column. The “Ratio of 5 Star to 1 Star Ratings” column was also highlighted and copied onto this new sheet under the “Ratings Ratio” column (see Figure 14). Next, to ensure the P-value would hold true to the data, obvious outliers were removed to avoid inflation or deflation. Both columns were then highlighted and sorted by right clicking and choosing the option “from A-Z.” The data was then sorted by testing the variable (shape of the container). This resulted in organizing the column by term along with their respective ratios (see Figure 15).

	A	B
1	Shape of Packaging	Ratings Ratio
2		
3		
4		
5		
6		
7		
8		
9		
10		

**Figure 12.** Columns for “Shape of Packaging” and “Ratings Ratio” Created on New Excel Spreadsheet

	D
1	Shape of Packaging
2	Cylinder
3	Cylinder
4	Cylinder
5	Cylinder
6	Cylinder
7	Rectangle
8	Cylinder
9	Cylinder
10	Cylinder
11	Cylinder
12	Cylinder
13	Cylinder
14	Cylinder
15	Cylinder

**Figure 13.** Raw Data Under “Shape of Packaging” (first 15 products)

	A	B
1	Shape of Packaging	
2	Cylinder	9.759259259
3	Cylinder	8.625
4	Cylinder	10.2
5	Rectangle	38.72727273
6	Cylinder	58.33333333
7	Cylinder	37.75
8	Rectangle	10.20689655
9	Cylinder	53.55555556
10	Cylinder	79
11	Cylinder	79
12	Cylinder	40.5
13	Cylinder	10.2
14	Rectangle	23.4
15	Rectangle	38.75
16	Cylinder	10.2

**Figure 14.** “Shape of Packaging” Column and “Ratings Ratio” Raw Data Side-by-Side (first 15 products)

	Cylinder	Rectangle
1	9.759259	38.72727
2	8.625	10.2069
3	10.2	23.4
5	58.33333	38.75
6	37.75	38.5
7	53.55556	10.2
8	40.5	10.2
9	10.2	38.72727
10	10.2	27.14286
11	36.25	21.93506
12	27.66667	21.93506
13	11.4	38.72727
14	2.344828	38.72727
15	7.166667	27.66667
16	21.93506	38.72727
17	21.93506	58.25
18	21.93506	10.2069
19	21.93506	10.2069
20	21.93506	21.93506
21	21.93506	21.125
22	18.75	21.93506
23	21.93506	21.93506
24	21.93506	13
25	21.93506	10.2
26	21.93506	10.2
27	10.2	21.93506
28	10.2	21.93506
29	21.93506	21.5
30	29.4	
31	10.2	
32	21.93506	

**Figure 15.** Raw Data from “Shape of Packaging” Sorted by Term Along with Respective Ratios

To ensure that the other conditions of running a two sample t-test were met, summary statistics were generated by using the data analysis function in Excel. The box titled “Descriptive Statistics” was clicked and the two variables of cylinder and rectangle were highlighted. Next, a new box titled “Summary Statistics” appeared on a new sheet, which was titled “Shape Stats” (see Figure 16).



	<i>Cylinder</i>		<i>Rectangle</i>
Mean	22.699181	Mean	24.56918
Standard Error	1.82335668	Standard Error	2.356411
Median	21.9350649	Median	21.93506
Mode	21.9350649	Mode	21.93506
Standard Deviation	19.4681219	Standard Deviation	12.46896
Sample Variance	379.007771	Sample Variance	155.4749
Kurtosis	36.0700551	Kurtosis	0.238927
Skewness	4.97691318	Skewness	0.730326
Range	175.655172	Range	48.05
Minimum	2.34482759	Minimum	10.2
Maximum	178	Maximum	58.25
Sum	2587.70664	Sum	687.937
Count	114	Count	28

**Figure 16.** Table of Summary Statistics for the “Shape of Packaging” Produced by Excel

Once all the conditions were met to run the two- sample t-test, the “Data Tab” was clicked, and then the “Data Analysis” button was clicked. Then “Two-Sample T-Test” and “Assuming Unequal Variances,” as shown by the data, were selected. The cylinder column was highlighted for variable one, and the rectangle column was highlighted for variable two. Then, the “Labels” box was clicked, which specified that the output from this test should be in the same tab for organizational purposes. The number “0” was selected for the hypothesized difference. After clicking “Okay,” the t-test output was produced (see Figure 17). Because the test examined the difference between two groups, the two-tailed P-value was of focus. This process for conducting a two-sample t-test was applied to the remaining applicable categories: “Type of Container” (see figure 18), “Image Presence” (see figure 19), and “Logo Presence” (see figure 20).

	<i>Cylinder</i>	<i>Rectangle</i>
Mean	22.69918	24.56918
Variance	379.0078	155.4749
Observations	114	28
Hypothesized Mean Difference	0	
df	64	
t Stat	-0.62763	
P(T<=t) one-tail	0.266241	
t Critical one-tail	1.669013	
P(T<=t) two-tail	0.532482	
t Critical two-tail	1.99773	

**Figure 17.** T-Test Output for “Shape of Packaging” Produced by Excel



	Twistable	Ziploc
Mean	22.69918	24.56918
Variance	379.0078	155.4749
Observations	114	28
Hypothesized Mean Difference	0	
df	64	
t Stat	-0.62763	
P(T<=t) one-tail	0.266241	
t Critical one-tail	1.669013	
P(T<=t) two-tail	0.532482	
t Critical two-tail	1.99773	

**Figure 18.** T-Test Output for “Type of Container” Produced by Excel

	Yes	No
Mean	20.55805	22.54125
Variance	142.2305	133.7524
Observations	74	65
Hypothesized Mean Difference	0	
df	136	
t Stat	-0.99412	
P(T<=t) one-tail	0.160965	
t Critical one-tail	1.656135	
P(T<=t) two-tail	0.32193	
t Critical two-tail	1.977561	

**Figure 19.** T-Test Output for “Image Presence” Produced by Excel

	Yes	No
Mean	20.245	24.90505
Variance	113.3895	195.4758
Observations	102	37
Hypothesized Mean Difference	0	
df	52	
t Stat	-1.8428	
P(T<=t) one-tail	0.035531	
t Critical one-tail	1.674689	
P(T<=t) two-tail	0.071063	
t Critical two-tail	2.006647	

**Figure 20.** T-Test Output for “Logo Presence” Produced by Excel

### Statistical Significance

The P-value is a number that signifies the existence of a correlation in the data under analysis. In interpreting such data, the P-value is compared to that of a significance level represented by a standardized number. In highly scientific studies, especially those concerning the medical field, alpha levels of .05 or point .01 are often set due to high specificity requirements. However, this study does not need to be as specific and marginal, so the significance level was set at .10.

To interpret a P-value, there are two general hypotheses that need to be set: the null hypothesis and the alternative hypothesis. The null hypothesis purports that there is no correlative value among the data while the alternative purports that there is a correlation between the data. In this case, the context of the hypothesis would be that there is or is not a correlation between the extrinsic factor in question and consumer appeal. In the case that the P-value is less than the significance level of .10, it is protocol to fail to reject the null hypothesis.

This indicates that the average ratio of five-star to one-star ratings is the same across each category, so consumer appeal is not affected by the extrinsic factor in question. On the other hand, if the P-value is greater than .10, it is protocol to reject the null hypothesis. This indicates that the average ratio of five-star to one-star ratings varies across each category in demonstration that consumer appeal is affected by the extrinsic factor in question.

Among the data collected, two extrinsic factors that showed significance regarding consumer appeal were “Logo Location” and “Logo Presence” (see Table 1). The P-values of 0.0510 for “Logo Location” and 0.0711 for “Logo Presence” were less than the significance level. Therefore, it can be concluded that these two factors impacted consumer appeal.

**Table 1.** Table Displaying the P-values in Comparison to the Significance Level of .10

Extrinsic Factor	P- Value	< or > significance level
Image Horizontal Location	0.1248	>
Image Vertical Location	0.7856	>
Logo Location	0.0510	<
Shape of Container	0.5325	>
Type of Container	0.5325	>
Image Presence	0.3219	>
Logo Presence	0.0711	<

## Discussion

### Implications and Significance

Overall, there was little to no correlation between consumer appeal and the extrinsic factors of the product packaging of whey protein powders as the majority of the factors analyzed had a P-value greater than the alpha value. Additionally, the test results for “Shape of Packaging” and “Type of Container” were identical. This was because rectangular shapes (shape of the packaging) were always in the form of a Ziploc bag (type of container) while cylindrical shapes (shape of packaging) were always in the form of a twistable top (type of container). Also, the P-value for both “Shape of Packaging” and “Type of Container” was higher than the alpha value. Therefore, it was concluded that “Shape of Packaging” and “Type of Container” had no relationship to consumer appeal. Further, due to the high P-value in relation to the alpha value, “Image Presence” produced insignificant results as well, which led to the conclusion that there was no correlation with consumer appeal. However, “Logo Presence” did produce significant results because of the low P-value in comparison to the alpha value. Therefore, it was concluded that products with logos had more consumer appeal than products without logos.

Even though the statistical analysis of the raw data led to the conclusion that there was no correlation between product packaging and consumer appeal, this study is still significant. First, it focused on one of the many gaps in linking consumer appeal with the purchase of a particular protein powder over another. One aspect of the analysis determined that product packaging had no correlation with purchase, which opens up other possible reasons such as the price of the product, the consumer’s prior knowledge of a product, raw nutrient information offered such as grams of protein and grams of sugar, and the influence on appeal and purchase of certain powders due to celebrity endorsements or ads.

The results of this study differ from that of a study mentioned previously in the literature review in regards to movement of images. Rompay et al. (2014) found that “the main effect of ‘Movement’ on package evaluation was significant” (p. 9), a discrepancy which underscores inconsistencies in evaluating a package’s consumer appeal and implies that there are other underlying factors which draw consumers’ appeal toward whey protein powders that are not considered in this study. Additionally, the consumer appeal of extrinsic factors may vary based on the type of product chosen. For example, consumers may react differently to product packaging on chocolate bars and water bottles versus whey protein powders.

This analysis of the data collection is useful to many stakeholders. As mentioned in the literature review, “package design conveys a strategically valued set of brand impressions, analogous to how consumers infer impressions from endorsers, advertising, and pricing” (Orth & Malkewitz, 2008, p. 74). This is strategic information that brand managers, protein powder marketers, and protein powder retailers can use to create a buzz about a product in order to appeal to consumers. Brand managers can utilize this information to narrow down what type of product packaging should be accepted for retail in order to maximize consumer attention. Marketers can use this information when designing whey protein powder packaging in order to maximize consumer appeal. Retailers can also utilize this information by showcasing these products in prominent displays in order to generate consumer interest.

Overall, the main implication of this project pertains to financial profit. As previously mentioned in the literature review, “because consumers often have limited time when considering a retail purchase, these pictures help increase sales through the generalizations made while evaluating the information provided on that package that directly affect consumers’ beliefs about the product” (Underwood & Klein, 2002, p. 59). However, this study demonstrated that images did not affect consumer appeal, which may explain why some brand marketers do not see including images as a priority. By understanding what extrinsic factors of protein packaging makes a product more appealing than others, stakeholders can utilize this information to generate maximum revenue.

## Limitations

A potential drawback associated with this study is that the analysis was limited to whey protein powders only sold on Walmart.com. Whey protein powders are sold at a variety of supermarkets and nutrient stores, giving consumers a wide variety of options from which to buy whey protein powder products. As a result, the findings of this study cannot be generalized as representative of the larger population as a whole.

Additionally, the products analyzed were determined by the number of reviews and ratings; however, not every customer who purchases a whey protein powder leaves a rating or a review. This means that the customers who do take the time to rate products and write reviews may be influenced by confirmation bias. Additionally, because only whey protein powders were analyzed, findings cannot be extrapolated past this product category. The results on which extrinsic factors influence consumer appeal may vary based on product category and there is no real way of applying this data beyond the scope of whey protein powders.

## Ethical Considerations

Because this study did not involve humans, consent forms and IRB interaction were not necessary, which reduced the ethical concerns involved in this study. The use of statistical tests that require a step-by-step process prevented the development of biased conclusions based simply on the raw data. They are also suitable for this study because “classical statistical significance testing is the primary method by which marketing researchers empirically test hypotheses and draw inferences about theories (Sawyer & Peter, 1983, p. 122). Additionally, legal issues were not present in this study because Walmart.com is a publicly-traded, international company available for online purchases at any time of day to consumers worldwide. Because the website was accessed in this general-use approach during this study, the information culled from the site was executed in a legal manner. Furthermore, Walmart.com polices all reviews and comments posted to their online site, which takes the onus off of the researcher in deciding what is standard protocol for acceptable information.

## Future Researchers

Future researchers who study the general topic of consumer appeal in relation to extrinsic factors of product packaging should have a method that directly involves humans. This includes surveys and/or interviews. Human participants can provide direct communication on product packaging appeal as opposed to the more abstract method used in this study of comparing the number of consumer reviews and ratings associated with a product.

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