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Analysis of Fit Issues Among Plus Size Females with Varying BMI

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ABSTRACT

This study explores the relationship between female body mass index (BMI) and fit issues for plus size females aged 18 and over who wore size 14 and larger. Participants were surveyed on their frequency of experiencing fit issues while shopping for apparel (Mintel, 2015). This study looks at how BMI classifications of overweight and obese effects the instances of fit issues among plus size consumers. A one-way ANOVA was used to analyze the data regarding fit between the two populations. Results showed significance between the populations where obese women tend to have more difficulty than overweight women. This study looks to strengthen the apparel industry's concern with apparel fit for plus size women; thereby motivating manufacturers to implement changes to design processes to combat these issues.

Keywords: plus size, fit, obesity, BMI

The plus size apparel industry has grown into a quite profitable market. In 2015, IbisWorld reported that the United States' plus size clothing industry was at approximately $9.7 billion in revenue. It is anticipated to increase over the next five years by 2.3% per year (IbisWorld, 2015). This industry has been previously criticized for its reluctance to provide plus size products. The level of difficulty to provide clothing for women with very intricate figures is what many manufacturers and designers shy away from (Walker, 2014). With the various body shapes known among the female population (Devarajan, Istook & Simmons, 2004) and the increase in obesity ratings (World Health Organization, 2016), the issue of fit for plus size consumers will only increase.

There are plus size retailers distributing clothing to this market. However, there still seems to be issues in reference to consumer satisfaction with offerings. Many apparel manufacturers only sell clothing that will fit particular body shapes (Ashdown and Song, 2013). Considering the nine different body shapes discussed by Devarajan, Istook and Simmons (2004), there is an urgent need to provide clothing that assess varying body shapes particularly for women of larger sizes. Large size women have distinct variations in body shape and have significant issues when

they wear clothing that does not justify their particular shape. Due to weight gain and proportional changes, industry leaders say the level of difficulty to construct large size clothing increases (Walker, 2014). This in turn would increase the chances of plus size females experiencing fit issues.

Fit Issues

ASTM standard D6960 (2004) identified the plus size range as women from size 14 to 32. This standard only provides dimensional measurements to support one body shape. In a 2004 study, Devarajan, Istook and Simmons discussed several different body shapes that can be used to describe the figures of women in the population. These nine body shapes consisted of the diamond shape, triangle, rectangle, oval, hourglass, inverted triangle, spoon as well as the top hourglass and bottom hourglass. Most of these shapes are determined using the bust, waist and hip dimensions. However, specific shapes incorporate the high hip, stomach and abdomen dimensions (Devarajan et. al, 2004).

There are retailers who provide clothing for plus size women including but not limited to: Ashley Stewart, Lane Bryant and Torrid. While these stores cater to the plus size female figure, the measurements that they provide to help the consumer determine the correct size only describe one body shape, though each company generally targets a different body shape (Ashley Stewart, n.d.; Lane Bryant, 2016; Torrid, 2016) leaving others with varying shapes having to deal with the fit issues related to disproportion. In a 2014 article, Rob Walker identified other brands who have incorporated plus sizes in their offerings. These popular brands included Cabiria from Eden Miller, ASOS, Forever 21, Mango and Rent the Runway (RTR). There was some concern observed when manufacturers and designers justified their reluctance to enter the plus size market by arguing about the difficulty of constructing plus size garments due to the definitive variations in shape. The fact that higher end designers were exploring this market caused some belief that others should also be able to enter this market (Walker, 2014).

In a 2015 consumer preference study, Staton found fit to be the main area of concern affecting plus size offerings. This study compared consumer responses to questions based on fashion and fit preferences. Staton also observed evidence of this fit issue when participants responded to survey questions about the sizes that they wore in various articles of clothing. Participants were asked to identify their body size. However, some of the plus size respondents reported that they wore tops in sizes smaller than the body size they reported. These women may have difficulty finding a proper fit when shopping for a dress as some dimension of their body will experience poor fit (Staton, 2015).

Obesity and BMI

Obesity rates have continually increased worldwide in past years. The World Health Organization (2016) reported that since 1980 the instances of obesity has increased by more than 100%. In 2014, 13% of adults were declared obese and 39% were overweight; where both statistics comprised of more women than men. Obesity is determined by a measurement of the body mass index (BMI) which is an individual's weight divided by their squared height (Weight in kg/Height in m^2). Overweight individuals have a BMI of 25 or more where those who are obese have a BMI of 30 or more (World Health Organization, 2016).

Research Design/Methodology

Some research has been done on the consumer preferences of plus size women in terms of fashion and fit. However, few studies show a comparison of how BMI effects consumer preferences. For the purposes of this study, fit will be the main variable being analyzed in comparison with two BMI classifications: overweight (25+) and obese (30+) (World Health Organization, 2016).

Data used for this study was retrieved from Mintel Reports. Lightspeed,

GMI and Mintel conducted a survey study on 802 males and females who all used the internet. This study, entitled Plus Size and Big & Tall Clothing, was conducted in 2015 in the United States. The sample included adults aged 18 and older. The females were those who wore a size 14 and over (Mintel, 2015). Only a small segment of this data was used. The portion of the study that surveyed the level of difficulty the participants experienced for finding clothing that fit was used for this study (Mintel, 2015). The survey question read: *"Which of the following shopping experiences would you say is typical when shopping for clothing for yourself? Please select one" (Mintel, 2015, Plus Size and Big & Tall Clothing - US - June 2015; Consumer section: Degree of Difficulty Finding Right Sizes by Demographics).*

The following options were presented:
"I **always** have difficulty finding clothes in my size that fit.
I **often** have difficulty finding clothes in my size that fit.
I **sometimes** have difficulty finding clothes in my size that fit.
I **rarely** have difficulty finding clothes in my size that fit.
I **never** have difficulty finding clothes in my size that fit." (Mintel, 2015, Plus Size and Big & Tall Clothing - US - June 2015; Consumer section: Degree of Difficulty Finding Right Sizes by Demographics).

Responses to this survey question were derived from 356 female participants. These individuals had bought plus size clothing in the past year (Mintel, 2015). The data used for this study provided an aggregate overview of the responses to this question for female participants who were overweight and obese. Table 1 shows the data in its original state as presented by Mintel and Lightspeed GMI (Mintel, 2015).

Table 1. Body Mass Index and Fit Issue

	Sample Size	High Difficulty	I always have difficulty finding clothes in my size that fit	I often have difficulty finding clothes in my size that fit	I sometimes have difficulty finding clothes in my size that fit	I rarely have difficulty finding clothes in my size that fit	I never have difficulty finding clothes in my size that fit
	#	%	%	%	%	%	%
Body Mass Index (BMI) (refers to overweight and obese classifications)							
Overweight	86*	31	10	21	35	23	10
Obese	238	51	22	29	35	9	5

Note: Data retrieved from Mintel, 2015, Plus Size and Big & Tall Clothing - US - June 2015; Consumer section: Degree of Difficulty Finding Right Sizes by Demographics.

Since this data was presented in this aggregate format, it had to be modified to a format more acceptable in order for the statistical analysis to be performed. The raw data for individual participant contribution was not available. Using the sample size and the percentages represented for each statement, individual responses were identified. For example, there was a total of 86 overweight participants.

However, only 10% of them stated that they always have difficulty with finding clothing that fit. Therefore 8.6 participants reported that they always had difficulty finding fit. This number was rounded up to 9. All calculations are seen in Table 2.

Table 2. Calculations for Participant Count

Body Mass Index Classification	Sample Size	Percentage (%)	Calculation	Count used
Overweight	86	10	86 x .10 = 8.6	9
Overweight	86	21	86 x .21 = 18.06	18
Overweight	86	35	86 x .35 = 30.1	30
Overweight	86	23	86 x .23 = 19.78	20
Overweight	86	10	86 x .10 = 8.6	9
			Total Count:	**86**
Obese	238	22	238 x .22 = 52.36	52
Obese	238	29	238 x .29 = 69.02	69
Obese	238	35	238 x .35 = 83.3	83
Obese	238	9	238 x .09 = 21.42	21
Obese	238	5	238 x .05 = 11.9	12
			Total Count:	**237**

Note: BMI, sample size and percentage data retrieved from Mintel, 2015, Plus Size and Big & Tall Clothing - US - June 2015; Consumer section: Degree of Difficulty Finding Right Sizes by Demographics

A 5-point Likert scale was applied to the five statements for the purposes of analysis procedures. This scale said that "never" having difficulty finding clothing that fit would be ranked at a 1; where "always" having difficulty finding clothing that fit ranks at a 5. See Table 3 for modified data table.

Table 3. Aggregate Data Participant Counts (Data based on data retrieved from Mintel, 2015)

Level of Rank	1	2	3	4	5	Totals
Overweight	9	20	30	18	9	**86**
Obese	12	21	83	69	52	**237**

Data Analysis

Using the JMP statistical software, the modified data was used to run a one-way analysis of variance (see Figure 1 and Tables 4-8) (JMP, 2012). This statistical method was used to determine if there was any significance between the means of the two populations (overweight and obese). In the case of this study, it was hypothesized that there would be a level of significance between the two variables with the mean of obese data ranking higher than that of overweight data.

This analysis was conducted and the resulting data was provided as follows:

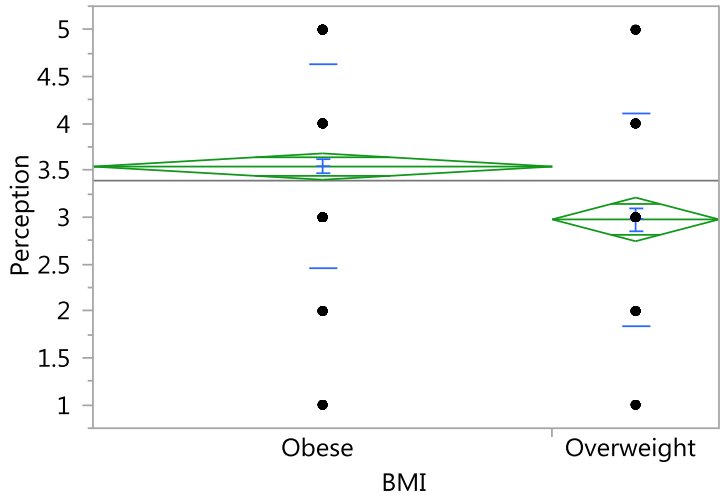

Figure 1. Oneway Analysis of Perception by Body Mass Index

Table 4. Oneway Anova: Summary of Fit

Rsquare	0.049221
Adj Rsquare	0.046259
Root Mean Square Error	1.09775
Mean of Response	**3.390093**
Observations (or Sum Wgts)	323

Table 5. T-Test: Overweight-Obese

Assuming equal variances

Difference	-0.56334	t Ratio	-4.07652
Std Err Dif	0.13819	DF	321
Upper CL Dif	-0.29146	Prob > |t|	<.0001*
Lower CL Dif	-0.83522	Prob > t	1.0000
Confidence	0.95	Prob < t	<.0001*

Table 6. Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Body Mass Index	1	20.02561	20.0256	16.6180	<.0001*
Error	321	386.82269	1.2051		
C. Total	322	406.84830			

Table 7. Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
Obese	237	**3.54008**	0.07131	3.3998	3.6804
Overweight	86	**2.97674**	0.11837	2.7439	3.2096

Note: Standard error uses a pooled estimate of error variance.

Table 8. Means and Std Deviations (retrieved from JMP software)

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Obese	237	3.54008	1.08313	0.07036	3.4015	3.6787
Overweight	86	2.97674	1.13735	0.12264	2.7329	3.2206

Discussion/Conclusions

The average of all responses overall was approximately 3.4 which determines that females who are either overweight or obese will sometimes experience difficulty finding clothing that fits (see Table 4). The resulting data showed a high level of significance between the two variables. The probability of error $p < 0.05$ shows a significance level of <.0001 in the instances of BMI (see Table 6). The mean for the obese population is approximately a 3.5 (see Table 7), which determines that the average obese female consumer is between the sometimes/often range for having difficulty finding clothing that fits. The mean for the overweight population is approximately a 3 (see Table 7) which determines that overweight females are sometimes likely to experience some difficulty finding clothing that fits. Comparing the two means, the obese population seems to be more likely to experience more difficulty finding clothing that fits. The p-value shows proof of a level of significance between the two variables and the means shows the exact location of where the significance lies. Therefore the original hypothesis can be accepted as proven.

This study demonstrates that larger women have trouble finding clothing that fits properly. The larger a women may be, she is at a more increased risk of experiencing some difficulty finding clothing that fits her correctly. It is highly likely that this is due to apparel companies making clothing that will only justify particular body shapes available to consumers (Ashdown and Song, 2013) This could be the main contributing factor to this issue. Since proportions are said to be more intricate in larger women, apparel makers do shy away from correcting this issue as construction of large size apparel is challenging (Walker, 2014).

This research is limited by its usage of aggregate data. Modified data showed one inconsistency in sample size count. Mintel data reported a sample size of 238 for obese females (see Tables 1 and 2; Mintel, 2015). However, after calculating percentages, there was only 237 found in the count for obese (see Table 2 and Table 3). All counts were rounded to the nearest tenth. Therefore, one obese participants' response was unknown.

Future research in this area should consist of sizing studies to get a better analysis of shape variations in the current population. These studies will help build sizing standards for varying body shapes. These standards can then be used by retailers and manufacturers to create clothing with appropriate fit for the plus size female population.

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