A COMPARISON OF FIT SATISFCTION FOR OVERWEIGHT AND OBESE (PLUS-SIZED) WOMEN BETWEEN USA AND TAIWAN

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ABSTRACT

The entire world is facing a crisis of epidemic proportions. The incidence of overweight and obese adults has increased significantly during the past three decades. In America, a 1999-2000 National Health and Nutrition Examination (NHANE) Survey, reported almost 65 % of American adults were overweight and 31 % were obese. Obesity rose 61 % from 1990 to 2000, and the obesity rates continue to rise quickly due to diet and lack of exercise (Sevrens, 2002). Taiwan is also facing the same situation. However, the need for well-fitted, plus-sized apparel for women has long been overlooked in the apparel market. With an increasing population of women falling into the plus-sized apparel market and the associated potential for large profits, more companies have begun to focus on producing better-fitting, more attractive plus-sized apparel. Plus-sized apparel is the fastest growing market segment worldwide.

The complex shape of the adult female body, the shortage of good anthropometric data, the social-psychological impact of apparel in relation to the body, and the complexities of sizing and grading apparel to establish a range of sizes are the main reasons fit problems occur.

In this study, overweight and obese women for both USA and Taiwan were used because fit has been a significant concern in the women's plus-sized apparel market. United States and Taiwanese plus-sized women based on Body Mass Index (BMI) were compared regarding the relationships among body shape, fit problems, and their fit satisfactions. With the end goal of creating a cross-national comparison studies, that focused on the overweight and obese women, may provide important information to marketers in their development of international plus-sized marketing strategies. One hundred forty nine U.S. and 83 Taiwanese plus-sized women completed self-administered questionnaires. Five-point scales were used to measure the fit satisfaction of six illustrated garment types (jacket, blouse, skirt, dress, jeans, and pant).The findings indicated that both respondents had a high level of dissatisfaction with their ready-to-wear. Approximately three-forth of respondents altered up to 100% of their garments. Most fitting problems experienced by both U.S. plus-sized women and Taiwanese plus-sized women were associated with pant lengths and their torso, especially, in the lower body. In addition, results of the Cross-tabulations revealed there were significant associations between fit problems (hip, thigh, armhole, abdomen, back width and shoulder seam) and body shape for U.S. plus-sized women, and there was a significant association between body shape and back width fit problem for Taiwanese plus-sized women. The ANOVA results reported that there were significant associations between fit satisfaction of individual garment and body shape. Pearson's Correlation Matrix revealed that there were significant association between overall RTW fit satisfaction and total fit problems and fit satisfaction of individual garments for both subjects. Cross-national comparison studies, such as this one, that focus on the consumer's fit satisfaction may provide important information to marketers in their development of international marketing strategies.

Keywords: BMI Body shape Fit satisfaction Plus-sized Overweight Obese

1. INTRODUCTION

Many studies reveal that the entire world is facing a crisis of epidemic proportions: people are getting taller and heavier and changing shape! The incidence of overweight and obese adults has increased significantly during the past three decades. With an increasing population of women falling into those complex target markets and the associated potential for large profits, more companies have begun to focus on producing better-fitting, more attractive plus-sized apparel. However, the need for well-fitted, plus-sized apparel for women has long been overlooked in the apparel market. The retailers throughout the world are responding to customer needs and requests for larger sizes. Taiwan is also facing the same situation. Plus-sized apparel is the fastest growing market segment worldwide.

The complex shape of the adult female body, the shortage of good anthropometric data, the social-psychological impact of apparel in relation to the body, and the complexities of sizing and grading apparel to establish a range of sizes are the main reasons fit problems occur. Fit is probably the most critical issue in purchasing a garment. Dissatisfaction with fit is one of the most frequently stated reasons given by consumers for not making garment purchases. Apparel fit problems are costly and frustrating for consumers, apparel manufacturers and retailers. Since there are no mandated size standards that are accepted by all manufacturers, each company has to develop its own measurement systems for sizing and fit as a marketing tool. Apparel manufacturers often differentiate themselves and their products by defining their own sizing standards and target markets, and by differentiating their marketing strategies. However, consumers suffer confusion from differentiation in sizes among different brands and stores. A key component for industry competitiveness is understanding how to translate measurements into apparel items that satisfactorily fit increasingly diverse consumer segments. Current sizing standards are significantly lacking when it comes to describing body shapes. As manufacturers think about new strategies to heighten competitiveness and differentiate their products, one area to consider is understanding fit satisfactions of different body shapes in order to more accurately produce garments that fit these target markets.

Fit issues provide the major motivation for the efforts which drive pattern development. Fit can be both an objective measure and a subjective element, based on individual preferences, and body shape may affect individuals' fit perceptions. Combining consumers' perceptions of fit with better understanding of body shape could begin to lay the foundation for better development of patterns and grading rules.

A Simmons Market Research Bureau report revealed that apparel business has begun segmenting customers by body type described as underweight, normal, overweight and obese. Scientists use a standard calculation called the Body Mass Index (BMI) to determine whether a person is normal in weight, underweight, overweight, or obese. BMI, which estimates body fat using measurements of height and weight, is defined as weight in kilograms divided by height (in meters) squared . BMI can be used for both sexes and over a wide range of ages (18-94 years).

The World Health Organization identifies the ideal BMI as being $20 \leq BMI < 25$, overweight as $25 \leq BMI < 30$, and obese as $BMI \geq 30$. Strawbridge, Wallhagen, and Shema (2000) and Schoenborn, Adams, and Barnes (2002) reported that the 1998 clinical guidelines used by the National Heart, Lung and Blood Institute (NHLBI) when treating

the overweight and obese divided adults into six categories on the basis of BMI: underweight (BMI<18.5), normal (18.5≤BMI<25), overweight: (25≤BMI<30), mildly obese (30≤BMI<35), moderately obese (35≤BMI<40), and extremely obese (40≥BMI). Another study reported by Dragon (2003) suggested the BMI thresholds for being overweight or obese in an Asian population should be lowered. The World Health Organization (WHO) considered data from studies conducted in China, Hong Kong, India, Indonesia, Japan, Republic of Korea, Malaysia, Philippines, Singapore, Taiwan and Thailand indicated that these populations could have a low BMI but a high percentage of body fat. Authorized Department of Health from Taiwan government divided adults into four categories on the basis of BMI as underweight (BMI<18.5), normal (18.5≤BMI<24), overweight: (24≤BMI<27), and obese (27≥BM).

As trade between countries continues to expand, the need for knowledge and understanding of the fit satisfaction of other nations becomes increasingly important to apparel companies which are conducting their businesses at international level. In this study, overweight and obese women for both USA and Taiwan were used because fit has been a significant concern in the women's plus-sized apparel market. The purpose of this study was to investigate the relationships among body shape and measurements based on Body Mass Index (BMI), fit problems and their fit satisfactions, with the end goal of creating a cross-national comparison studies, that focus on the overweight and obese women may provide important information to marketers in their development of international marketing strategies.

2. RESEARCH METHOD

This study was designed to assess overweight and obese women's body shape, fit problems, fit satisfaction, body measurements, and clothing fit preferences. Demographics, shopping behaviors, fit problem locations, and satisfaction with fit were used to understand the issues relating to body size and fit needs. This study classified sample by using BMI. The clothing fit problems, fit satisfactions and fit preference analysis, combined with the body shape analysis, were used to explore measurements and shapes for the population of overweight and obese women with the goal of determining possible ways to improve the fit of ready-to-wear apparel for them.

2.1 Sampling and Data Collection and Classification

This was an exploratory study of overweight and obese female consumers between the ages of 19 and 65. A convenience sample consisted of 310 subjects from entire Taiwan area and included 83 of them were overweight and obese female consumers, 525 subjects from United States and included 149 of them were overweight and obese female consumers completed Self-administered questionnaire. For USA sample, classification as underweight (BMI<18.5), normal (25>BMI≥18.5), overweight (30>BMI≥25) and obese (BMI≥30) were made using established BMI categories. For Taiwanese sample, classification as underweight (BMI<18.5), normal (24>BMI≥18.5), overweight (27>BMI≥24) and obese (BMI≥27) were made using established BMI categories. For the calculation of the formula (weight/height^2), subjects' weights and heights were used. Subjects' BMIs, calculated by weight (in kilograms) divided by height (in meters) squared, was applied to all studies. In this study, the overweight and obese female consumers were considered as a whole of plus-sized consumers.

2.2 Questionnaire

For this study, the methodological approach utilized a printed self-administered questionnaire. The questionnaire used to measure the variables was adapted from previous studies (Hwang, 1996, Shim and Bickle, 1994). The original version of the questionnaire was developed by the National Textile Center (NTC) researchers at Auburn University for a focus group study reported by Ma (2003). The questionnaire was revised and used in other studies by Alexander (2000) and Pisut (2001). Three measures included in the questionnaire were published in earlier studies (Hwang, 1996; Shim & Bickle, 1994; Goldsberry et al., 1996). The questionnaire was divided into three sections.

Section I: Respondents were asked questions related to their shopping habits, the types of stores where they shop for clothing, brand preferences, satisfaction with ready-to-wear, and frequency of alterations. The fit problems instrument published by Goldsberry et al. (1996) was part of Section I. In this instrument, respondents were asked to check areas of the body where they had fit problems and to identify the basic nature of those problems. (e.g., too loose/too tight).

Section II: Respondents were asked to identify demographic information including: age, race, income, occupation, education, exercise habits, body measurements and body shape.

Section III: For six illustrated garment types (jacket, blouse, skirt, dress, jean, and pant), subjects were asked to select one of three fit variation preferences (fitted, semi-fitted, and loosely fitted). For those selections, respondents were asked to indicate their level of satisfaction with areas of fit in similar garments tried on or worn.

2.3 Analysis of Data

Data from the subjects' responses to the questionnaire was first numerically coded and analyzed statistically using the Statistical Package for the Social Sciences (SPSS) version 12.0. Frequencies were first looked at to determine personal profiles of respondents, and then descriptive statistics were computed to assess subjects' fit satisfaction for garments. The data were coded using numeric values for the statistical analysis. The data were separated into 138 variables (questionnaire) in the database and named according to the nature of the question. The data were then aggregated and analyzed according to the research questions. Cross-tabulation, ANOVA and Correlation were computed to assess the relationships among body shape, fit problems and fit satisfactions.

3. RESULTS AND DISCUSSION

3.1 Frequency

Frequency distributions, percentages, and means were used to reveal the demographic profiles and characteristics of the respondents. Frequencies were first examined to analyze demographic profiles of height, weight, measurements, age range, body shape, satisfaction with ready-to-wear, and frequency of alterations. Then descriptive statistics were computed to assess subjects' fit satisfactions, fit preferences and fit problems for garments.

Table I. Demographic Profiles of Plus-sized (Overweight and Obese) Women Among USA and Taiwanese Respondents

Demographic Profiles	USA	Taiwan
Height (inch/cm)	64.64 (164.19)	63.23 (160.61)
Weight (kg/lb)	180.88 (82.22)	149.69 (68.04)
Bust (inch/cm)	103.25 (40.65)	93.52 (36.82)
Waist (inch/cm)	92.20 (36.03)	80.99 (31.89)
Hip (inch/cm)	113.49 (44.68)	102.33 (40.29)
Age		
19-25	20 (13.8%)	7 (8.4%)
26-35	30 (20.7%)	13 (15.7%)
36-45	44 (30.3%)	26 (31.3%)
46-55	51 (35.2%)	30 (36.1%)
55+	0 (0%)	5 (6.0%)
Missing	4	2
Body Shape		
Rectangular	47 (31.5%)	35 (43.2%)
Pear	50 (33.6%)	38 (46.9%)
Inverted Triangle	7 (4.7%)	3 (3.7%)
Hourglass	44 (29.5%)	5 (6.2%)
Missing	1	2
Satisfaction-RTW		
Extremely Satisfied	1 (0.7%)	0 (0%)
Somewhat Satisfied	33 (22.3%)	8 (1.2%)
Satisfied	34 (23.0%)	35 (42.2%)
Mostly Unsatisfied	68 (45.9%)	39 (47.0%)
Extremely Unsatisfied	12 (8.1%)	0 (0%)
Missing	1	0
Percent Altered		
None	41 (27.7%)	21 (25.3%)
Up to 25%	63 (42.6%)	36 (43.4%)
Up to 50%	22 (14.9%)	17 (20.5%)
Up to 75%	17 (11.5%)	8 (9.6%)
Up to 100%	5 (3.4%)	0
Missing	1	1
Total	n = 149	n = 83

According to Table I, the sample of U.S. plus-sized women revealed higher means in all measurements (height, weight, bust, waist, and hip) than did the sample of Taiwanese plus-sized women. The age group with the largest percentage of respondents was the 46-55 age range, at 35.2% for U.S. women and 36.1% for Taiwanese women, respectively. Over half of all women were placed in the rectangular or pear body types. Note, however, that both respondents had a high level of dissatisfaction with their ready-to-wear. Almost half of U.S. women (45.9%) and Taiwanese women (47.0%) reported that they were mostly unsatisfied with their ready-to-wear fit. Approximately three-forth of respondents altered up to 100% of their garments.

Table II. Fit Location Problems of Plus-sized (Overweight and Obese) Women Among USA and Taiwanese Respondents

Location	USA		Taiwan	
Pant length	1.	111 (74.5%)	1.	47 (63.5%)
Waist	2.	107 (71.8%)	4.	37 (47.4%)
Bust	3.	94 (63.1%))		22 (28.2%)
Abdomen	4.	90 (60.4%)	2.	43 (55.1%))
Hip	5.	88 (59.1%)	3.	39 (50.6%)
Sleeve Length	5.	88 (59.1%)		17 (23.0%)
Thigh	6.	78 (52.3%)	5.	39 (40.3%)
Total	n = 149		n = 83	

Table II indicated most fitting problems experienced by both U.S. plus-sized women and Taiwanese plus-sized women were associated with garment lengths and the torso, including pant length (74.5%, 63.5%), waist (71.8%, 47.4%), abdomen (60.4%, 55.1%), hip (59.1%, 50.6%), thigh(52.3%, 40.3%), bust, and sleeve length, respectively.

3.2 Cross-tabulations

Cross-tabulation was used to investigate the relationship between body shape and fit problems locations. Cross-tabulation was used because the variables were gathered through quantitative data analysis. Cross-tabulations in this study were used to investigate the relationship between body shape (rectangular, pear, inverted triangle, hourglass) and fit problems locations including neck, bust, waist, abdomen, hip, thigh, upper arm, armhole, sleeve length, back width, shoulder seam, dress length, pant length, crotch and other.

Table III. Cross-tabulation of Body Location Fit Problems by Body Shape

Fit Problem			Body Shape				X^2
			Rectangular	Pear	Inverted	Hourglass	
Hip	Yes	USA	50.7%	28.1%	48.9%	49.7%	**21.34*** **
	No						

	N		49.3%	71.9%	51.1%	50.3%	
			149	149	149	149	
	Yes	TW	57.6%	38.2%	50.0%	60.0%	5.83
	No		42.4%	61.8%	50.0%	40.0%	
	N		83	83	83	83	
Thigh	Yes	USA	66.7%	41.9%	64.4%	53.0%	**18.78*** **
	No		33.3%	58.1%	35.6%	47.0%	
	N		149	149	149	149	
	Yes	TW	72.7%	48.6%	66.7%	85.7%	4.20
	No		27.3%	514%	33.3%	14.3%	
	N		83	83	83	83	
Armhole	Yes	USA	78.8%	79.4%	55.6%	82.8%	**15.49** **
	No		21.2%	20.6%	44.4%	17.2%	
	N		149	149	149	149	
	Yes	TW	71.9%	63.6%	50.0%	85.7%	3.64
	No		28.1%	36.4%	50.0%	14.3%	
	N		83	83	83	83	
Abdomen	Yes	USA	53.4%	57.5%	60.0%	72.2%	**12.30** **
	No		46.6%	42.5%	40.0%	27.8%	
	N		149	149	149	149	
	Yes	TW	54.5%	37.1%	66.7%	85.7%	3.36
	No		45.5%	62.9%	33.3%	14.3%	
	N		83	83	83	83	
Back Width	Yes	USA	80.8%	87.5%	68.9%	82.8%	**8.83***
	No		19.2%	12.5%	31.1%	17.2%	
	N		149	149	149	149	
	Yes	TW	88.4%	78.6%	50.0%	85.7%	**7.43***
	No		11.6%	21.4%	50.0%	14.3%	
	N		83	83	83	83	
Shoulder Seam	Yes	USA	84.9%	83.1%	68.9%	84.1%	**6.73***
	No		15.1%	16.9%	31.1%	15.9%	
	N		149	149	149	149	
	Yes	TW	90.3%	93.9%	66.7%	85.7%	3.21
	No		9.7%	6.1%	33.3%	14.3%	
	N		83	83	83	83	

Note. Significant X^2 values are noted by: ***p<.001, **p<.01, *p<.05.

Results of the Cross-tabulations for body shape and fit problems locations were given in Table III. The Chi-Square X^2 value for body shape and hip, thigh, armhole, abdomen, back width and shoulder seam fit problems associations of 21.34, 18.78, 15.49, 12.30, 8.83, 6.73, which were significant at the ***p<.001, **p<.01 and *p<.05 revealed there were significant associations between fit problems (hip, thigh, armhole, abdomen, back width and shoulder seam) and body shape for U.S. plus-sized women. With X^2 value of 21.34 and 18.78, ***P< .001 revealed the rectangular body type was more likely than others to have problems with the fit at the hips and thighs. With X^2 value of 15.49 and 12.30, **P< .01 revealed the hourglass body type was more likely to have problems with the fit at armhole and abdomen. With X^2 value of 8.83 and 6.73, *P< .05 revealed the pear body type was more likely to have problems with the fit at back width and the rectangular body type was more likely to have problems with the fit at shoulder seam for U. S. respondents . The Chi-Square value for body shape and back width fit problems

associations was 7.43, which was significant at the*p<.05, and there was thus a significant association between body shape and back width fit problem for Taiwanese plus-sized women.

3.3 ANOVA

ANOVA was used to investigate the relationship because one of these two variables consisted of categorical data. ANOVA was performed to determine where relationships between body shape and fit satisfaction of individual garment occurred.

Table IV. ANOVA of Fit Satisfaction of Garments by Body Shape

			Fit Satisfaction				
Garment			Rectangular	Pear	Inverted	Hourglass	*F*
Jacket	Mean	USA	16.66	16.42	15.57	16.00	.29
	(S.D.)	(N=149)	(3.8)	(4.3)	(6.1)	(3.3)	
		TW	18.74	16.92	17.33	16.20	**2.71***
		(N=83)	(3.5)	(2.6)	(1.1)	(1.3)	
Blouse	Mean	USA	13.27	13.13	10.50	13.42	1.31
	(S.D.)	(N=149)	(3.9)	(3.2)	(4.4)	(2.9)	
		TW	15.62	14.24	13.00	14.60	2.08
		(N=83)	(3.0)	(2.4)	(1.7)	(1.9)	
Skirt	Mean	USA	10.35	9.21	9.71	10.41	1.84
	(S.D.)	(N=149)	(3.1)	(2.0)	(2.5)	(2.8)	
		TW	11.17	10.97	11.50	11.80	.21
		(N=83)	(2.3)	(2.3)	(0.7)	(3.0)	
Dress	Mean	USA	10.02	10.02	8.57	10.30	.99
	(S.D.)	(N=149)	(2.8)	(2.3)	(2.7)	(2.3)	
		TW	12.09	11.03	11.00	10.80	1.80
		(N=83)	(2.2)	(2.0)	(1.0)	(1.8)	
Jeans	Mean	USA	12.65	11.43	10.29	12.33	2.22
	(S.D.)	(N=149)	(3.4)	(2.3)	(3.8)	(3.1)	
		TW	13.71	12.59	12.33	13.40	1.04
		(N=83)	(2.5)	(2.8)	(3.1)	(4.6)	
Pant	Mean	USA	12.89	11.50	10.14	12.15	**2.55***
	(S.D.)	(N=149)	(3.5)	(2.4)	(3.8)	(3.5)	
		TW	13.74	12.86	12.00	13.00	.83
		(N=83)	(2.6)	(2.8)	(3.6)	(3.1)	

Note. Significant *F* values are noted by: **p*<.05.

The ANOVA results reported in Table IV showed that for U.S. women, with mean value of 12.89, F(2,149) = 2.55, *p<.05, the rectangular body type reported highest fit satisfaction at pant than any other body types. The fit satisfaction at pant (mean value of 10.14) was the least likely to be reported by the inverted triangular body types. For Taiwanese plus-sized women with mean value of 18.74, F(2, 83) = 2.71, *p<.05, the rectangular body type reported highest fit satisfaction with jacket than any other body types. Whereas, the fit satisfaction with jacket (mean value of 16.20) were the least likely to be reported by the hourglass body type.

3.4 Pearson's Correlation

Pearson's correlation was performed to determine where the relationships between subjects' overall RTW fit satisfaction and fit satisfaction for a particular garment type (jacket, blouse, skirt, dress, jeans, and pants), and between RTW fit satisfaction and total fit problems occurred. Person's correlation was used to investigate the relationship because the data were continuous variables.

Table V. Correlation Matrix of Overall RTW Fit Satisfaction and Total Fit Problems and Fit Satisfaction of Individual Garments

Fit problem		Overall fit satisfaction	Total fit problems
Total fit problems	US	-.35**	
	TW	-.39**	
Jacket	US	**.84****	-.27**
	TW	.79**	-.41**
Blouse	US	.76**	-.27**
	TW	.78**	**-.44****
Skirt	US	.78**	**-.30****
	TW	.66**	-.09
Dress	US	.77**	-.26**
	TW	**.84****	-.35*
Jeans	US	.75**	**-.30****
	TW	.79**	-.29*
Pant	US	**.82****	-.25**
	TW	**.84****	-.20

Note. Significant *r* values are noted by: ***p*<.01, **p*<.05.

Pearson's Correlation Matrix revealed that there were significant association at the .01 level between overall RTW fit satisfaction and total fit problems for both subjects, and between overall RTW fit satisfaction and fit satisfaction of individual garments including jacket (r =.84, .79; p<.01), blouse(r =.76, .78; p<.01), skirt (r =.78, .66; p<.01), dress (r =.77, .84; p<.01), jeans (r =.75, .79; p<.01), and pant (r =.82, .84; p<.01) for both U.S. and Taiwanese subjects. The correlation coefficients were -.35, -.39, suggesting a fair degree of negative relationship between overall fit satisfaction and total fit problems for both subjects. The correlation revealed that the more respondents were satisfied with their fit, the less likely they would have the fit problems. The jacket, pant and dress with r value of .84 were significant at p<.01, suggesting a very strong association between overall fit satisfaction and fit satisfaction of individual. The blouse, skirt and jeans had a fair degree of negative association with r value of -.44, -.30 between total fit problems and fit satisfaction of individual.

4. CONCLUSIONS

The clothing fit problems and fit satisfaction analysis combined with the body scan analysis, can be used to explore basic sizing, sloper and grading rules for the plus-sized population of a specific target market. In general, both respondents had a high level of dissatisfaction with their ready-to-wear. Approximately three-forth of respondents altered up to 100% of their garments. Most fitting problems experienced by both U.S.

women and Taiwanese women were associated with pant lengths and the torso, especially, in the lower body. Results of the Cross-tabulations revealed there were significant associations between fit problems (hip, thigh, armhole, abdomen, back width and shoulder seam) and body shape for U.S. plus-sized women, and there was a significant association between body shape and back width fit problem for Taiwanese plus-sized women. The ANOVA results reported that for U.S. women, the rectangular body type reported highest fit satisfaction with pant than any other body types. The fit satisfaction with pant was the least likely to be reported by the inverted triangular body types. For Taiwanese plus-sized women, the rectangular body type reported highest fit satisfaction with jacket than any other body types, whereas, the fit satisfaction with jacket was the least likely to be reported by the hourglass body type. Pearson's Correlation Matrix revealed that there were significant association between overall RTW fit satisfaction and total fit problems and fit satisfaction of individual garments for both subjects. The correlation results suggested a fair degree of negative relationship between overall fit satisfaction and total fit problems for both subjects. The correlation revealed that the more respondents were satisfied with their garment fit, the less likely they would have fit problems. The jacket, pant and dress had very strong association between overall fit satisfaction and fit satisfaction of individual garment. Whereas, the blouse, skirt and jeans had fair degree negative association between total fit problems and fit satisfaction of individual garment.

Hopefully the cross-national comparison of this study will pave the way towards providing important information for researchers, apparel firms, manufacturers and marketers to help better meet the needs of female consumers, and enabling marketers to develop their international marketing strategies as well.

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