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Perceived Effect of Obesity in Rural Vs. Urban Areas

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THE PERCEIVED EFFECT OF OBESITY IN RURAL vs. URBAN AREAS

by

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ABSTRACT

This study examined the effects of obesity on quality of life (QOL) using the ORWELL 97 questionnaire, which measured psychosocial (discomfort and impact) and physical (physical discomfort) distress. Data were collected during Spring and Summer semesters (2006) from physical activity classes and student organizations. A total of 166 students (84 males, 86 females) participated. Students were grouped by sex (male, female) weight category (obese, non-obese) or BMI (obese, overweight, normal weight), and geographic area (rural, urban); three-factor analysis of variance (ANOVA) tested for main effects and interactions. Obese participants reported a poorer QOL than the non-obese, and females reported a poorer QOL than males; there were no significant differences for rural vs. urban areas. Psychosocial distress appeared to play a role in students' QOL; physical distress did not. The ORWELL 97 appears to be a useful addition to other instruments when measuring QOL in university students in the United States.

INDEX WORDS: Quality of life, BMI, Obesity, ORWELL 97 questionnaire; Physical distress; Psychosocial distress.

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By

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DEDICATION

I would like to dedicate this work to the late Dr. Duncan J. MacLeod. Those who knew him were touched by his lessons, his vast knowledge and his kindness. He was a great man, a great friend, and most of all a wonderful father.

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CHAPTER 1

INTRODUCTION

Obesity, one of the more prominent diseases discussed in society, is an escalating problem with associated costs in 1998 reaching an estimated $78.5 billion, which accounted for 9.1% of all medical expenditures at the time (Finkelstein, Fiebelkorn, & Wang, 2003). Recent data from the National Center for Health Statistics show that 30% of US adults aged 20 and over are obese (Centers for Disease Control and Prevention [CDC], 2006). There are many dimensions for which the effect of obesity can be measured. Obesity can be linked – either directly or indirectly – to physical functioning, psychological issues and social well being (CDC). Medical issues such as increased risk for type II diabetes, coronary heart disease, strokes and some cancers have also been linked to obesity (Lean, Han, & Seidell, 1990).

The cumulative effect of obesity on physical, psychological and medical problems, as well as social well-being, has been correlated with a decrease in quality of life. Quality of life is an individual's satisfaction with his or her life. It expresses a relative value, related to need and expectations for the individual (French, Rogers, & Cobb, 1974). The research literature can be organized by areas mainly concerning physical functioning and psychological concerns with respect to quality of life. For example, Kushner and Foster (2000) found that the response from patients as to why they want to be treated for obesity was generally related to appearance or difficulty in daily functioning.

Both men and women rated themselves as having a lower quality of life in regards to physical functioning (Lopez-Garcia et al, 2003). Physical functioning (i.e. cardiovascular, respiratory and musculoskeletal functions) contribute to quality of life to

a greater degree than many variables. However, psychiatrists have speculated that psychological consequences may be the most severe consequences resulting from obesity (Kushner and Foster, 2000). However, the research literature is not as clear as it about the psychological effects. For example, one study reported that obese females rated themselves as having a lower quality of life than the non-obese (Mannucci et al., 1999), however, another team of investigators found no evidence of psychological and social repercussions (Le Penn et al., 1998). Whether the problems that exist are due to physical – or psychological – reasons, the research has shown that as obese individuals progress through weight loss programs, they report an increase in quality of life (Hafner, Watts, & Rogers, 1991; Kral, Sjostrom, & Sullivan, 1992; Rand & Macgregor, 1994).

There are many suggested reasons concerning the link between obesity and quality of life. As noted earlier, research findings vary as to whether obesity has a direct effect psychologically. However, the perceptions of non-obese individuals as they relate to the obese may have an impact. The workplace is one such example, where it has been documented that obese persons face discrimination. Employers are reluctant to hire obese women, specifically due to factors such as fatigue, being more prone to illness, and having lower efficacy rates (Wadden & Stunkard, 1985).

Obesity also puts more pressure on the body to function. Musculoskeletal difficulties occur due to the excess weight. This is especially true for the lower extremities (Hills, Henning, Byrne, & Steele, 2002). It is not only the skeletal system that is affected by excess weight, since both the cardiovascular and respiratory systems have to work harder to supply the body with oxygenated blood. Nonetheless, obesity is considered a modifiable risk factor for high blood pressure and high cholesterol (Neiman, 2003).

Most research studies conducted on quality of life typically compare men and women, but all too often fail to examine the population as a whole. In addition, it is difficult to find comprehensive research on males versus females when dealing with the different concerns of quality of life. By looking at the two sexes together, societal trends can be documented and awareness initiatives started.

Another area where there is lack of research is in physical environment – geographic area. Despite the documented larger prevalence of disease and disease risk factors in rural settings (Pearson & Lewis, 1998) individuals living in rural areas may not perceive the risk obesity imposes on well-being the same as individuals living in urban settings. This may be attributable in part to fewer public campaigns aimed towards increasing awareness and education. For example, urban environments often have more public advertising about potential health concerns than some rural settings. In addition the relationship between gender, geographic area, and quality of life in the obese is unknown.

Purpose of the Study

The purpose of this study was twofold: 1) to determine if obese individuals report a lower quality of life than non-obese individuals; and 2) to compare the results between men and women and urban and rural settings. It was hypothesized that: 1) obese subjects would report a lower quality of life than non-obese subjects; 2) obese females would have a lower quality of life than obese males; and 3) obese participants in the urban group would perceive themselves as having a lower quality of life than those in the rural group.

CHAPTER 2

METHODS

Recruitment of Subjects

Subjects were recruited from the student body on the Georgia Southern University campus. Two main sources for student recruitment – physical activity classes and student organizations – were cited in the study proposal, however, physical activity classes turned out to be the major vehicle for both student recruitment and participation.

For activity classes, instructors were contacted to receive permission to use their classes in the study; a total of 27 instructors were contacted, and 14 agreed to participate. The investigator then visited each class and spoke to students at the beginning of the class period, requesting their participation. The investigator explained the nature of the study and what their participation involved, including completion of a brief questionnaire and having three anthropometric measurements taken to assess body composition. Those who agreed to take part in the study were informed of location and time; for those who were unable to attend, alternative arrangements were made. As a result of these efforts, 162 students from activity classes took part in the study.

To recruit subjects from student organizations, the investigator wrote a letter to each organization explaining the nature of the study and the need for participants. Two weeks later, a follow-up letter and phone call were made. As a result of these efforts, one student organization was recruited for the study. A brief presentation was made to each participating organization, encouraging its members to participate. Appointments were set up in the same way as they were for physical activity classes; as a result, 12 students took part in the study.

Instrumentation

The instrument used in the study to measure quality of life was a modified form of the Obesity Related Well-Being Questionnaire (ORWELL97) (Manucci, Ricca, Barciulli, et al., 1999). The ORWELL97 consists of 18 items. Three scores are reported from the questionnaire, relevance (ORWELL 97-R), occurrence (ORWELL 97-O) and total score (ORWELL 97-T). The sum of all of the relevance questions and the occurrence questions reflect the ORWELL 97-R and ORWELL 97-O respectively. ORWELL 97-T is the sum of R and O scores; higher scores represent a poorer quality of life. Individual items can also be scored by adding the two numbers. All items are answered on a four-point Likert-type scale: 1 = Not at All; 2 = Just a Little; 3 = Not That Much; and 4 = Very Much. Test-retest reliability for the total instrument was reported as $r = .92$ (Manucci et al.); internal consistency was reported to be .83 ($\alpha \geq .80$ is considered to be satisfactory for measures of internal consistency) (Nunnally, 1967).

The instrument measures two major factors related to quality of life: the psychosocial aspects of obesity, and physical discomfort related to obesity, which accounts for 40.8% of the total input variance. The first factor on psychosocial aspects is comprised of a total of 13 items, and accounts for 30.3% of the variance. Two subscales – Discomfort (seven items) and Impact (six items) – are identified. The Discomfort subscale includes items such as feeling nervous, showing one's body, derision, sadness, sexual attractiveness, apprehension, and work. The Impact subscale includes items on social activities, self-esteem, feeling as though you are in danger, familial relationships, health concerns, and social modeling. The second major factor on physical discomfort accounts for 10.4% of

the variance, and includes five items related to the symptoms of physical discomfort, including: sexual life; shortness of breath; feeling sleepy; sweating; and physical activity.

Procedures

Data collection took place in either the Health Performance or Biomechanics Lab on the Georgia Southern University campus; alternate collection sites – the Hanner weight room and body conditioning rooms -- were also used. Prior to data collection, the investigator explained to all subjects the process and the informed consent; each signed the informed consent before participating.

The questionnaire and a separate sheet to record anthropometric data were given to each participant; each had a coded number at the top right corner of the first page. There was no time limit given for completion of the questionnaire. Once subjects completed the survey, they placed it into a folder, then handed the investigator the sheet, upon which was recorded his/her anthropometric measures; after data collection, each questionnaire and the corresponding anthropometric measurement were matched for purposes of data entry.

The first anthropometric measurement taken was waist circumference. Using a Gulick spring-loaded tape measure, the investigator measured each subject's waist around the navel and recorded the information in centimeters (cm) on the form. Subjects then had their weight measured on a calibrated Detecto® balanced beam scale; weight was taken without shoes, recorded on the form in pounds (lbs), then later converted to kilograms (kg). While subjects were on the scale, the investigator used a stadiometer to take height measurement in meters (m), which was also recorded on the form. The investigator then placed the anthropometric data form in a second folder.

Data Treatment and Analysis

Two levels of analysis were conducted on the data using SPSS for Windows 12.0. The first level included obese and non-obese participants, using body mass index (BMI) and waist circumference (WC) classifications to create a single cut-off point for obesity for males (BMI ≥ 30.0 kg/m^2 and WC ≥ 102.0 cm) and females (BMI ≥ 30.0 kg/m^2 and WC ≥ 88.0 cm) The second level used BMI values exclusively to classify the weight status of subjects into three levels: normal weight (BMI 18.5-to-24.9 kg/m^2); overweight (BMI 25.0-to-29.9 kg/m^2); and obese (BMI ≥ 30.0 kg/m^2); during subject recruitment, two students were considered underweight (BMI < 18.5 kg/m^2) and were not retained.

For geographic area, participants were asked to provide information on their state and county of residence. Only students from Georgia were included in the study; two students who lived in other states were not retained. The coding system included in the Georgia 2003 Metropolitan Statistical Areas map (Carl Vinson Institute of Government, 2003), was then used to classify students as residing in either a rural or urban county.

For statistical analyses, two levels were conducted. First, a three-way analysis of variance (ANOVA) (sex by weight category by geographic area) was conducted for each of the three dependant variables: occurrence (ORWELL 97-O); relevance (ORWELL 97-R); and total score (ORWELL 97-T). There were two levels for sex (male, female), two for weight category (obese, non-obese), and two for geographic area (rural, urban).

For level two, a three-way analysis of variance (ANOVA) (sex by BMI by geographic area) was conducted for each of the three dependant variables: occurrence (ORWELL 97-O); relevance (ORWELL 97-R); and total score (ORWELL 97-T). There were two levels for sex (male, female), three for BMI (obese, overweight, and normal weight), and two

for geographic area (rural, urban). In the event that statistical significance was detected by the ANOVA, a Tukey Post-Hoc Honest Significant Difference (HSD) test was used to determine which set of pairwise comparisons remained statistically significant (Keppel, 1982, p. 155). All statistical analyses were considered at $p \leq .05$.

CHAPTER 3

RESULTS

Data were collected from 174 participants. Due to incorrect information provided on some surveys, 8 were omitted; questionnaires for the remaining 166 subjects in the study (male: $n = 84$; female: $n = 82$) were analyzed using SPSS 12.0 for Windows.

Demographic information on the subject pool is provided in Tables 1 and 2.

Table 1: Participant demographic percentages ($n = 166$)

	Male	Female
Race		
White	72.6 %	69.5 %
Black	23.8 %	23.2 %
Hispanic or Latino	0 %	0 %
Asian Pacific Islander	1.2 %	2.4 %
American Indian or Alaskan Native	0 %	1.2 %
Other	2.4 %	3.7 %
Geographic Area		
Rural	33.3 %	30.5 %
Urban	66.7 %	69.5 %

Table 2: Participant means for age, height, and weight (*n* = 166)

	Male		Female	
	Mean	SD	Mean	SD
Age (yrs)	20.5	1.9	20.4	1.8
Height (m)	1.76	0.06	1.69	0.09
Weight (kg)	82.9	16.2	74.1	17.4

Two levels of analysis were completed. The first reports data using obese and non-obese participants. For these analyses, an additional nine surveys were omitted, since the participants had to have met the classification schema for both body mass index (BMI) and weight circumference (WC). Table 3 shows the numbers of participants in each category.

Table 3: Male and female participants by weight category (*n* = 157) [1]

	Male	Female
Weight Category		
Non-Obese	61	61
Obese	19	16

[1] *Measures of body mass index (BMI) and waist circumference (WC) were used to categorize subjects*

Level-One Analysis: Obese vs. Non-Obese (Composite Measures)

Results of the three-way analysis of variance (ANOVA) conducted for the ORWELL 97-T (Total) are presented in Table 4. The main effect for SEX reveals that there was a statistically significant difference detected ($F_{1,157} = 19.54$; $p < .001$). Females in the study (75.62 ± 15.49) reported a poorer quality of life than males (65.59 ± 11.68). The main effect for weight category (WTCAT) reveals that there was a statistically significant difference in the data ($F_{1,157} = 21.59$; $p < .001$). Obese participants (79.74 ± 17.93) reported a poorer quality of life than the non-obese (67.86 ± 12.26). There was no statistically significant difference detected on the main effect test for geographic area (GEOG) ($p = .443$).

Non-significant *F*-ratios were calculated for each of the interactions.

Table 4: Three-factor analysis of variance (ANOVA) – ORWELL97 (Total) (*n* = 157)

Sources of Variance	**SS**	**df**	**MS**	***F***	***p*-Value**
Main Effects					
SEX	3223.27	1	3223.27	19.54	.000
WTCAT	3561.27	1	3561.27	21.59	.000
GEOG	97.76	1	97.76	0.06	.443
2-Way Interactions					
SEX WTCAT	16.85	1	16.85	0.10	.750
SEX GEOG	20.79	1	20.79	0.13	.723
WTCAT GEOG	4.43	1	4.43	0.03	.870
Residual	24575.54	149			
Total	813500.00	157			

Results for the three-way ANOVA conducted for the ORWELL 97-0 (Total) are presented in Table 5. The main effect for SEX reveals there was a statistically significant difference ($F_{1,157} = 14.31$; $p < .001$) detected between male and female participants for the ORWELL 97-O. Females (33.69 ± 8.91) reported a poorer quality of life than males in the study (28.87 ± 7.20). The main effect for WTCAT reveals there was a statistically significant difference ($F_{1,157} = 28.03$; $p < .001$) between obese and non-obese participants for the ORWELL 97-O. Obese participants (37.54 ± 10.29) reported a poorer quality of life than the non-obese (29.43 ± 6.83). There was no statistically significant difference detected on the main effect test for GEOG ($p = .315$).

Non-significant *F*-ratios were calculated for each of the interactions.

Table 5: Three-factor analysis of variance (ANOVA) – ORWELL97-O (Total) (*n* = 157)

Sources of Variance	SS	df	MS	*F*	*p*-Value
Main Effects					
SEX	776.22	1	776.22	14.31	.000
WTCAT	1562.07	1	1562.07	28.80	.000
GEOG	13.40	1	13.40	0.25	.620
2-Way Interactions					
SEX WTCAT	0.01	1	.01	0.00	.987
SEX GEOG	14.29	1	14.29	0.27	.609
WTCAT GEOG	13.77	1	13.77	0.25	.615
Residual	8080.69	149			
Total	164216.00	157			

Results for the three-way ANOVA conducted for the ORWELL 97-R (Total) are presented in Table 6. The main effect test conducted for SEX reveals that there was a statistically significant difference ($F_{1,157} = 21.94$; $p < .001$), between male and female participants. Females (41.94 ± 7.27) reported a poorer quality of life than males in the study (36.71 ± 5.22). The main effect test WTCAT reveals that there was a statistically significant difference ($F_{1,157} = 10.66$; $p = .001$) between obese and non-obese subjects. Obese participants (42.2 ± 8.04) reported a poorer quality of life than did the non-obese participants (38.43 ± 6.20). There was no main effect detected for geographic area (GEOG) ($p = .620$).

Non-significant *F*-ratios were calculated for each of the interactions.

Table 6: Three-factor analysis of variance (ANOVA) for ORWELL97-R (Total) (*n* = 157)

Sources of Variance	SS	df	MS	*F*	*p*-Value
Main Effects					
SEX	835.96	1	835.96	21.94	.000
WTCAT	406.16	1	406.16	10.66	.001
GEOG	38.77	1	38.77	1.02	.315
2-Way Interactions					
SEX WTCAT	15.88	1	15.88	0.42	.520
SEX GEOG	0.61	1	0.61	0.02	.900
WTCAT GEOG	2.58	1	2.58	0.07	.795
Residual	5677.52	149	38.10		
Total	29400.00	157			

Analyses for the ORWELL-1 Subscale: Discomfort and Impact

Results for the three-way ANOVA conducted for ORWELL 97 (ORWELL-1) are presented in Table 7. The main effect test for SEX reveals a statistically significant difference ($F_{1,157} = 30.68$; $p < .001$). Female participants (56.19 ± 12.47) reported a poorer quality of life than the male participants (47.14 ± 8.772). The main effect for WTCAT detected a statistically significant difference ($F_{1,157} = 21.869$; $p < .001$), between obese and non-obese subjects on discomfort and impact. Obese subjects in the sample (58.66 ± 15.06) reported a poorer quality of life than the non-obese (49.55 ± 9.60). There was no significant main effect detected for GEOG ($p = .349$).

Non-significant *F*-ratios were calculated for each of the interactions.

Table 7: Three-factor analysis of variance (ANOVA) for ORWELL97-T (ORWELL-1) – Discomfort and Impact (*n* = 157)

Sources of Variance	**SS**	**df**	**MS**	***F***	***p*-Value**
Main Effects					
SEX	3098.85	1	3098.85	30.68	.000
WTCAT	2208.65	1	2208.65	21.87	.000
GEOG	89.00	1	89.00	0.88	.349
2-Way Interactions					
SEX WTCAT	115.46	1	115.46	1.14	.287
SEX GEOG	80.43	1	80.43	0.79	.374
WTCAT GEOG	1.21	1	1.21	0.01	.913
Residual	15048.44	149			
Total	438798.00	157			

Results for the three-way ANOVA conducted for ORWELL 97-O (ORWELL-1) are presented in Table 8. The main effect test for SEX reveals that there was a statistically significant difference ($F_{1,157} = 21.33$; $p < .001$) on discomfort and impact (ORWELL-1). Female participants (24.64 ± 7.06) reported a poorer quality of life than male participants (20.61 ± 5.23). The main effect test for WTCAT reveals that there was a statistically significant difference ($F_{1,157} = 29.497$, $p < .001$), between obese and non-obese subjects on the ORWELL-1 subscale. Obese participants (27.29 ± 8.34) reported a poorer quality of life than the non-obese participants (21.24 ± 5.16). There was no main effect detected for geographic area (GEOG) ($p = .381$).

Non-significant *F*-ratios were calculated for each of the interactions.

Table 8: Three-factor analysis of variance (ANOVA) for ORWELL97-O (ORWELL-1) – Discomfort and Impact (*n* = 157)

Sources of Variance	SS	df	MS	*F*	*p*-Value
Main Effects					
SEX	681.27	1	681.27	21.33	.000
WTCAT	942.22	1	942.22	29.49	.000
GEOG	24.68	1	24.68	0.77	.381
2-Way Interactions					
SEX WTCAT	23.53	1	23.53	0.74	.392
SEX GEOG	37.64	1	37.64	1.18	.279
WTCAT GEOG	0.42	1	0.42	0.01	.909
Residual	4759.44	149			
Total	86672.00	157			

Results for the three-way ANOVA conducted for the ORWELL 97-R (ORWELL-1) are presented in Table 9. The main effect for SEX reveals that there was a statistically significant difference ($F_{1,157} = 33.95$; $p < .001$). Females (31.56 ± 6.03) reported a poorer quality of life than male participants (26.53 ± 4.269). The main effect test for WTCAT reveals that there was a statistically significant difference ($F_{1,157} = 10.32$; $p = .002$) for obese and non-obese participants. Obese participants (31.37 ± 7.04) reported a poorer quality of life than non-obese participants (28.31 ± 5.188). There was no main effect detected for geographic area (GEOG) ($p = .380$).

Non-significant *F*-ratios were calculated for each of the interactions.

Table 9: Three-factor analysis of variance (ANOVA) for ORWELL97-R (ORWELL-1) – Discomfort and Impact (*n* = 157)

Sources of Variance	SS	df	MS	*F*	*p*-Value
Main Effects					
SEX	874.16	1	874.16	33.95	.000
WTCAT	265.71	1	265.71	10.32	.002
GEOG	19.95	1	19.95	0.78	.380
2-Way Interactions					
SEX WTCAT	34.75	1	34.75	1.35	.247
SEX GEOG	8.03	1	8.03	0.31	.577
WTCAT GEOG	0.20	1	0.20	0.01	.930
Residual	3837.15	149			
Total	137176.00	157			

Analyses for the ORWELL-2 Subscale: Physical Discomfort

Results for the three-way (ANOVA) conducted for ORWELL 97 (ORWELL-2) are presented in Table 10. The main effect for WTCAT reveals that there was a statistically significant difference ($F_{1,157} = 9.33$; $p = .003$), between obese and non-obese participants. Obese participants (21.09 ± 4.62) reported a poorer quality of life than their non-obese counterparts (18.31 ± 4.01). There were no significant main effects detected for either SEX ($p = .790$), or GEOG ($p = .913$).

Non-significant *F*-ratios were calculated for each of the interactions.

Table 10: Three-factor analysis of variance (ANOVA) for ORWELL97-T (ORWELL-2) – Physical Discomfort (*n* = 157)

Sources of Variance	**SS**	**df**	**MS**	***F***	***p*-Value**
Main Effects					
SEX	1.22	1	1.22	0.07	.790
WTCAT	160.79	1	160.79	9.33	.003
GEOG	0.21	1	0.21	0.01	.913
2-Way Interactions					
SEX WTCAT	44.09	1	44.09	2.56	.112
SEX GEOG	19.44	1	19.44	1.13	.290
WTCAT GEOG	1.01	1	1.01	0.06	.809
Residual	2567.54	149			
Total	59142.00	157			

Results for the three-way ANOVA conducted for ORWELL 97-O (ORWELL-2) are presented in Table 11. The main effect for WTCAT reveals that there was a statistically significant difference ($F_{1,157} = 11.41$; $p = .001$) between obese and non-obese subjects in the study. Those who were classified as obese participants (10.26 ± 3.09) reported a poorer quality of life than non-obese participants (8.19 ± 2.51). There were no main effects detected for SEX ($p = .502$), or GEOG ($p = .618$).

Non-significant *F*-ratios were calculated for each of the interactions.

Table 11: Three-factor analysis of variance (ANOVA) for ORWELL97-O (ORWELL-2) – Physical Discomfort (*n* = 157)

Sources of Variance	SS	df	MS	*F*	*p*-Value
Main Effects					
SEX	3.10	1	3.10	0.45	.502
WTCAT	77.92	1	77.92	11.41	.001
GEOG	1.71	1	1.71	0.25	.618
2-Way Interactions					
SEX WTCAT	22.38	1	22.38	3.28	.072
SEX GEOG	5.54	1	5.54	0.81	.369
WTCAT GEOG	9.38	1	9.38	1.37	.243
Residual	1017.81	149			
Total	12948.00	157			

Results for the three-way ANOVA conducted for ORWELL 97-R (ORWELL-2) are presented in Table 12. There were no main effects detected for SEX (p = .752), WTCAT (p = .064), or GEOG (p = .395).

Non-significant F-ratios were calculated for each of the interactions.

Table 12: Three-factor analysis of variance (ANOVA) for ORWELL97-R (ORWELL-2) – Physical Discomfort (n = 157)

Sources of Variance	SS	df	MS	*F*	*p*-Value
Main Effects					
SEX	0.43	1	0.43	0.10	.752
WTCAT	14.84	1	14.84	3.49	.064
GEOG	3.10	1	3.10	0.73	.395
2-Way Interactions					
SEX WTCAT	3.65	1	3.65	0.86	.356
SEX GEOG	4.22	1	4.22	0.99	.321
WTCAT GEOG	4.23	1	4.23	0.99	.320
Residual	633.44	149			
Total	17258.00	157			

Level-Two Analyses: Obese, Overweight, and Normal Weight (BMI Measures)

The second level of analysis conducted used BMI as the classification schema for participants. For these analyses, two surveys were omitted, since only two participants were classified as underweight, leaving 164 in this set of analyses. The breakdown by category is presented in Table 13.

Table 13: Male and female participants by BMI category

	Male	Female
BMI Category		
Normal	34	48
Overweight	29	16
Obese	21	16

Results for the three-way ANOVA conducted for ORWELL 97 (Total) are presented in Table 14. The main effect test for SEX reveals that there was a statistically significant difference ($F_{1,164} = 24.84$; $p < .001$) between males and females. Females (75.43 ± 15.19) reported a poorer quality of life than males (65.90 ± 11.66). The main effect test for BMI reveals there was a statistically significant difference ($F_{2,164}=11.11$; $p < .001$) among the three BMI categories. The Tukey Post-Hoc test reveals that students classified as obese (79.11 ± 17.63) reported a poorer quality of life than those who were overweight (68.33 ± 12.20) or of normal weight (67.90 ± 12.16). There was no main effect detected for GEOG ($p = .270$).

Non-significant *F*-ratios were calculated for each of the interactions.

Table 14: Three-factor analysis of variance (ANOVA) for ORWELL97 – Total (*n* = 164)

Sources of Variance	SS	df	MS	*F*	*p*-Value
Main Effects					
SEX	4053.40	1	4053.40	24.84	.000
BMI	3625.21	2	3625.21	11.11	.000
GEOG	200.31	1	200.31	1.23	.270
2-Way Interactions					
SEX BMI	28.52	2	14.26	0.09	.916
SEX GEOG	117.41	1	117.41	0.72	.398
BMI GEOG	29.25	2	14.63	0.09	.914
Residual	24802.10	152			
Total	849466.00	164			

Results for the three-way ANOVA conducted for ORWELL 97-O (Total) are presented in Table 15. The main effect for SEX reveals that there was a statistically significant difference ($F_{1,164} = 19.94$; $p < .001$) between male and female participants. Females (33.61 ± 8.71) reported a poorer quality of life than the males (29.02 ± 7.13). The main effect test for BMI reveals that there was a statistically significant difference ($F_{2,164} = 14.0$; $p < .001$) among the three categories. The Tukey Post-Hoc tests reveal that obese participants (37.11 ± 10.17) reported a poorer quality of life than their overweight (30.11 ± 6.70) and normal weight (29.26 ± 6.78) counterparts. There was no significant main effect detected for GEOG ($p = .371$).

Non-significant *F*-ratios were calculated for each of the interactions.

Table 15: Three-factor analysis of variance (ANOVA) for ORWELL97-O (Total) (*n* = 164)

Sources of Variance	SS	df	MS	*F*	*p*-Value
Main Effects					
SEX	1060.03	1	1060.03	19.94	.000
BMI	1574.12	2	787.06	14.80	.000
GEOG	42.76	1	42.76	0.80	.371
2-Way Interactions					
SEX BMI	1.35	2	0.68	0.01	.987
SEX GEOG	61.79	1	61.79	1.16	.283
BMI GEOG	9.38	2	4.69	0.09	.916
Residual	8081.10	152			
Total	171355.00	164			

Results for the three-way ANOVA conducted for ORWELL 97-R (Total) are presented in Table 16. The main effect test for SEX reveals that there was a statistically significant difference ($F_{1,164} = 25.34$; $p < .001$) between males and females. Females (41.81 ± 7.17) reported a poorer quality of life than males (36.88 ± 5.09). The main effect test for BMI categories reveals that there were statistically significant differences ($F_{2,164} = 5.53$; $p = .005$) among the three. Tukey Post-Hoc analyses reveal that obese students (42.00 ± 7.86) reported a poorer quality of life than overweight (38.22 ± 6.52) and normal weight (38.65 ± 6.13) students. There was no main effect detected for GEOG ($p = .220$).

Non-significant *F*-ratios were calculated for each of the interactions.

Table 16: Three-factor analysis of variance (ANOVA) for ORWELL97-R (Total) (*n* = 164)

Sources of Variance	SS	df	MS	*F*	*p*-Value
Main Effects					
SEX	967.72	1	967.72	25.37	.000
BMI	421.83	2	210.91	5.53	.005
GEOG	57.98	1	57.98	1.52	.220
2-Way Interactions					
SEX BMI	23.57	2	11.79	0.31	.735
SEX GEOG	8.85	1	8.85	0.23	.631
BMI GEOG	16.85	2	8.43	0.22	.802
Residual	5798.75	152			
Total	260465.00	164			

Results for the three-way analysis of variance (ANOVA) conducted for ORWELL97-T (ORWELL-1) are presented in Table 17. The main effect for SEX reveals that there was a statistically significant difference ($F_{1,164} = 34.95$; $p < .001$) between males and females; females (55.96 ± 12.31) reported a poorer quality of life than males in the study (47.37 ± 8.74). The main effect for BMI reveals there was a statistically significant difference ($F_{1,164} = 11.46$; $p < .001$) detected in the three weight classifications. The Tukey Post-Hoc test reveals that obese participants (58.08 ± 14.84) reported a poorer quality of life than overweight (49.91 ± 9.70) and normal weight (49.52 ± 9.45) participants. There was no main effect detected for GEOG ($p = .189$).

Non-significant *F*-ratios were calculated for each of the interactions.

Table 17: Three-factor analysis of variance (ANOVA) for ORWELL97-T (ORWELL-1) – Discomfort and Impact (*n* = 164)

Sources of Variance	SS	df	MS	*F*	*p*-Value
Main Effects					
SEX	3493.21	1	3493.21	34.95	.000
BMI	2290.15	2	1145.08	11.46	.000
GEOG	174.36	1	174.36	1.75	.189
2-Way Interactions					
SEX BMI	145.42	2	72.71	0.73	.485
SEX GEOG	186.11	1	186.11	1.86	.174
BMI GEOG	21.49	2	10.75	0.11	.898
Residual	15191.68	152			
Total	457332.00	164			

Results for the three-way ANOVA conducted for ORWELL 97-O (ORWELL-1) are presented in Table 18. The main effect for SEX reveals that there was a statistically significant difference ($F_{1,164} = 25.17$; $p < .001$), between male and female participants. Females (24.54 ± 6.94) reported a poorer quality of life than males (20.75 ± 5.17) in the study. The main effect test for BMI reveals that there was a statistically significant difference ($F_{1,164} = 15.58$; $p < .001$) in the weight categories. The Tukey Post-Hoc test reveals that obese participants (26.97 ± 8.22) reported a poorer quality of life than both their overweight (21.80 ± 5.12) and normal weight (21.06 ± 5.09) participants. There was no main effect detected for GEOG ($p = .231$).

Non-significant *F*-ratios were calculated for each of the interactions.

Table 18: Three-factor analysis of variance (ANOVA) for ORWELL97-O (ORWELL-1) (*n* = 164)

Sources of Variance	**SS**	**df**	**MS**	***F***	***p*-Value**
Main Effects					
SEX	784.81	1	784.81	25.17	.000
BMI	971.23	2	485.61	15.58	.000
GEOG	45.10	1	45.10	1.45	.231
2-Way Interactions					
SEX BMI	31.50	2	15.75	0.51	.604
SEX GEOG	80.02	1	80.20	2.57	.111
BMI GEOG	1.03	2	0.52	0.02	.984
Residual	4738.65	152			
Total	90360.00	164			

Results for the three-way ANOVA conducted for ORWELL 97-R (ORWELL-1) are presented in Table 19. The main effect for SEX reveals that there was a statistically significant difference ($F_{1,164} = 37.42$; $p < .001$), between male and female participants. Females (31.42 ± 5.99) reported a poorer quality of life than males (47.37 ± 8.74) in the study. The main effect for BMI reveals that there was a statistically significant difference ($F_{1,164} = 5.39$; $p = .005$) in the three weight classifications. The Tukey Post Hoc analyses reveals that obese participants (31.11 ± 6.94) reported a poorer quality of life than their overweight (28.11 ± 5.32) and normal weight (28.46 ± 5.08) counterparts. There was no main effect detected for GEOG ($p = .204$).

Non-significant *F*-ratios were calculated for each of the interactions.

Table 19: Three-factor analysis of variance (ANOVA) for ORWELL97-R (ORWELL-1) (*n* = 164)

Sources of Variance	SS	df	MS	*F*	*p*-Value
Main Effects					
SEX	966.52	1	966.52	37.42	.000
BMI	278.60	2	139.30	5.39	.005
GEOG	42.11	1	42.11	1.63	.204
2-Way Interactions					
SEX BMI	45.44	2	22.72	0.88	.417
SEX GEOG	22.06	1	22.06	0.85	.357
BMI GEOG	13.14	2	6.57	0.25	.776
Residual	3926.50	152			
Total	142870.00	164			

Results for the three-way ANOVA conducted for ORWELL 97-T (ORWELL-2) are presented in Table 20. The main effect for BMI reveals that there was a statistically significant difference ($F_{1,164} = 4.47$; $p = .013$) in the three weight categories. The Tukey Post Hoc test reveals that obese participants (21.03 ± 4.53) reported a poorer quality of life than overweight (18.42 ± 3.63) and normal weight (18.38 ± 4.15) participants. There were no main effects detected for SEX ($p = .272$) or GEOG ($p = .819$).

Non-significant *F*-ratios were calculated for each of the interactions.

Table 20: Three-factor analysis of variance (ANOVA) for ORWELL97-T (ORWELL-2) – Physical Discomfort (*n* = 164)

Sources of Variance	SS	df	MS	*F*	*p*-Value
Main Effects					
SEX	20.82	1	20.82	1.23	.272
BMI	152.87	2	76.44	4.47	.013
GEOG	0.90	1	0.90	0.05	.819
2-Way Interactions					
SEX BMI	49.62	2	24.81	1.45	.237
SEX GEOG	7.88	1	7.88	0.46	.498
BMI GEOG	1.03	2	0.51	0.03	.970
Residual	2598.42	152			
Total	62040.00	164			

Results for the three-way ANOVA conducted for ORWELL 97-O (ORWELL-2) are presented in Table 21. The main effect for BMI reveals that there was a statistically significant difference ($F_{1,164} = 5.30$; $p = .006$) among the three weight classifications. The Tukey Post-Hoc test reveals that obese students (10.14 ± 3.06) reported a poorer quality of life than their overweight (8.31 ± 2.37) and normal weight (8.20 ± 2.56) counterparts. There were no main effects detected for SEX ($p = .084$) or GEOG ($p = .946$).

Non-significant *F*-ratios were calculated for each of the interactions.

Table 21: Three-factor analysis of variance (ANOVA) for ORWELL97-O (ORWELL-2) – Physical Discomfort (*n* = 164)

Sources of Variance	SS	df	MS	*F*	*p*-Value
Main Effects					
SEX	20.64	1	20.64	3.02	.084
BMI	72.42	2	36.22	5.30	.006
GEOG	0.03	1	0.03	0.01	.946
2-Way Interactions					
SEX BMI	21.62	2	10.81	1.58	.209
SEX GEOG	1.76	1	1.18	0.17	.679
BMI GEOG	6.59	2	3.30	0.48	.618
Residual	1039.05	152			
Total	13531.00	164			

Results for the three-way ANOVA conducted for ORWELL 97-R (ORWELL-2) are presented in Table 22. There were no statistically significant main effects detected for SEX (p = .993), BMI (p = .172), GEOG (p = .585).

Non-significant F-ratios were calculated for each of the interactions.

Table 22: Three-factor analysis of variance (ANOVA) for ORWELL97-R (ORWELL-2) – Physical Discomfort (n = 164)

Sources of Variance	SS	df	MS	*F*	*p*-Value
Main Effects					
SEX	0.00	1	0.00	0.00	.993
BMI	15.09	2	7.55	1.78	.172
GEOG	1.27	1	1.27	0.30	.585
2-Way Interactions					
SEX BMI	5.98	2	2.99	0.71	.495
SEX GEOG	2.97	1	2.97	0.70	.404
BMI GEOG	3.13	2	1.56	0.370	.692
Residual	644.09	152			
Total	18153.00	164			

CHAPTER 4

DISCUSSION

The purpose of this study was twofold: 1) to determine if obese individuals report a lower quality of life than non-obese individuals; and 2) to compare the results between men and women and urban and rural settings. The results of the study supported two of the three research questions related to the study's purpose. Students who were classified as obese reported a poorer of life, and the same was true for women. Both sets of results are consistent with the literature on quality of life, for example, the Swallen et al. (2005) study (on sex) and Han et al.'s (1998) research (on obesity).

Results from this study found no differences in the way participants in rural settings viewed their quality of life when compared to those in urban counties, contrary to what was originally hypothesized. Across all comparisons, where a participant lived was not related to his/her perceptions concerning quality of life. In this study, each participant was relatively well-educated, given their enrollment at a major university. As such, the analyses could not be sensitive to education as a factor; future study might include a more representative subject pool. A future study might also attempt to find out why there were no differences, since residents of rural and urban environments seem to differ on many issues, and not just this one.

Although sex and weight category both showed main effects, these two factors only minimally explain quality of life in this study. For example, when considering the total model, the main effects for both SEX and WTCAT combined accounted for less than one percent of the total sums of squares in the analysis. In a practical sense, being a woman or being obese does not necessarily mean that a person has a poorer quality of life. These

data suggest that these factors comprise two components of a much larger picture, and that quality of life is a complex, multi-factorial phenomenon.

The results of the study show that the ORWELL 97 could be a useful instrument in determining quality of life in American university students. However, it should be used as one of a battery of tests and measures that assess quality of life in this population. In addition, the questionnaire does not currently provide a cut-off point, or threshold, for a "poor" quality of life, but provides a continuous scale of relativity. Future testing might explore the potential for establishing a criterion measure, or cut-off., or at least provide some data to help determine what that threshold might be.

Results of the study suggest that the ORWELL 97 is a reliable (r = .90) instrument for measuring quality of life in this population. When looking at the two subscales, reliability data suggest that the ORWELL-1 on psychosocial distress (discomfort and impact) is also a reliable measure (r = .89), however, the ORWELL-2 which measures physical distress (physical discomfort) is not (r = .66); an $r \geq .80$ is typically accepted as the level for a reliable measure (Nunnally, 1967). Overall, it appears that this instrument may be one that can be used to measure of quality of life among students in the United States, as two of the three measures had reliability coefficients that were high enough to be acceptable. Further psychometric testing on the questionnaire is indicated to demonstrate validity, test-retest reliability, etc. Only then will there be enough evidence to support the claim that this instrument measures quality of life in this population.

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APPENDIX A

RESEARCH HYPOTHESES, SIGNIFICANCE OF THE STUDY, VARIABLES IN THE STUDY, DELIMITATIONS, LIMITATIONS, ASSUMPTIONS, AND DEFINITION OF TERMS

Research Hypotheses

It is hypothesized that the following relationships will exist:

1. Study participants classified as obese will report a lower quality of life than the non-obese.
2. Among obese participants, females will report a lower quality of life than males.
3. Among obese participants, those in urban areas will report a lower quality of life than those in rural areas.

Significance of the Study

Research studies conducted on quality of life typically compare men and women in their methods, but all too often fail to examine the population as a whole. In addition, it is difficult to find comprehensive research on males versus females when dealing with the different concerns of quality of life. By looking at the two sexes together, societal trends can be documented and awareness initiatives begun.

Another area where there is lack of research is in physical environment – geographic area. Despite the documented larger prevalence of disease and disease risk factors in rural settings, individuals living in rural areas may not perceive the risk obesity imposes on well-being in the same way as individuals who live in urban settings. This may be attributable in part to fewer public campaigns aimed towards increasing awareness and education. For example, urban environments often have more public advertising about

potential health concerns than some rural settings. And the relationship between gender, geographic area, and quality of life in the obese is unknown.

Variables in the Study

Overall, the following variables (and sub-levels) will be included: sex (male, female); weight category (non-obese, obese), body mass index (BMI) (normal weight, overweight, obese); geographical area (rural, urban); quality of life (Total) (total, discomfort/impact, physical discomfort); quality of life (Relevance) (total, discomfort and impact, physical discomfort); and quality of life (Occurrence) (total, discomfort and impact, physical discomfort).

Independent Variables: Sex, Weight Category, and Geographical Area

Dependent Variables: Quality of Life (Total, Relevance, and Occcurrence)

Delimitations

The study was delimited to the following:

1. All participants recruited for the study were 18-to-24 years of age who lived in the state of Georgia;
2. All participants were currently enrolled at Georgia Southern University, a mid-sized university in the southeastern United States;
3. All participants were registered in physical activity classes, or members of a student organization on-campus;
4. A 36-item paper-pencil questionnaire, the ORWELL-97, used to measure quality of life in students; and
5. A set of anthropometric measures, including height, weight, and waist circumference.

Limitations

The study was limited by the following factors:

1. Participants were purposively selected, and limited to the classes included for purposes of recruitment, therefore, results of the study are not generalizable;
2. The instrument used for quality of life assessment was a paper-pencil survey that relied on self-report;
3. The study included only those who agreed to participate; and
4. The content and meaning of study findings were based on interpretation of the researcher.

Assumptions

The conduct of this study was based upon the following assumptions:

1. The ORWELL 97 measured of quality of life the way it was intended;
2. Participants understood the questions presented in the instrument; and
3. Participants answered questions honestly.

Definition of Terms

Terms pertinent to the study were defined as follows:

Body Mass Index. A calculation of body weight and height indices for determining the degree of obesity (Nieman, 2003).

Normal Weight. Defined as a body mass index of 18.5-to-24.9 kg/m^2 (CDC, 2006a; CDC, 2006b).

Obesity. Defined as "…a BMI of ≥ 30 kg/m^2…" (National Heart, Lung, and Blood Institute [NHLBI], 1998, p. xi)

Occurrence. The intensity of the questions subject on physical and psychosocial distress on participants taking the questionnaire Mannuci et al., 1999).

Overweight. Defined as "…a body mass index (BMI) of 25 to 29.9 kg/m^2…" (NHLBI, 1998, p. xi)

Relevance. The relevance of the questions subject on physical and psychosocial distress on participants taking the questionnaire Mannuci et al., 1999).

Rural Area. The Census Bureau "rural" classification consists of all territory, population, and housing units located outside of UAs and UCs. The rural component contains both place and non-place territory (U.S. Census Bureau, 2002).

Urban Area. For the 2000 Census, the Census Bureau classifies as "urban" all territory, population, and housing units located within an urbanized area (UA) or an urban cluster (UC) (U.S. Census Bureau, 2002).

Waist Circumference. A measurement of distance around the waist, which physicians may use to assess a patient's abdominal fat (ObesityinAmerica.org. 2006)

APPENDIX B

EXTENDED REVIEW OF LITERATURE

Obesity: A Brief Overview

Obesity, in the simplest term, is an excessive accumulation of body fat (Nieman, 2003). Vast research has been conducted on obesity and the consequences of the disease, such as: cardiovascular and respiratory problems (Zhu et al., 2004), diabetes (Bigaard et al., 2003), physical functioning (Kushner & Foster, 2000), and psychological issues (Kushner & Foster, 2000; Rejeski et al., 2002). It is not uncommon for an obese person to have one or more of the above to conditions concurrently.

It is the combined effect of these consequences that can lead to a perceived lower quality of life (Sullivan, Sullivan & Kral, 1987). Mannucci et al. (1999) define quality of life as an individual's overall satisfaction of the life he or she is living. The literature available is often broken down into categories. Researchers are often only investigating certain aspects of a disease and what the consequences are for specific variables. For example, some studies will only look at the physical functioning in relation to obesity, whereas others might only focus on the psychological concerns. Notable exceptions to this are shown by studies conducted by Mannucci et al. (1999), who looked at how quality of life was affected by obesity. Their results reflected how different sexes perceived the disease. However, there is a gap in the literature when looking at quality of life in obese men and women in comparative settings in urban and rural environments. Research in this area might help to determine how populations are targeted with information and support about health concerns, specifically to obesity in this case.

When considering quality of life issues that encompass most factors, it is important to understand what some of the variables that encompass quality of life. However, before breaking down the different aspects of quality of life, it is essential to understand how obesity is classified. The techniques for determining if an individual is obese differ, depending on the equipment available, time to take measurements and the accuracy of the results. Secondly, understanding the effects of obesity on general, musculoskeletal and psychological health is a prerequisite.

Classifying Obesity

The most common methods for assessing obesity in the population are related to determination of body composition and include: bioelectrical impedance ($r \geq 0.99$); Body Mass Index (BMI); skinfold measurement ($r \geq 0.90$); waist circumference (WC); waist-to-hip ratio; and underwater weighing ($r = 0.95$) (Nieman, 2003). Each method has advantages and disadvantages, and unique characteristics that prevent them from being used interchangeably. For example, abdominal obesity is not easily determined by the use of skinfold calipers (Moyard, 2001). When there is a large amount of body fat to be measured, skinfold calipers may not be large enough to take the measurement. Another issue that can arise with a large amount of excess body fat is the need for a second person. The job of the second person would be to pull the skin out with both hands while the first applies the calipers. More technologically advanced methods such as dual-energy x-ray absorptiometry (DEXA), and bioelectrical impedance analysis are also effective ways of measuring body fat percentages (Table 23). Although bioelectrical impedance is an accurate tool, it is limited outside a clinical setting. It is important that the subject being assessed does not take in fluids beforehand, because excess water can

confound results. When used in a clinical setting, the client is asked to refrain from consuming fluids or engaging in exercise for at least two hours prior to the test. Data collection at a public venue, with no pre-arranged appointments, prohibits bioelectric impedance from being the measurement tool of choice in these instances.

For studies involving multiple subjects, BMI, WC and hip-to-waist ratio are the most effective (Zhu et al., 2004). Hip-to waist ratio is a good tool because it helps to identify where the excess body fat is stored. Along with BMI and WC, hip-to-waist measurements are a quick and easy collection method for large populations. The effectiveness of BMI and WC in large populations is due to the ease and time in recording the data. Little equipment is needed and not much space or time is needed in taking the measurements.

Table 23: Body fat ranges for adults 18 years of age and older [1]

Classification Schema	Male	Female
Unhealthy range (too low)	5% and below	8% and below
Acceptable range (low)	6-to-15%	9-to-23%
Acceptable range (high)	16-to-24%	24-to-31%
Unhealthy range (high)	25%- and-above	32%-and-above

[1] *Source: Nieman (2003)*

Traditionally, BMI has been considered the method of choice for operationally defining obesity. Organizations such as the National Heart, Lung, and Blood Institute (NHLBI) and the Centers for Disease and Control (CDC) use BMI as the basis for their

operational definitions (Lewis, 2004). BMI is calculated by dividing weight in kilograms by height in meters squared (kg/m^2). Using this calculation, overweight is defined as a BMI of 25 – 29.9 kg/m^2 and obesity being a BMI of greater than or equal to 30 kg/m^2 (World Health Organization [WHO], 1995).

A limitation with BMI is that body composition cannot be delineated between fat and muscle tissue, or its distribution about the individual. BMI is only a crude index of obesity and should not be used to determine body fatness of an individual due to the prediction error (≥ 5.0% BF) (Heyward, 2002, pp183). It is conceivable that an individual, such as a body builder or power lifter, with a large muscle mass and low body fat percentage could register a BMI of greater than 30 kg/m^2, but not have the health risks associated with being obese.

In response, WHO has decided to express different levels of BMI in terms of degrees of overweight rather than obesity. The numerical figures of BMI stay the same under the WHO system, however, obesity is omitted and continuing stages of being overweight are used to represent the degree of the problem. The reasoning behind this is that defining BMI in terms of obesity implies knowledge of body composition (WHO, 1995), and as previously mentioned, BMI values do not indicate underlying body composition.

In 1995, Han et al. produced a study that suggested that weight circumference (WC) should also be used as a tool in weight management. The authors concluded that a WC > 102 cm for men and a WC > 88cm for women was a valuable adjunct to the traditionally used BMI ≥ 30 kg/m^2 for classifying someone as obese (Han et al). In reaching this conclusion, the authors investigated the relationship between two levels of WC and heart disease risk factors. Level 1 was operationally defined as a WC 94cm for men and 80cm

for women (indicating overweight) and Level 2 was operationally defined as a WC 102 for men and a 88cm for women. Both Levels showed an increase in risk for heart disease. Specifically, Level 1 was associated with 1.5 to 2 times greater likelihood of heart disease compared to the general population and Level 2 was associated with 2.5 to 3 times greater risk. Weight circumference (WC) has also been designated as a more effective tool for linking obesity as a major risk factor for other diseases besides heart disease (Jansen et al., 2004; Ford et al., 2003). From their review of literature, Ford et al. acknowledged six reasons for the preferred use of WC measurements when studying the effects of obesity: 1) WC is associated more strongly with cardiovascular disease; 2) WC provides information about diabetes, hypertension, and dyslipidemias; 3) WC can be a better predictor of medical health costs; 4) it is easier to measure; 5) the general public more easily understands the measure; and 6) WC measurements are needed to measure the metabolic syndrome (Ford et al.).

Leading health organizations such as the WHO and the National Heart, Blood, and Lung Institute (NHBLI) have each endorsed both BMI and WC as important tools for assessing obesity (Iwoa et al., 2001). Despite this endorsement, WHO has elected to use the differing BMI levels as their method of choice. The use of BMI, WC, or BMI and WC in tandem appears to remain a personal choice for researchers. Although the larger health organizations tend to stipulate BMI, there are many researchers who will still use other instruments. Jansen et al. (2004) stated that WC can stand alone and can predict a larger variety of risk factors than BMI, however, it is not known if the opposite is necessarily true. Other studies offer similar support that a high WC is a strong enough

indicator of obesity and it's presence as a high risk factor for other diseases, regardless of BMI (Arden et al., 2003).

Associated Problems with Obesity

Risk Factors for Disease. Being obese increases one's risk for many diseases. Some of these include hypertension, dyslipidemia, type 2 diabetes, heart disease, gallbladder disease, osteoarthritis, sleep apnea, respiratory problems, and some cancers (Zhu et al., 2004; Jansen et al., 2004). Furthermore, from an intervention perspective, the single most effective way of controlling blood pressure is with weight loss (Lopez-Garcia et al., 2003). Similar data exists for type 2 diabetes (Must, Spadano, Coakley, Colditz, & Dietz, 1999). Obesity is prevalent in most people with type 2 (Nieman, 2003) diabetes. For both type 2 diabetes and hypertension, obesity as a risk factor is modifiable with a good weight management program (Nieman, 2003).

Relationships have been established between obesity and heart disease (Arden et al., 2003). Excess body weight forces the heart to work harder to circulate blood throughout the body. A longitudinal study looked at nurses over an eight year period and found that the risk of coronary heart disease almost tripled in those with a body mass greater than 29 kg/m^2 compared to a BMI of less than 21 kg/m^2 (Moyard, 2001).

Research has shown that certain classifications of obesity serve as better predictors of heart disease, than others, with differences existing between males and females. In one study considering hip circumference, waist circumference, and BMI, hip circumference was associated with higher death risk and development of CVD and CHD among females than either waist circumference or BMI, however, the same was not true for males. BMI

and waist circumference were both independently related to the aforementioned diseases, but hip circumference was not (Heitmann, Frederiksen, & Lissner, 2004).

Overweight and obesity are major risk factors for gallbladder disease and are more prominent in women than men. There is a direct relationship between the risk of gall-bladder disease and an increase in BMI (WHO.

The Musculoskeletal System. Along with the many physiological consequences that are associated with obesity, the musculoskeletal system is also affected negatively (Jansen et al., 2004). An increased quantity of adipose tissue places a greater demand on the musculoskeletal system to complete locomotion and weight bearing activities. Physical functioning is limited due to obesity (Swallen, Reither, Hass, & Meier, 2005). Lower back pain and joint pain can have an adverse effect on an individual's quality of life. Lumbar spine pain has been attributed to obesity (for this study obesity was classified as a BMI > 29.0 kg/m^2) and that losing weight can have, albeit small, positive effect on reducing that pain (Garzillo & Garzillo, 1994).

During locomotion, people who are obese have been shown to have different patterns of movement (Hills, Hennig, Byrne, & Steele, 2002. This may be attributable to the excess fat around the lower extremities and the extra body weight that must be moved. One immediate difference is a lower movement velocity and a longer gait cycle (Hills & Parker, 1991). Additionally, it appears that obesity imposes a weight bearing imbalance between the legs and an asymmetry between the legs on the horizontal plane (Mizrahi & Susat, 1989). The net result of imbalances is an injury predisposition to the extremity being forced to contribute greater work (Mizrahi & Susat).

As with walking, other Activities of Daily Living (ADLs) have been described as being negatively affected by obesity. (Larsson & Mattsson, 2001b) Daily tasks become more difficult to accomplish; some are impossible. Complaints such as having trouble with kneeling or squatting, getting on and off public transportation (Kushner & Foster, 2000), or housework (Larsson & Mattsson, 2001b) are often cited. In that regard, many functional limitations in obese women, including flexibility, balance, squatting or kneeling, rising up from furniture, stair climbing and carrying grocery bags make their chores much more of a demand (Larsson & Mattsson, 2001b). Not only does obesity cause limitations with ADLs, but it is also associated with an increase in back and limb pain due to the extra weight (Larsson & Mattsson, 2001a).

The link between obesity and osteoarthritis has been made, but the relationship between the two is sometimes unclear (Hills et al., 2002). However, an association between obesity and osteoarthritis in the knee has been found, but this is not true for the hips.

Psychological Factors. A great deal of research has been conducted on obesity; however, there is an overwhelming emphasis in the research literature with regard to physiological verses psychological effects; much more has been studied on the physiological consequences of obesity than the psychological ones (Wadden & Stunkard, 1985).

The National Institutes of Health Consensus Development Conference Statement, developed mainly by physicians, studied both the physical and psychological consequences of obesity. They concluded that: "Obesity creates an enormous psychological burden. In terms of suffering, this burden may be the greatest adverse effect of obesity." (National Institutes of Health [NIH], 1985, p. 1073). Obesity has been

linked to feelings of guilt, depression, anxiety, and low self esteem (Larson, 2004). Due to the negative connotation associated with obesity, it is common for the obese to be subjected to prejudice and discrimination (Stunkard & Wadden, 1985). A consequence of obesity for women is a slower work pace and capacity. In Sweden, this has led to a bias against obese women for not being able to work as effectively or efficiently (Larsson & Mattsson, 2001b). In a study on the social and psychological consequences of obesity, words such as; lazy, dirty, stupid, ugly, and cheats were found to have been used at an early childhood age when referring to obese children (Staffieri, 1967).

Stunkard and Wadden (1985), reported similar results and said that the psychological burden is especially of concern among adolescents (Stunkard & Wadden, 1985) A subsequent study found that psychological concerns, with depression being the main issue, are more prevalent among the obese than the non obese (Fitzgibbon, Stolley, & Kirschenbaum, 1993).

Research appears to indicate that women suffer more psychological and emotional problems than do men due to obesity. For example, women with a BMI >34 kg/m^2 have been reported to have a greater amount of psychological issues than men with a BMI >38 kg/m^2 (Sullivan et al., 1987). In a study conducted among adolescents and quality of life related to obesity, results showed that gender was a major factor, with girls significantly more likely to report depression and low self-esteem than boys (Swallen et al., 2005). Furthermore, the girls reported more problems with social functioning in high school (Swallen et al.).

Among the greatest concerns for the obese are body image (Rosen, 1996) and binge eating (Spitzer, et al., 1992); having both affects one's self and his/her place in society.

One epidemiological study found that overweight and obesity have been linked to proneness to accidents, drug use, and psychological problems (Fitzgibbon, Stolley, & Kirschenbaum, 1993).

Quality of Life

There is no single universally adopted definition quality of life. In general, quality of life displays "…the satisfaction of an individual's values, goals and needs through the actualization of their abilities or life-style." (Emerson, 1985, p. 346). Multiple variables factor into quality of life, and they all need to be examined. A comprehensive assessment of quality of life likely includes standard of living, quality of housing and neighborhood, satisfaction in the work place and home, relationships, and health (Ware, 1993). Whereas it is easy to draw conclusions on how someone else is living, results from self-assessment reflect the individual's views more accurately. Quality of life is the individual's overall satisfaction with his or her life and is based on one's own values, goals ability and needs (French, Rogers, & Cobb, 1974).

Measurement of Quality of Life. Among the most appropriate of techniques for assessing quality of life is the use of a questionnaire based instrument. Two types of scales – specific and generic – are used. The specific scales are adapted to the specific diseases and as a result can record very small changes in quality of life associated with the disease. Le Penn et al. (1998) describe specific scales as being repetitive on certain questions by asking them in two-or-more different ways and that the results are hard to interpret due to lack of external reference. When a question is reformed in a different format, there are not always direct examples upon which to refer. In contrast, generic scales are used across a variety of diseases and are a validated instrument of choice for

health-related studies (Le Penn et al.). Although validated and able to be used over a wide spectrum of health issues, generic scales may be poorly adapted to some conditions due to a lack of sensitivity (Le Penn et al.). When conducting a study, it is important for the investigator to select the appropriate type of questionnaire for the disease being examined (Kushner & Foster, 2000).

Examples of such survey tools are the Obesity Related Well Being (ORWELL-97) questionnaire (Manucci et al., 1999), the SF-36 questionnaire (Rejeski et al., 2002), and the RAND-36 questionnaire (Hays, Sherbourne, & Mazel, 1993). The ORWELL-97 is an example of a specific scale, specific to obesity, whereas SF-36 and RAND-36 are both examples of generic scales.

ORWELL-97 was designed by Mannucci and his colleagues, with contributions from several psychiatrists, endocrinologists, nurses, and dietitians. After a trial test period, and feedback from patients and physicians, the questionnaire was modified. The final survey instrument addresses three main areas: Symptoms; Discomfort; and Impact (Mannucci et al., 1999). There are 18 items, each with two parts. One part is related to occurrence (O) and the other to relevance (R). When analyzing results, three factors are considered; the total score (ORWELL-97), the occurrence score (ORWELL 97-O), and the relevance score (ORWELL 97-R). Results indicated that obese females report higher mean scores than males, signifying a lower quality of life. The authors suggested that differences seen between sexes is entirely due to psychological factors regarding being overweight. In the instrument validation process, there were no significant age-based correlations observed on any of the three factors. BMI did not correlate significantly with the ORWELL 97 or the ORWELL 97-R, but did with the ORWELL 97-O. For the subscales, a positive linear

correlation between BMI and the physical symptoms was observed, but not for the scale on measuring psychological impact. The authors interpret this to mean that the severity of obesity interferes with physical functioning and not with psychological status or social adjustment. Similar results were found in another study, where quality of life is reported to be poorer in the obese is due to worse physical functioning (Kushner & Foster, 2000).

The SF-36 and RAND-36 may each be used in a variety of settings and are considered to be Health Related Quality of Life (HRQL) tools (Kushner & Foster, 2000; Han et al., 1998). The RAND-36 was adapted from the SF-36 and covers the same areas and scales as its predecessor (Han et al.). The SF-36 questionnaire is comprised of two norm based T-scales – Mental Health and Physical Functioning – and eight subscales. The subscales are: Physical Functioning; Mental Health; Role-Physical; Role- Emotional; Bodily Pain; General Health; Vitality; and Social Functioning. The norm-based scales each have a mean of 50 with a standard deviation of 10; subscale scores are reported on a range of zero to 100, with higher scores representing higher levels of functioning (Rejeski et al., 2002). RAND-36 differs only on the scoring scales. One study that used the SF-36 reported that as BMI increased, the scores decreased, indicating a poorer quality of life (Kushner & Foster, 2000).

In a study comparing generic versus specific questionnaires, Le Penn et al. (1998) designed an obesity-specific instrument to compare to the SF-36. Both scales measured changes in quality of life in obese subjects when compared to the non-obese. The SF-36 scale was sensitive to the physical differences in quality of life between obese and non-obese, as opposed to psychological ones. The disease-specific questionnaire showed significant differences in all of its domains; physical, psychological, and social. The

authors reported that the two types of scales correspond to different objectives. The generic scale can be used to compare one disease to another and the specific scale is more limited in its objectives. In this case the objectives measured quality of life in the obese (Le Penn et al.)

Quality of Life and Obesity. Various studies have considered quality of life in the obese. Results demonstrated that obese individuals rate themselves as having a decreased quality of life when compared to the non-obese (Lean et al., 1998; Rejeski et al., 2002; Lopez-Garcia et al., 2003; Han et al., 1998). The differences in quality of life are primarily related to physical functioning and pain, but not psychological issues. Physical problems frequently cited involve: walking several blocks, bending, kneeling, and stooping (Han et al.).

Obesity is a major risk factor for other diseases, which can in turn further decrease quality of life (Lean et al., 1998). Results from one study suggest that quality of life in the obese is modifiable. The authors assessed the changes in quality of life for the obese when diet and exercise was administered. Using the SF-36 questionnaire, they found a positive effect of diet and exercise in all primary domains, except the composite mental health score (Rejeski et al., 2002)

Quality of life assessments report that women were much more likely to report a poorer score on a general basis than men (Swallen et al., 2005). The same results are true when investigating quality of life based on obesity. One study looked at the results based on increased waist circumference and BMI. As the measures increased, the scores signified a decrease in quality of life (Han et al., 1998). Women said that their quality of

life was “not good,” where as men said that they did not know. Another comparison was when men rated themselves as ‘not happy’ and women as “down in the dumps.”

Physical Environment and Quality of Life. Where an individual lives in geographical terms is a partial indicator of what diseases they might be at risk for. Early research indicated that cardiovascular disease was much more prevalent in urban settings. For obesity, similar results have been found. Findings from a study investigated rural verses urban environments, educational status and obesity. In both environments, obesity levels were higher in people who had not finished high school. For those in rural settings, however, higher prevalence rates of obesity were observed (Pearson & Lewis, 1998).

A study conducted at the University of Washington looked at the prevalence of obesity in rural counties (Jackson, Doescher, Jerant, Hart, 2005). The investigators found that in rural counties, 23% of people were obese, where as in urban counties; there was a 20.5% rate of obesity. Theses figures show an increase of 4.8% in rural settings and 5.5% in urban. The highest obesity prevalence occurred in rural counties in Louisiana, Mississippi, and Texas; obesity prevalence increased for rural residents in all states but Florida over the study period (Jackson et al.). These results supported the previous findings that rural settings have a higher percent of obese people living in them.

A research study based in India (Sidhu, Kaur, & Prabhjot, 2005) provided evidence contrary to that reported above. The authors found that obesity was more prominent in females in urban settings (Sidhu et al.). Similar research was carried out in North Korea, but had mixed results. Men aged 50 – 64 showed a higher prevalence of obesity in urban settings, where as men aged 20-to-49 showed no difference. For the younger age group,

there were more obese women in the rural environment and no differences in the older age group (Chung, Han, Lee, & Kang, 2005).

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APPENDIX C

QUALITY OF LIFE STUDY
PARTICIPANT SURVEY

Participant Code: _____

Section I: Demographic Information.

Please provide the following information in the space provided…

1. What is your age? _____

2. What is your sex? (Please check one)
   - ☐ Male
   - ☐ Female

3. What is your sex? (Please check one)
   - ☐ White -- not Hispanic
   - ☐ Black -- not Hispanic
   - ☐ Hispanic or Latino
   - ☐ Asian or Pacific Islander
   - ☐ American Indian or Alaskan Native
   - ☐ Other

4. What is your State of residence? _____

5. What is your County of residence? _____

6. How long have you lived there? _____

Section II: Personal Information.

Please provide the following information in the space provided…

1 Are you pregnant? (Please check one)

- ☐ No
- ☐ Yes

2. Have you had surgery in the past year? (Please check one)

- ☐ No
- ☐ Yes

If yes, what type of surgery was it?

_____

_____

3. Are you currently suffering from any injuries? (Please check one)

- ☐ No
- ☐ Yes

If yes, what type of injury is it?

_____

_____

Section III: Quality of Life Questionnaire.

Questions in Section III are about what you think and how you feel about your life. Each item will ask about the relevance and the occurrence of things in your life. Please answer each question by filling in the appropriate circle. Thank you.

Questionnaire Item	Not At All	Just A Little	Not That Much	Very Much
1a. How important is it for you to exercise regularly?	①	②	③	④
1b. Is your weight an obstacle to exercising regularly?	①	②	③	④
2a. How important is it to for you to have sex regularly?	①	②	③	④
2b. Is your weight an obstacle in your sex activity?	①	②	③	④
3a. Do you suffer from shortness of breath?	①	②	③	④
3b. Is this an obstacle to your daily activities?	①	②	③	④
4a. Do you often feel sleepy?	①	②	③	④
4b. Is this an obstacle to your daily activities?	①	②	③	④
5a. Do you suffer from excessive sweating?	①	②	③	④
5b. Is this an obstacle to your daily activities?	①	②	③	④
6a. Mass media (TV, newspapers, etc.) often report that obesity is a major risk factor for health. How much do you pay attention this subject?	①	②	③	④
6b. To what degree does this information increase your preoccupation with your health?	①	②	③	④
7a. Is it important for you to live in a serene family environment?	①	②	③	④
7b. Does being overweight prompt discussions in your family?	①	②	③	④
8a. Is it important for you to be successful in your job?	①	②	③	④
8b. Does your weight present an obstacle in your job?	①	②	③	④
9a. Is it important that you spend time with family?	①	②	③	④
9b. Does your weight interfere with family/friends?	①	②	③	④

Section III (continued): Physical Discomfort, Psychological Status, and Social Adjustment Related to Obesity.

Questionnaire Item	Not At All	Just A Little	Not That Much	Very Much
10a. Do you feel uneasy showing your body?	①	②	③	④
10b. Does this interfere with you leisure activities?	①	②	③	④
11a. Is it important for you to feel sexually attractive?	①	②	③	④
11b. Does this make you less sexually attractive?	①	②	③	④
12a. Do others tease you about your weight?	①	②	③	④
12b. If this happens, does it worsen your mood?	①	②	③	④
13a. Do you feel excessively worried about unimportant matters?	①	②	③	④
13b. Do you think that being overweight makes you more apprehensive?	①	②	③	④
14a. Do you ever feel sad?	①	②	③	④
14b. Do you feel this way because of being overweight?	①	②	③	④
15a. Do you ever feel very nervous?	①	②	③	④
15b. Does being overweight make you feel more nervous?	①	②	③	④
16a. Do you have a negative opinion of yourself?	①	②	③	④
16b. Does being overweight interfere with your opinion of yourself?	①	②	③	④
17a. Do you ever experience a feeling of immediate danger with no apparent reason?	①	②	③	④
17b. Do you ever feel more exposed to risks because of being overweight?	①	②	③	④
18a. The world of fashion and entertainment pursues thinness in its models. How far-removed do you feel from being someone who is this way?	①	②	③	④
18b. How important is it for you to reach this model of thinness?	①	②	③	④

Participant Code: _____

Section IV: Anthropometrics

Weight:

_____ (lbs)

_____ (kg)

Height:

_____ (ft)

_____ (m)

Waist Circumference:

_____ (cm)

_____ (in)

APPENDIX D

INFORMED CONSENT

COLLEGE: School of Public Health

DEPARTMENT OF: Health and Kinesiology

INFORMED CONSENT

My name is Damian MacLeod and I am a graduate student at Georgia Southern University. This study is for my thesis: The Perceived Effect of Obesity in Urban vs. Rural Environments.

1. Purpose of the Study: The purpose of this research is to see if people from different living environments perceive health issues (specifically obesity) in the same way.

2. Procedures to be followed: Participation in this research will include completion of a 36 question questionnaire. Before the questionnaire is administered, height, weight and waist measurements will be taken.

3. Discomforts and Risks: There are no known risks associated with this study. Some people may find some of the questions or tasks slightly embarrassing. Know one will see the results except for the investigator and no names will be associated with those results.

4. Benefits:
   a. The benefits to participants include awareness to how certain tasks affect their lifestyle.
   b. The benefits to society include a better understanding on how effective education and awareness on obesity is and whether certain environments are being left out.

5. Duration/Time: 10 - 15 minutes

6. Statement of Confidentiality: All results will be kept in a secure location by the investigator. There will be no names or identification of the participant on any of the results forms or questionnaires.

7. Right to Ask Questions: Participants have the right to ask questions and have those questions answered. If you have questions about this study, please contact the researcher named above or the researcher's faculty advisor, whose contact information is located at the end of the informed consent. For questions concerning your rights as a research participant, contact Georgia Southern University Office of Research Services and Sponsored Programs at 912-486-7758.

8. Compensation: All participants will receive a voucher for their participation. There are no costs associated with this study for the participant.

9. Voluntary Participation: Participation in this study is voluntary. You have the right to withdraw at any time, with no penalty for doing so (you will still receive a voucher). If you wish to withdraw, please tell the investigator.

10. Eligibility: Pregnant women can not participate in this study.

    You must be 18 years of age or older to consent to participate in this research study. If you consent to participate in this research study and to the terms above, please sign your name and indicate the date below

You will be given a copy of this consent form to keep for your records.

Title of Project:
Principal Investigator: Damian MacLeod, 126 A Lester Rd, Statesboro, GA 30458, 912 – 531 – 0048, spescz@aol.com
Faculty Advisor: Dr Bryan Riemann, PO Box 8076, Statesboro, GA 30460, 912 – 681 – 5268, briemann@georgiasouthern.edu

_____ _____
Participant Signature Date

I, the undersigned, verify that the above informed consent procedure has been followed.

_____ _____
Investigator Signature Date