# Overweight/Obesity and Quality of Life: A Comparison of Mexican and Mexican American Adolescents

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## Abstract

Overweight/Obesity and Quality of Life: A Comparison of Mexican and Mexican American Adolescents

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Background:
The Youth Quality of Life – Weight (YQOL-W) module measures the weight related quality of life of adolescents across three domains – self, environment and social. Quality of life (QoL) measures are used frequently in research to assess health outcomes and the impact health problems have on overall life quality. Despite intensive QoL research, few studies have used QoL measures to compare the impacts of obesity on a multi-cultural population.

Methods:
The data was collected between 2006-2008 in Seattle, WA, Los Angeles, CA and Cuernavaca, Mexico. This study compared the weight related QoL of African American (N=104), European American (N=105), Mexican American (N=98) and Mexican (N=196) adolescents aged 11-18 who completed the QoL weight-specific model. Data was analyzed using a backwards step-wise multiple regression analysis with a step-size of 0.05.

Results:

Results found that African Americans had the highest YQOL-W, while Mexicans had the lowest ($p<0.001$). Males had significantly higher YQOL-W than females across all ethnicities ($p<0.001$). Ethnic affinity, or how closely one feels connected to their ethnicity or culture, was also significantly correlated with a higher quality of life across all groups. Perceived body size was most predictive of QoL – adolescents who perceived their body as heavier, regardless of their weight, have significantly lower QoL scores ($p<0.001$). Qualitative interviews demonstrated that African American youth were accepted by their peers and families, while the majority of Mexicans (92%) and Mexican Americans (52%) felt stigmatized or teased about their weight from their peers and/or families. The sub-analysis found that the difference in QoL between Mexican and Mexican Americans was not significant, however being obese was more predictive of poor QoL-Self domain than being overweight ($p<0.021$). There was a significant difference in YQOL-W between Mexican and Mexican American males, where Mexicans had significantly lower scores ($p<0.044$).

Conclusions:

Results demonstrated that race/ethnicity does impact weight-related QoL, but areas such as gender, perceived body size and ethnic affinity more important to weigh-specific QoL. These results can be used to better tailor cross-cultural weight-loss interventions and programs in the future.

## Introduction

The goal of this project was to elucidate differences in obesity/overweight-related quality of life (QoL) between Mexican and Mexican American[1] adolescents ages 11-18 years. Mexico and the United States (US) currently have the highest and second highest prevalence of obesity in the world, respectively [1]. Despite being neighbors, however, these countries have divergent cultural attitudes and beliefs regarding obesity, diet, and health [2]. Mexican American adolescents do not necessarily share the same cultural attitudes as Mexican adolescents who have been born and raised in Mexico.

## Background and Significance

Quality of life (QoL) is a commonly used concept that incorporates a variety of factors that include a person's physical and emotional health status, level of independence and their degree of social support and connectedness[3,4]. Obesity in adolescence has generally been shown to be associated with increased comorbidities, depressed mood and premature mortality, however less is known about how obesity-specific QOL differs across cultures [3]. As populations become more diverse, there is a need to learn how different cultures relate to health, body shape and obesity. This information will help tailor weight-loss programs to the specific needs and concerns of different ethnicities/races. QoL is affected by cultural norms, particularly among individuals of the same ethnic group who are living in different countries. The comparison between Mexican and Mexican American youth is a unique way to understand the impact of cultural norms separate from ethnicity.

QoL and obesity in adolescents. Studies have consistently shown that obese adolescents have poorer health-related QoL (HRQOL) than their leaner peers [5,6,7,8,9]. Generally, as an adolescent's BMI increases, it has been shown that their HRQOL decreases. The amount that HRQOL declines is dependent on many factors, including age, race/ethnicity, and other individual differences. Declines in HRQOL are observed as soon as BMI is above the normal range [6,10]. The literature suggests that there is a moderate to strong inverse relationship between weight status and the physical and social functioning domains of HRQOL[5,6,10].

Female adolescents seem to be particularly vulnerable in terms of physical and social functioning, with evidence indicating that increased weight status has a particularly negative influence on these domains [5,6,11]. However, overweight and obesity appear most detrimental to the emotional and body esteem domains of QoL in female adolescents [5,12]. These differences in QoL are not seen in overweight/obese boys [6].

Studies have shown that emotional function is impaired among overweight and obese adolescents aged 12-14, although this impairment disappears as children age [6, 13]. Younger overweight and obese adolescents, particularly those under 15, also have poorer HRQOL, particularly in the social and physical domains, than their older adolescent counterparts [6]. This suggests coping mechanisms may develop at a later age.

Race/ethnicity and QoL in adolescents**.** When comparing adolescents of different races and ethnicities, African-American youth consistently have the highest HRQOL [11, 12, 14, 15]. Various studies done in the US have shown that African American children when compared to white children, particularly girls, are more likely to prefer a heavier ideal body size and are less likely to perceive themselves as overweight or obese, even when

they fit the diagnostic criteria for these weight classes [12,15]. African Americans consistently report higher body satisfaction, [12,14,15] and a greater physical function-related HRQOL, than their white counterparts [12].

Obesity/overweight and QoL in Mexican and Mexican-American adolescents. Studies have shown that US-born Mexican American adolescents are more likely to be obese than their Mexico-born peers [16]. The overweight and obesity prevalence among Mexican-American adolescents (48.8%) and Mexican immigrant adolescents (43.2%) is significantly higher than the national US average (34%)[17]. Mexican American and Mexican boys are more likely to be overweight or obese than both Mexican American and Mexican girls [17]. The literature suggests that Mexican American female adolescents are, on average, heavier and less physically active than their non-Hispanic counterparts[18]. Finally, immigrant women who were born in Mexico but raised in the US, generally have a higher BMI and perceive themselves as overweight/obese than women who reside in Mexico[19,20]. Immigrants who have been in the US for less than five years retain the weight status and related outcomes of their home country. Mexican American women who were born in the US are more likely to be obese than immigrant women[19].

While adolescent overweight and obesity are common in the US and Mexico, no research has directly compared the QoL between obese/overweight Mexican and Mexican American adolescents. Determining how QoL differs between Mexican and Mexican American adolescents can help improve weight-loss programs. Poor QoL is associated with depressive symptoms and decreased motivation[11]. By addressing the unique root causes of QoL in different ethnic/racial groups, researchers can create more effective weight-loss or health promotion interventions. Although these groups share a

common ethnicity, their cultural beliefs and understandings likely differ and it is not known if adolescents of Mexican ethnicity experience a differing QoL depending on their country of residence. Cultural differences, such as levels of social support, peer-pressure, and stress, may all affect one's perception of overweight/obesity and its impact on QoL[21,22]. There is some evidence to suggest Mexican women's perception of their body image becomes more negative the longer they have lived in the US [14,23.] This may be indicative of an American cultural pressure to be thin or a culture that places a lot of significance on body image. Further evidence suggests that Mexican American women share the American cultural values regarding appearance and experience similar rates of body image dissatisfaction[23]. Body image has historically been less important in Mexican culture which is less likely to reject or discriminate against people based on their weight status[23].

QoL is an effective and informative measure that can be used across different cultures and ethnicities; however it has never been used to understand the impact of cultural norms separate from ethnicity/race. Measuring weight-related QoL in adolescents can help recognize problems early and design programs to correct poor QoL that can lead to later comorbidities. This study aimed to evaluate which variables are most predictive of low QoL and how these variables differ between different groups.

## Methods

Parent Study**.** This analysis used both qualitative and quantitative data that were collected as part of a research study funded by the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK, grant # R01 DK071101), which developed and validated a cross-cultural QoL weight-specific module for adolescents [4,24]. The data were collected between 2006-2008 in Seattle, WA, Los Angeles, CA, and Cuernavaca, Mexico. Qualitative interviews were conducted with adolescents to develop items in both English and Spanish for the weight- specific QoL instrument. A total of 60 obese adolescents were interviewed in Seattle (n=29), Los Angeles (n=20), and Mexico (n=11). The resulting Youth Quality of Life Instrument – Weight module (YQOL-W) is comprised of 21 items assessing three domains of weight specific QoL: Self (n=4), Social (n=12) and Environment (n=5), and includes a total score. The Self domain measures how weight impacts an individual's sense of self, including how their weight makes them feel in front of others. The Social domain looks to assess how weight impacts social relationships and individual's interactions with their peer groups. The Environment domain evaluates obstacles and opportunities that adolescents attribute to their weight. Questions from each domain include: "I feel uncomfortable around people who are skinnier than I am" (self)," I feel like a loser when others tease me about my weight" (social), and "because of my weight I avoid being seen in a swim suit" (environment). Each item is answered on an 11-point rating scale (zero to ten), with a higher score representing higher QoL.

To validate the YQOL-W module, a community sample of 634 adolescents in Seattle (n=232), Los Angeles (n=221) and Cuernavaca, Mexico (n=181) were invited to complete the questionnaire. Height, weight and waist circumference measurements were

collected prior to the interview. The questionnaire battery included the YQOL-W module in addition to the Multi-Group Ethnic Identity measure [25], which evaluates each adolescent's sense of belonging to their ethnic group, the Youth Perception of Body Size from the RENO Heart Study [26], and the Self Rated Health Status health survey [27]. For more details on the procedures and methods of the parent study, see Morales et al [4]. Ethnicity was self-reported by the adolescents and/or their parents.

Present Analysis. This is a mixed-methods analysis that uses both quantitative data and qualitative interviews. The quantitative data was analyzed first and directed what themes/topics in the qualitative interviews were most applicable to the results.

The present analysis compared the weight related QoL of African American (N=105), European American (N=105), Mexican-American (N=85) and Mexican (N=209) adolescents aged 11-18, who were included in the validation study described above. The covariate and predictor variables were obtained from the YQOL-W module that was used to measure weight-related QoL, and from the Multi-Group Ethnic Identify Measure-Short Form and Youth Perception of Body Size, which asks youths to report their perceived body shape using drawings ranked from 1 (thinnest) to 13 (largest). Additionally, the WHO BMI Classification schedule were included in the analyses. Demographic variables, including age, sex, birthplace, ethnicity, and language spoken at home were also included.

The models used for analyses were:

**TotWQoL** = $B_0 + B_1$ (Gender) + $B_2$ (Age Group) + $B_3$ (Birth Place) + $B_4$ (Ethnic Affinity Score) + $B_5$ (Weight Category) + $B_6$ (Your Body Shape) + $B_7$ (Race/Ethnicity)

**QoL Self** = $B_0 + B_1$ (Gender) + $B_2$ (Age Group) + $B_3$ (Birth Place) + $B_4$ (Ethnic Affinity Score) + $B_5$ (Weight Category) + $B_6$ (Your Body Shape) + $B_7$ (Race/Ethnicity)

**QoL Social** = $B_0 + B_1$ (Gender) + $B_2$ (Age Group) + $B_3$ (Birth Place) + $B_4$ (Ethnic Affinity Score) + $B_5$ (Weight Category) + $B_6$ (Your Body Shape) + $B_7$ (Race/Ethnicity)

**QoL Environment** = $B_0 + B_1$ (Gender) + $B_2$ (Age Group) + $B_3$ (Birth Place) + $B_4$ (Ethnic Affinity Score) + $B_5$ (Weight Category) + $B_6$ (Your Body Shape) + $B_7$ (Race/Ethnicity)

Where each YQOL-W domain score is the dependent variable.

The predictor variables were selected based on the findings of previous QoL research studies, and our hypotheses, found at the end of the introduction section, regarding which variables would be most associated or indicative of QoL differences between cultures and ethnicities. The Ethnic Affinity Score was used as a proxy to determine how adolescents perceive themselves as fitting in with their identified ethnic group. The perceived body shape variable was found to be a good predictor of YQOL-W in a study by Edwards et.al [15].

Each model was entered into STATA 14.1 using a backwards step-wise multiple regression analysis with a step-size of 0.05. Individuals were excluded from the analyses if they identified as mixed race (n=99), Asian American (n=7), Native American (n=26), other (n=20) or the field was left blank (n=1). Additionally, individuals who selected "Mexican" as their ethnicity but were born in the US and only spoke English at home were reclassified as Mexican American (n=10). An individual who self-identified as

"Mexican American" but were born in Mexico, only spoke Spanish at home and completed their interview in Mexico were reclassified as "Mexican" (n=1).

Sub-Analysis Results and Qualitative Illustrations. After the overall analyses were conducted with the entire study sample, the weight-specific QoL scores of the Mexican and Mexican Americans participants were compared to one another. The model for these sub-analyses was the same as the one that was used for the overall analyses; however it only included those individuals who identified as Mexican or Mexican American. This was done to narrow in on how YQOL-W differed between these two groups and determine if there were subtle differences that were masked by the large, more heterogeneous sample. Similar to the overall analyses, the sub-analyses tested the total QoL scores in addition to the three domain scores in the following groups:

- Mexican American boys compared to Mexican boys (N=144)
- Mexican American girls compared to Mexican girls (N=150)
- Mexican boys compared to Mexican girls (N=196)
- Mexican American boys compared to Mexican American girls (N=98)

Once the quantitative analyses were completed for each group, the qualitative interviews (N=28) with overweight and obese Mexican and Mexican American adolescents were examined to further explore the associations found and provide context for the quantitative results. These interviews had previously been transcribed and had passages coded as relating to each of the QoL domains. These passages were abstracted and examined to further to better understand the quantitative results.

## Results

Characteristics of the Total Sample.

Table 1 reports the BMI and some of the demographic characteristics of the total sample (N=503), which included African American (n=104), Caucasian (n=105), Mexican-American (n=98) and Mexican (n=196) adolescents aged 11-18. The sample was evenly distributed between the two age groups – 11-14 years old (52%) and 15-18 years old (48%). The breakdown by weight category was 30% normal weight, 33% overweight, and 38% obese.

**Table 1: Sample BMI and Demographic Characteristics**

| | African American( N=104) | European American (N=105) | Mexican American (N=98) | Mexican (N=196) | Total |
|---|---|---|---|---|---|
| **Age** | | | | | |
| 11-14 | 43 | 47 | 61 | 111 | 262 (52%) |
| 15-18 | 61 | 58 | 37 | 85 | 241 (48%) |
| **BMI** | | | | | |
| Normal | 41 | 35 | 29 | 45 | 150 (29.8%) |
| Overweight | 27 | 32 | 30 | 75 | 164 (32.6%) |
| Obese | 36 | 38 | 39 | 76 | 189 (37.6%) |
| **Gender** | | | | | |
| Female | 51 | 56 | 55 | 95 | 257 (51.1%) |
| Male | 53 | 49 | 43 | 101 | 246 (48.9) |
| **Birthplace** | | | | | |
| USA | 101 | 102 | 85 | 3 | 291 (58.2) |
| Mexico | 0 | 0 | 13 | 193 | 206 (41.2) |
| Other | 1 | 2 | NA | NA | 3 (0.6) |
| **Mother's Education** | | | | | |
| No school | 2 | 0 | 3 | 8 | 13 (2.6) |
| Primary school | 0 | 0 | 16 | 45 | 61 (12.1) |
| Some high school | 6 | 2 | 21 | 63 | 92 (18.3) |
| High school grad | 23 | 16 | 16 | 54 | 109 (21.6) |
| Some college | 37 | 27 | 20 | 8 | 92 (18.3) |
| College grad | 23 | 35 | 13 | 15 | 86 (17.1) |
| Master's/postgrad | 4 | 23 | 1 | 2 | 30 (6.0) |
| Don't know/blank | 9 | 2 | 8 | 1 | 20 (4.0) |
| **Home Language** | | | | | |
| English | 103 | 104 | 36 | 0 | 243 (48.5) |
| Spanish | 0 | 0 | 10 | 185 | 195 (38.9) |
| Spanish and English equally | 0 | 0 | 52 | 11 | 63 (12.6) |

Overall Results.

In all the YQOL-W domains, males had a significantly higher QoL score than females. The greatest difference was observed in the Self domain (Table 3), where males had a nearly 15-point higher score than females. Although the differences were smaller for other domains, they were all significant: 9 points for the Total score (Table 2), 7 points for the Social domain (Table 4), and 12 points for the Environment domain (Table 5). The Youth Perception of Body Size was significantly inversely associated with YQOL-W score across all domains.

Ethnic Affinity, a measure of how strongly youth identified with their cultural and ethnic background, had a positive relationship with QoL across all domains. For every one-point increase in ethnic affinity score, adolescents had a 4 to 5.7 point higher QoL.

Mexican and MexicanAmericans had the poorest QoL of all the race/ethnicities in the model. Being African American or European American were not significant predictors of QoL in the overall model. Mexicans had a slightly lower QoL than their Mexican American counterparts in all domains, with the smallest difference observed in the Self domain. Birthplace and Weight category were not associated with QoL and were rejected from the model.

**Table 2: YQOL-W Total score**

| TQoL | Coefficient | STD Error | P-Value |
|---|---|---|---|
| Gender – Male | 9.668 | 1.93 | 0.000 |
| Age Group – 15-18 | 4.700 | 1.95 | 0.017 |
| Ethnicity – Mexican | -11.336 | 2.28 | 0.000 |
| Mexican-American | -7.247 | 2.69 | 0.007 |
| Your Body Shape | -7.005 | 0.499 | 0.000 |
| Ethnic Affinity | 5.323 | 1.776 | 0.003 |
| Constant | 82.775 | 6.503 | 0.000 |

N=500, P value 0.0000, R-Squared 0.3894

**Table 3: YQOL-W – Self domain score**

| QoL – Self | Coefficient | STD Error | P-Value |
|---|---|---|---|
| Gender – Male | 14.536 | 2.425 | 0.000 |
| Ethnicity-<br>Mexican American | -10.100 | 3.331 | 0.003 |
| Mexican | -11.294 | 2.837 | 0.000 |
| Your Body Shape | -6.689 | 0.635 | 0.000 |
| Ethnic Affinity | 5.186 | 2.225 | 0.020 |
| Constant | 73.247 | 9.17 | 0.000 |

N=499, P-value < 0.0001, R-Squared=0.2967

**Table 4: YQOL-W – Social domain score**

| QoL – Social | Coefficient | STD Error | P-Value |
|---|---|---|---|
| Gender – Male | 7.214 | 1.985 | 0.000 |
| Age Group – 15-18 | 4.966 | 2.008 | 0.014 |
| Ethnicity-<br>Mexican | -11.089 | 2.340 | 0.000 |
| Mexican-American | -6.068 | 2.760 | 0.028 |
| Your Body Shape | -6.784 | 0.512 | 0.000 |
| Ethnic Affinity | 5.707 | 1.824 | 0.002 |
| Constant | 84.796 | 6.681 | 0.000 |

N=501, P-value < 0.0001, R Squared = 0.3547

**Table 5: YQOL-W – Environment domain score**

| QoL – Environment | Coefficient | STD Error | P-Value |
|---|---|---|---|
| Gender – Male | 11.555 | 2.125 | 0.000 |
| Ethnicity –<br>Mexican American | -9.457 | 2.925 | 0.001 |
| Mexican | -13.047 | 2.487 | 0.000 |
| Your Body Shape | -7.678 | 0.548 | 0.000 |
| Ethnic Affinity | 4.170 | 1.952 | 0.033 |
| Constant | 90.918 | 7.014 | 0.000 |

N=501, P-value< 0.0001, R Squared=0.3881

Males of all ethnic groups were better at ignoring insults and not internalizing them. One 15-year-old male Mexican American said “It doesn’t bother me [if I’m the slowest and people make fun of me], I just like go down and keep going and keep running ‘til I make it.” Females did not talk of brushing off insults but mentioned instead that it changed their feelings or outlook on things. One 14-year old Mexican girl said: ”One of my classmates is always is bothering me and then will say ‘Oh, you’re fat” or

things like that. And then, yeah, I feel bad[a].” Girls of all ethnicities were more likely than males to internalize their feelings and/or take comments from peers personally, which likely accounts for their lower YQOL-W scores.

Mexicans and Mexican Americans had the lowest YQOL-W scores. This finding was supported in the qualitative interviews. Interviews demonstrated that African Americans are more likely to be accepted by their peers and families regardless of weight status. One 17-year old African American obese female indicated that “I have talked to my friends about [her weight], and they just look at me like, hey, we like you for who you are, so it shouldn’t matter.” This same attitude was not seen in Mexican and Mexican American interviews. 92% of Mexicans and 57% of Mexican Americans reported being rejected and/or bullied by friends or family because of their weight. Mexicans reported family and friends calling them *marrano* (pig), *panzón* (big stomach) or *gordito (*fat) in a joking way but the adolescents internalized these comments and took them personally. Mexican American youths did not report the use of these terms but did indicate that friends and family make negative comments about how much they eat.

The qualitative interviews could not provide context for body shape or ethnic affinity as this information was not obtained from the qualitative interview participants.

Comparison between Mexicans and Mexicans Americans

In the overall analysis, results suggested that Mexican Americans and Mexicans have the lowest QoL of any ethnic group. In order to better understand this and compare the similarities and differences between their scores, an in-depth sub-analysis was conducted. The sub-analysis excluded all individuals identifying as African or European

[a] Translated from Spanish – “Uno que siempre me molesta de mi salón, o luego me dice “ay, estás gorda” o cosas así. Y pues, sí, siento feo.

American. The sub-analysis (N=294) contained 98 Mexican Americans and 196 Mexicans. The sample was split equally between males and females but the sample from Mexico had slightly more individuals in the younger age group.

In all models comparing Mexican and Mexican American adolescents, males had a higher QoL across all domains, echoing the trends seen in the analyses with the total study sample. Older age was associated with higher QoL scores in the Total model and the Social domain. (Tables 7 and 9) The ethnic affinity scores was associated with a higher QoL in the Total Score and the Social domain. In both cases, a one-point higher ethnic affinity score was associated with a six to seven point higher QoL. (Tables 7 and 9) These results are different than those observed with the total study sample, where ethnic affinity was a significant predictor in all domains. Additionally, perceived body shape was significantly associated with a decreased QoL scores in all the domains. (Tables 7-10) The Self domain had BMI as a significant predictor variables that did not appear in the other domain models. Being obese was associated with an eight-point decrease in QoL, however this variable was only significant in the Self domain. (Table 8)

**Table 7: YQOL- W - Total Score for Mexican and Mexican-American Adolescents**

| **WTQOL** | Coefficient | STD Error | P value |
|---|---|---|---|
| Gender – Male | 9.160 | 2.719 | 0.001 |
| Age group – 15-18 | 6.072 | 2.753 | 0.028 |
| Ethnic Affinity | 6.431 | 2.756 | 0.020 |
| Your Body shape | -7.817 | 0.702 | 0.000 |
| Constant | 72.314 | 10.22 | 0.000 |

R-squared = 0.3363, Number of Observations = 294, Overall P-Value =0.000

**Table 8: YQOL-W - Self for Mexican and Mexican-American Adolescents**

| WQoL - Self | Coefficient | STD Error | P-Value |
|---|---|---|---|
| Gender – Male | 14.793 | 3.311 | 0.000 |
| Weight Category – Obese | -8.034 | 3.460 | 0.021 |
| Your Body Shape | -7.535 | 0.855 | 0.000 |
| Constant | 86.599 | 4.908 | 0.000 |

R-squared = 0.2725, Number of Observations = 292, Overall P-Value = 0.000

**Table 9: YQOL-W - Social for Mexican and Mexican-American Adolescents**

| WQoL – Social | Coefficient | STD Error | P-Value |
|---|---|---|---|
| Gender –Male | 6.682 | 2.805 | 0.018 |
| Age Group – 15-18 | 7.009 | 2.840 | 0.014 |
| Your Body Shape | -7.498 | 0.724 | 0.000 |
| Ethnic Affinity | 7.338 | 2.842 | 0.010 |
| Constant | 72.400 | 10.546 | 0.000 |

R-Squared= 0.3008, Observations = 294, Overall P-Value = 0.000

**Table 10: YQOL-W - Environment for Mexican and Mexican-American Adolescents**

| WQOL Environment | Coefficient | STD Error | P-Value |
|---|---|---|---|
| Gender – Male | 9.727 | 3.022 | 0.001 |
| Your Body Shape | -8.708 | 0.779 | 0.000 |
| Constant | 98.836 | 4.227 | 0.000 |

R-Squared Value – 0.3272, Observations = 294, Overall P-Value = 0.000

Additional analyses were conducted to compare specific sub-groups, and the results can be found in Appendix A. As observed with the total sample, a larger perceived body shape was associated with a decrease in QoL scores across all four domains, among Mexican and Mexican American boys. Older age was also a significant positive predictor variable in the Total, Social and Environment domains in the Mexican males in both countries. Among Mexican and Mexican American girls an increase in perceived body shape was associated with a similar decrease in QoL across all domains, as found in the boys. Mexican boys had a lower YQOL score than their Mexican American counterparts in the Total domain ($p<0.042$) and the Social domain ($p<0.044$)(Tables 1 and 2 in Appendix A). Additionally, being a male born in Mexico was a negative predictor on YQOL in the Self domain ($p<0.000$, Table 3 in Appendix A).

Perceived body shape was also a significant predictor variable across all domains for boys and girls in Mexico. For every one-point increase in perceived body shape, there was a seven point corresponding decrease in QoL. Older age was associated with an increase in QoL in the Total, Social and Environment domains. Mexican boys reported a

better QoL than girls in the Self and Environment domains. In the other domains, gender was not a predictor of QoL and was rejected in the stepwise regression modeling. (Appendix A)

Mexican-American boys had a higher QoL than girls however, increased QoL scores were found among the Mexican-American boys than their male peers in Mexico. Mexican boys experienced a nine-point increase in QoL over Mexican girls. When comparing Mexican-American boys to Mexican American girls this increase ranged from 11 to 27 points.

Qualitative results add additional insight into how QoL differs between Mexican and Mexican American boys and girls. In the Self domain, girls of both ethnicities engaged in activity avoidance – they spoke of avoiding theme parks over fears of not fitting in the rides, and passing on opportunities to go to the beach with friends or looking in the mirror. Girls also mentioned internal guilt and obsessively thinking about their weight or how to lose weight. Boys, spoke less of avoidance behavior and most said they can do anything their friends can (sports, go to theme parks), but sometimes need to try harder than their thinner friends. Multiple male informants mentioned that they avoided opportunities to spend time with or date girls because they felt unattractive. However, they did feel comfortable spending time with male friends and had no interest in losing weight for girls.

**Discussion:**

The main hypothesis of this study, that ethnic/cultural influences have a substantial impact on QoL, was not supported by the results. Perceived body shape was the most consistent and significant negative predictive variable of weight-related QoL in all the analyses, supporting the findings of the Edwards et. al. article[15]. This suggests that regardless of adolescent's actual weight or BMI status, how they perceive themselves and their body is more indicative of their QoL. This has important ramifications for how obesity is treated and managed. A focus on perceived body size may be more beneficial and effective to achieving weight loss or improving QoL than targeting adolescents based on their weight or BMI alone.

Ethnic affinity was significantly associated with higher QoL in the analyses in the total study sample, but was not found to be significant in the Self and Environment domains of the Mexican/Mexican American sub-analyses. Ethnic affinity can be considered as a proxy of how individuals feel they fit into or are part of a group. This finding suggests that being part of a larger group or the ability to relate to others with a similar race/ethnicity is associated with a better QoL and could be used as a way to improve QoL in future interventions.

In the overall analysis, Mexican adolescents had the lowest YQOL-W scores of any race. Additionally, the sub-analysis results demonstrated that Mexican males have lower YQOL-W scores than their Mexican-American counterparts. Female Mexican adolescents had a higher YQOL-W score than female Mexican American adolescents. This finding was supported by qualitative interviews as Mexicans reported frequent bullying and weight-related stigma. These qualitative results contradicted the findings of

Toro et. al., who found that Mexicans are less likely to reject or discriminate against those who are overweight or obese[23]. The Mexican sample in the Toro et. al. article was taken from an upper-middle class urban environment, which is a minority that is unrepresentative of the general population. This may be one reason why they did not find bullying behavior. Nearly all of the male Mexicans interviewed in our study mentioned that they were bullied or made fun of at school and that their weight directly impacted their social life. Additionally, most mentioned that their family judges their eating and exercise habits and use names to call them fat. Male Mexican Americans also reported bullying and struggles in their social life, but were better able to ignore the insults or bullies. Mexican American families were also more willing to work with the adolescents on losing weight, through dieting and/or exercising. This result could be related to Breitkopf et. al.'s findings that body image worsens the longer Mexicans live in the US[14]. The increased willingness to diet and exercise among Mexican American families could be due to a worsening perception of their body image and their desire to improve it.

The results of the Mexican and Mexican American subanalyses suggest that there is no signifcant difference between QoL in the two groups. Gender, ethnic affinity, and preceived body shape were more indicative of weight-related QoL. Ethnicity was only associated with a change in YQOL-W scores when comparing Mexican and Mexican American males. In all other analyses, ethnicity/race was not significantly correlated with QoL scores. This may indicate that future weight loss interventions could be tailored according to these varaibles, rather than ethnicity. Weight loss interventions targeting males and females separately or those with high or low ethnic affinity may be more successful that attempts to tailor interventions based on race/ethnicty.

This study has several limitations. The study participants were recruited through convenience methods and are not representative of the general population. This is particularly true of those individuals recruited in Cuernavaca, Mexico. All individuals were recruited from the Instituto Mexicano del Seguro Social (IMSS, Mexican Social Security Institute) so there may not be a broad diversity in the participants.

Overall, this study demonstrates the multitude of variables that impact QoL in adolescents. This study's use of qualitative interviews helps explain the quantitative findings, which few QoL studies have done. Weight interventions should target perception of body status and sense of belonging rather than anthropomorphic measurements alone, as these measurements are consistently better predictors of QoL.

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[27] Self Rated Health Status**.** RAND Health Survey.

## Appendix A

The following sub-analysis were done but results and tables were not included in the final paper:

- Mexican American boys compared to Mexican boys (N=144)
- Mexican American girls compared to Mexican girls (N=150)
- Mexican boys compared to Mexican girls (N=196)
- Mexican American boys compared to Mexican American girls (N=98)

### Comparing QoL between Mexican and Mexican American Boys

Summary of Findings:
Similar to the overall findings, a higher rating on the perceived body shape scale was associated with a decrease in QoL scores across all four domains. Older age (ages 15-18) appeared as a significant positive predictor variable in three domains – Total, Social and Environment. Mexican boys had a lower Total YQOL-W score than their Mexican-American counterparts ($p<0.042$). Boys also had a lower YQOL-W score in the Social domain ($p<0.044$). In the Self domain, being Mexican was not correlated with a lower YQOL-W score, however, being born in Mexico was significantly associated ($p<0.000$).

**Table 1: Total QoL between Mexican and Mexican American Boys**

| WQoL - Total | Coefficient | STD Error | P-Value |
|---|---|---|---|
| Age Group – 15-18 | 8.86 | 3.859 | 0.023 |
| Ethnicity - Mexican | -8.521 | 4.156 | 0.042 |
| Your Body Shape | -5.710 | 0.934 | 0.000 |
| Constant | 98.850 | 5.30 | 0.000 |

R-Squared Value – 0.2722, Observations -144, Overall P-Value < 0.0001

**Table 2: QoL - Social between Mexican and Mexican American Boys**

| WQoL - Social | Coefficient | STD Error | P-Value |
|---|---|---|---|
| Age Group – 15-18 | 9.704 | 4.040 | 0.018 |
| Your Body Shape | -5.07 | 0.978 | 0.000 |
| Ethnicity – Mexican | -8.844 | 4.35 | 0.044 |

| | | | |
|---|---|---|---|
| Constant | 89.794 | 5.723 | 0.000 |

R-Squared Value – 0.2281, Observations – 144, Overall P-Value < 0.0001

**Table 3: QoL – Self between Mexican and Mexican American Boys**

| WQoL - Self | Coefficient | STD Error | P-Value |
|---|---|---|---|
| Birthplace – Mexico | -11.488 | 1.125 | 0.000 |
| Your Body Shape | -6.406 | 5.152 | 0.027 |
| Constant | 102.055 | 6.193 | 0.000 |

R-Squared Value – 0.2311, Observations – 142, Overall P-Value <0.0001

**Table 4: QOL - Environment between Mexican and Mexican American Boys**

| TQOL Environment | Coefficient | STD Error | P-Value |
|---|---|---|---|
| Your Body Shape | -6.957 | 1.037 | 0.000 |
| Constant | 100.853 | 5.030 | 0.000 |

R-Squared Value – 0.2407, Observations – 144, Overall P-Value <0.0001

## Comparing QoL Between Mexican and Mexican American Girls

Summary of Findings:

Perceived body shape was a significant predictor of QoL across all domains. An increase in perceived body shape was associated with a decrease in QoL. In the YQOL-W total score, perceived body shape was the only significant predictor ($p<0.000$). In the same analysis for boys, there were several factors that significantly contributing to YQOL-W. Mexican girls had a higher YQOL-W score than their Mexican-American counterparts ($p<0.030$), however this result was only seen in the Self domain. Overweight was significantly associated with lower YQOL-W scores in the Self domain ($p<0.025$).

**Table 5: Total WQoL Between Mexican and Mexican American Girls**

| WQoL - Total | Coefficient | STD Error | P-Value |
|---|---|---|---|
| Your body shape | -9.550 | 1.050 | 0.000 |
| Constant | 105.279 | 5.295 | 0.000 |

R-Squared – 0.3586, Observations – 150, Overall P-value <0.0001

**Table 6: WQoL - Self Between Mexican and Mexican American Girls**

| WQoL-Self | Coefficient | STD Error | P-Value |
|---|---|---|---|
| Your Body Shape | -8.756 | 1.306 | 0.000 |
| Ethnicity - Mexican | 10.898 | 4.976 | 0.030 |
| Weight Category - Overweight | -10.965 | 4.853 | 0.025 |
| Constant | 91.826 | 6.696 | 0.000 |

R-Squared – 0.2348, Observations – 150, P-Value <0.0001

**Table 7: WQoL - Social Between Mexican and Mexican American Girls**

| WQoL – Social | Coefficient | STD Error | P-Value |
|---|---|---|---|
| Age Group – 15-18 | 8.176 | 3.952 | 0.040 |
| Ethnic Affinity | 10.582 | 4.265 | 0.014 |
| Your Body Shape | -9.621 | 1.072 | 0.000 |
| Constant | 70.677 | 16.350 | 0.000 |

R-Squared – 0.3764, Observations - 150, P-value <0.0001

**Table 8: WQoL - Environment Between Mexican and Mexican American Girls**

| WQoL – Environment | Coefficient | STD Error | P-Value |
|---|---|---|---|
| Your Body Shape | -10.792 | 1.155 | 0.000 |
| Constant | 108.629 | 5.821 | 0.000 |

R-Squared – 0.3709, Observations - 150, P-value <0.0001

**Comparing QoL Between Mexican Boys and Girls**

Summary of Findings:
Perceived body shape was a significant predictor variable across all domains. For every one-point higher score in perceived body shape, there was a seven point corresponding lower QoL. Age 15-18 was associated with higher QoL in the Total, Social and Environment domains. Boys had better QoL in the Self and Environment domains. In the other domains, gender was not a predictor of QoL and was rejected in the stepwise regression modeling.

**Table 9: WQoL – Total Between Mexican Boys and Girls**

| WQoL - Total | Coefficient | STD Error | P-Value |
|---|---|---|---|
| Your Body Shape | -7.129 | 0.891 | 0.000 |
| Age Group – 15-18 | 8.113 | 3.478 | 0.021 |
| Constant | 93.948 | 4.817 | 0.000 |

R-Squared – 0.2556, Observations - 196, P-value <0.0001

**Table 10: WQoL – Self Between Mexican Boys and Girls**

| WQoL- Self | Coefficient | STD Error | P-Value |
|---|---|---|---|
| Gender – Boys | 9.00 | 4.100 | 0.029 |
| Your Body Shape | -7.204 | 1.054 | 0.000 |
| Constant | 85.179 | 6.012 | 0.000 |

R-Squared – 0.2249, Observations - 194, P-value <0.0001

**Table 11: WQoL – Social Between Mexican Boys and Girls**

| WQoL-Social | Coefficient | STD Error | P-Value |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Your Body Shape | -6.801 | 0.911 | 0.000 |
| Age Group – 15-18 | 9.109 | 3.557 | 0.011 |
| Constant | 95.460 | 4.927 | 0.000 |

R-Squared – 0.2423, Observations - 196, P-value <0.0001

**Table 12: WQoL – Environment Between Mexican Boys and Girls**

| WQoL – Environment | Coefficient | STD Error | P-Value |
|---|---|---|---|
| Gender – Boys | 9.732 | 3.809 | 0.011 |
| Age Group – 15-18 | 8.375 | 3.820 | 0.030 |
| Your Body Shape | -7.360 | 0.983 | 0.000 |
| Constant | 88.085 | 5.85 | 0.000 |

R-Squared – 0.2706, Observations - 196, P-value <0.0001

**Comparing QoL Between Mexican American Boys and Girls**

Summary of Findings:

Males had a higher QoL than females, a trend that was also seen in the sub-analysis of Mexican boys and girls. However, increases in QoL score associated with being male were much higher among Mexican Americans than Mexicans. Mexican boys experienced a nine-point higher QoL over Mexican girls. In Mexican American boys this increase ranged from 11 to 27 points. Perceived body shape was also shown to decrease QoL across all domains, except environment. This was similar to the pattern seen in Mexican boys and girls – the only difference was that perceived body shape appeared in all domains in the Mexican sub-analysis. Ethnic affinity was positively correlated with YQOL-W score – a higher ethnic affinity score increased the QoL score. Ethnic affinity did not appear in the Mexican sub-analysis, making this measure unique to the Mexican American sub-analysis.

**Table 13: WQoL – Total Between Mexican American Boys and Girls**

| WQoL – Total | Coefficient | STD Error | P-Value |
|---|---|---|---|
| Gender – Male | 14.189 | 4.335 | 0.001 |
| Weight Category – Overweight | -9.210 | 4.594 | 0.048 |
| Your Body Shape | -8.900 | 1.153 | 0.000 |
| Ethnic Affinity | 8.633 | 3.94 | 0.024 |
| Constant | 70.022 | 14.690 | 0.000 |

R-Squared – 0.4811, Observations - 98, P-value <0.0001

**Table 14: WQoL – Self Between Mexican American Boys and Girls**

| WQoL Self | Coefficient | STD Error | P-Value |
|---|---|---|---|
| Gender – Male | 27.359 | 5.436 | 0.000 |
| Weight Category – Overweight | -17.834 | 5.843 | 0.003 |
| Your Body Shape | -7.787 | 1.446 | 0.000 |
| Constant | 84.581 | 7.269 | 0.000 |

R-Squared – 0.4186, Observations - 98, P-value <0.0001

**Table 15: WQoL – Social Between Mexican American Boys and Girls**

| WQoL – Social | Coefficient | STD Error | P-Value |
|---|---|---|---|
| Gender – Male | 10.743 | 4.530 | 0.020 |
| Your Body Shape | -8.262 | 1.205 | 0.000 |
| Ethnic Affinity | 10.961 | 4.174 | 0.010 |
| Constant | 67.378 | 15.353 | 0.000 |

R-Squared – 0.3996, Observations - 98, P-value <0.0001

**Table 16: WQoL – Environment Between Mexican American Boys and Girls**

| WQOL – Environment | Coefficient | STD Error | P-Value |
|---|---|---|---|
| Gender – Male | 11.201 | 4.678 | 0.019 |
| Your Body Shape | -11.363 | 1.244 | 0.000 |
| Weight Category – Overweight | -10.806 | 5.028 | 0.034 |
| Constant | 113.720 | 6.255 | 0.000 |

R-Squared – 0.5083, Observations - 98, P-value <0.0001