

# Demographic Usage Patterns of Purgatory Creek Park, San Marcos, TX

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## I. Introduction

Natural area parks are an important component of human wellness. They provide outdoor recreation and thus potentially benefit mental health, physical health, neighborhood aesthetics, social interactions, nature interactions, education, and cultural identity (Monbiot, 2014; Active Living Research, 2010). Natural area parks and green spaces are also important for conservation, with urban parks contributing considerably to reducing the problem of air pollution and CO<sub>2</sub> in urban areas (Nowak, Heisler 2010). Not only are parks and natural areas good for human and environmental health, but they also bring a number of economic benefits to the local government, homeowners, and businesses, such as higher property valuations and increased tourism, which increase both citizen's income and local tax revenue (Active Living Research, 2010).

Despite the widely-accepted importance of natural parks, researchers have noted key differences in the way that different socio-demographic groups, whether racial, ethnic, gender, or socioeconomic status, enjoy and use natural areas. There have been many studies performed since the mid-1960s regarding the connection between race, ethnicity, and participation in certain outdoor activities along with utilization of parks and recreation areas. This project seeks to answer the following question: Do user demographics at Purgatory Creek Park in San Marcos, TX match the demographics of city residents? Based on my literature review, I hypothesize that park user demographics will not match city demographics but instead

will follow established trends which indicate a strong correlation between race/ethnic group and choice of outdoor leisure activities. Accordingly, this study will test the Null Hypothesis:

**H<sub>0</sub>:** Purgatory Creek Park's user demographics are not significantly different than San Marcos, TX resident demographics.

If this null hypothesis is rejected, I will then investigate which geographic and other (non-racial/ethnic) demographic variables influence the differences between park user demographics and city resident demographics.

This project seeks to make use of methods utilized in previous studies, such as surveys, statistical analysis and literature research, and apply those techniques to Purgatory Creek Park. The findings will be useful to city planners, parks and recreation officials, and city accountants and budget managers, so they can make the best-informed decisions regarding the expenditure of resources on city parks and green spaces. As the city of San Marcos grows, the need for green spaces and leisure areas will grow as well, and creating spaces that appeal to, and have something to offer to as many citizens as possible is certainly a smart and fiscally-responsible goal.

## **II. Background**

Purgatory Creek Park is located in San Marcos, a city in central Texas positioned along the "I-35 Corridor" between Austin and San Antonio. According to the US Census Bureau, San Marcos was the "fastest growing city in the US" in 2012-2015. Per the 2010 census, the population of San Marcos was 44,894 persons, and 2015 Census Bureau estimates put the population at 60,684 persons. (US Census, 2016) This represents a 35.2% population increase in

five years. The demographic breakdown of the population of San Marcos is displayed in Table

1.

**Table 1:** Demographic distribution of City of San Marcos, TX (USA) based on race and ethnicity (US Census Bureau, 2010)

<b>Native American</b>	0.65%
<b>Asian</b>	1.23%
<b>Black</b>	5.53%
<b>Hispanic</b>	36.5%
<b>Pacific Islander</b>	0.11%
<b>White (non-Hispanic)</b>	36.05%
<b>Mixed Race</b>	2.90%
<b>Other</b>	17.03%

Purgatory Creek Park is a 570-acre natural area, and is the largest park in San Marcos (Fig. 1). Initial purchases of the land began in 2001, and various parcels were purchased until the park's current configuration was completed in 2010 (SMGA, 2016). It is situated in the Edwards Aquifer Recharge Zone, and is home to several endangered species, notably the Golden-Cheeked Warbler. The park features an extensive trail system and is utilized by park-goers for hiking, running, biking, dog-walking, bird-watching, and other non-motorized recreation. The park is day-use only, so no camping is permitted.

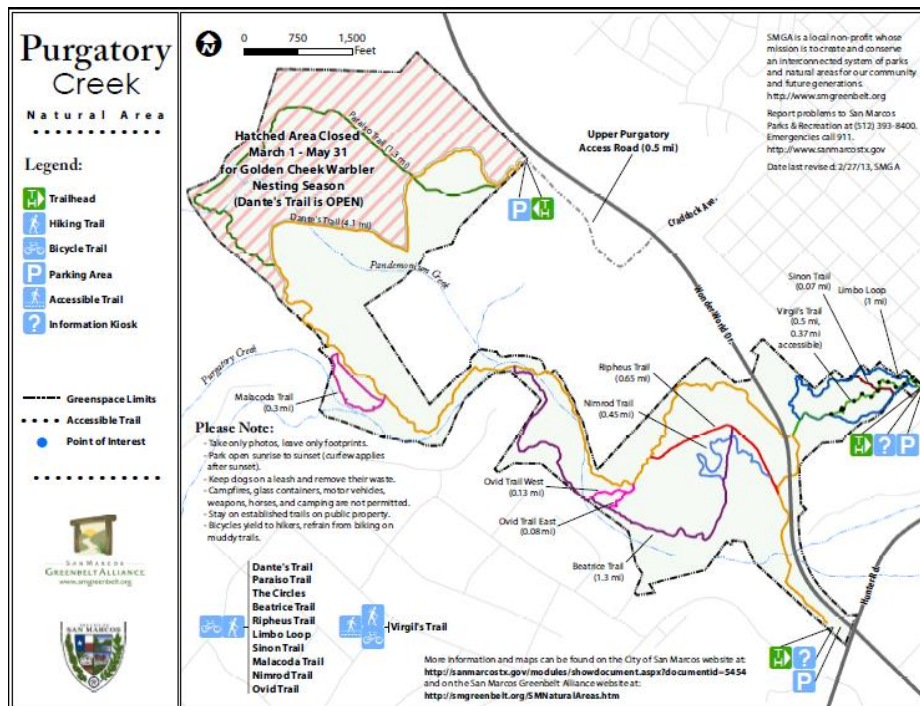


Fig 1: Purgatory Creek natural area and trail map (SMGA, 2016)

### III. Literature Review

This project draws on and contributes to two bodies of literature: (1) testing the demographic representativeness of park users within the context of previous studies regarding race/ethnicity and leisure preference and utilization of parks, and (2) informing the policymakers at the city, county or state level about park usage trends in the city of San Marcos.

Since the 1960s, many studies have been conducted on possible connections between race/ethnicity and leisure activity and park usage. The studies range from analysis of urban park use to examining trends at National Parks. The literature suggests that there is a correlation between race/ethnicity and park usage; notably, that racial/ethnic minorities are underrepresented among park and natural area users compared to their demographic numbers, but there is no clear consensus as to the *why* behind the differences (Krymkowski, et al. 2014).

While some studies indicate that there is little association with race/ethnicity being an issue with park access, they do indicate that Hispanic and black people were more likely than white people to report barriers to access, such as safety concerns and inadequate facilities (Carlson, et al. 2010). Other studies indicate a definite inequality in access to recreation opportunities, whether it be a general unequal geographic distribution of parks and greenspaces in low-income or minority areas (Lindsey, et al. 2001), or differentiating between parks. The park “type” distinction is between parks which typically offer “sports-oriented” activities, are free to use, and are more evenly distributed to low-income and minority areas, versus “recreational facilities”, which often have fees associated with use, and tend to have a higher density in higher-income or white areas (Moore, et al. 2008).

One interesting facet of these studies is the effect of cultural influence on different racial and ethnic groups’ leisure activity and park usage. Multiple studies indicate a clear difference between black and white recreation patterns and preferences, which in the past was attributed to the typically lower socioeconomic position of black people in a white-majority nation. However, after controlling for socioeconomic variables, the differences persisted, lending credence to the argument that the differences are (sub)cultural (Krymowski, et al. 2014). Another study examining the cultural differences reinforced the existing conclusions, and showed that black people tend to avoid parks and areas with dense vegetation and/or a sense of enclosure, but prefer areas with built-up components and/or openness and visibility (Kaplan, Talbot, 1988). While the authors of that study ask the question “is nature relatively unimportant to blacks?”, they quickly reference a 1983 study which indicated no racial preference difference towards “natural” urban settings, and that the natural environment is important and valued across demographic lines (Anderson, Schroeder 1983).

The differences regarding activity preference, park type preference, and connection to race/ethnicity between Hispanic and white people is not as clearly defined, with a definite correlation between Hispanic assimilation/acculturation to the majority (Anglo/White) culture in the US and the closer their preferences become to white park users. The more “Americanized” Hispanic people become, the more their park and leisure activity preferences begin to resemble white people’s (Krymkowski, et al. 2014; Shaul, Gramann 1998; Gramann 1996). However, with Hispanic immigration (mainly Mexican) being an ongoing trend for the US, the category of “Hispanic” is certainly not a monolithic bloc, and while US-born Hispanics that have hundreds of years of history here in the US may exhibit certain trends and patterns, newly-arrived Hispanics likely will not have the same preferences and cultural influences (Gramann 1996; Carr, Williams 1993, Baas, et al. 1993).

Asians tend to have park and recreation habits similar to whites’, however, similar to Hispanics above, multiple studies warn about characterizing “Asians” as a single bloc, since East Asians (Japanese, Koreans) are distinctly culturally different from Southeast Asians (Vietnamese, Laotians), to name but one example, and their preferences and habits tend to be accordingly different (Gramann, 1996).

Activity preference between racial and ethnic groups has also been studied by numerous researchers. In one study, elderly users of a Chicago urban park were surveyed and cultural differences along racial and ethnic lines were very apparent (Tinsley, et al. 2002). The authors attributed cultural differences to their findings, such as whites tending to visit the park alone or, at most, with an immediate family member, while black people typically went with multiple friends. They attribute this to white American culture emphasizing “rugged individualism”, while black culture is more centered around social cohesion. White people

tended to focus on exercise and personal enjoyment or pleasure seeking, which tend to be individualist pursuits. In contrast, Asians and Hispanics tended to visit with larger social organizations, and/or large extended family groups. The authors assign this to the more “collectivist cultures” of Asians and Hispanics, which would still be the dominant cultural force for tourists, newly-arrived immigrants, or first- or second-generation US-born descendants. These results match with the results of another study (Sasidharan, et al. 2005), which concluded that ethnic park-goers more often visited in groups and that facilities need to be prepared to handle the load, especially on weekends and holidays, and that holidays and social events that are important to different ethnicities should be prepared for.

An interesting counterpoint to these studies is a study that analyzed leisure preference against the variables of race, ethnicity and gender, but also personality, affective style and motivational orientation (Barnett 2006). It indicated that there was a definite correlation between a person’s leisure preference and their personality, affective style and motivation; but race, ethnicity and gender played a smaller, less significant role. This would bolster the cultural argument, but not necessarily along racial or ethnic lines.

Sasidharan’s (2005) research echoes the sentiments of other studies cautioning against lumping large and diverse groups into a single large “supergroup”. Similar to the “Hispanic” or “Asian” group definitions discussed above, defining “White” as a single large bloc is also limiting, since among “Whites”, there are many nationalities and cultural groups, with each group having its own cultural background and preferences for certain activities and by lumping them all together it potentially limits understanding. Similar caution should be taken with “Blacks”, since African black people are distinct from American black people, who are distinct from Caribbean black people, to name a few.

Gramann (1996), in his report for the Army Corps of Engineers, echoed similar sentiment, but took issue with the entire body of literature to that point. He said that a major failing of the literature is the interpretation of racial differences as ethnic differences and thus “confounding of these two distinct concepts” (p. viii). He also advises that since the probability of taking part in a particular activity is correlated to the race and ethnicity of the participant, awareness of the geographic trends regarding the nation’s demographics is very important.

Spatial relationship to parks or natural areas is clearly an important factor for participation, and it was commonly accepted that black people, typically being socioeconomically-disadvantaged, (relative to white people), would be less inclined to travel to distant parks. This expectation has borne out in some studies (Krymkowski, et al. 2014, Gramman 1996), with National Park usage being lower among black people, but especially with geographically-distant black people, while white people were more likely to travel to utilize the parks. However, another study indicated that in the case of Lincoln Park in Chicago, black people were more likely to drive or travel to that park instead of using a closer park to their homes (Tinsley, et al. 2002). In the same study, the lower Hispanic attendance at the park (compared to white people and black people) was attributed to spatial relationships. Hispanics and Asians were more likely to frequent parks closer to their homes, while white people typically lived closer to Lincoln Park, making travel easier. So, while a geographic or spatial correlation is extremely likely to influence park use habits, there are certainly circumstances where that is not the case. In cases where it is a factor, there is typically a stronger correlation between income and spatial relationship. That is, low-income people of all racial and ethnic groups are less likely to travel long distances to a park, regardless (Gramman, 1996; Krymkowski, et al. 2014).



#### **IV. Research Methods**

This project draws on an empiricist paradigm and employs the scientific method. The methodology is based on earlier studies on the topic. The project employed surveys taken of park visitors, and statistical analysis of the results to determine if existing trends are applicable to Purgatory Creek Park. Each technique will be discussed in detail below.

The survey instrument contained 23 questions addressing use patterns, preferences, management concerns, and user demographics. The survey was administered face-to-face to people coming off trail or out of the park. The sampling design was intended to encourage a form of quota/convenience sampling that engaged visitors at various times of the day and at different access points. The park has three entrances: Lower Purgatory, Upper Purgatory, and Prospect Park. Interviews were conducted at each entrance at various times of day in three-hour blocks from 6 am to 9 pm, (e.g., 6-9am, 9am-noon, etc.). Times and entrances were selected generally based on interviewer availability. Four hundred surveys were the target amount.

The overarching hypothesis of the study was addressed by using SPSS (version 24) to perform a Chi-squared goodness-of-fit test for the demographic data compared to the census data for San Marcos. Further analysis was performed using log-linear analysis. This method was chosen because it is basically an extension of the Chi-square test, and is used to examine all interactions between three or more categorical variables, (Chi-squared tests being limited to two variables).

The interactions, if any, between the variables of race/ethnicity, gender, age, education, income, and affiliation with Texas State were compared using the saturated log-linear model. The saturated model was chosen since it is the most thorough analysis, allowing comparison of

interactions at all levels, then uses backward elimination and stepwise selection with Akaike information criterion (AIC) to remove the most insignificant variables, and it re-tests to find the simplest non-saturated model that fits the observed data and predicts the actual cell frequency.

## V. Results

Literature for the past half century has established some fairly consistent correlations and connections between racial and ethnic group and outdoor leisure preferences and park usage patterns. By performing a Chi-square goodness-of-fit test in SPSS to compare the census data to the park usage data, we were able to reject the null hypothesis:

**H<sub>0</sub>:** Purgatory Creek Park’s user demographics will not be significantly different than San Marcos, TX resident demographics.

The analysis confirmed that Purgatory Creek Park’s (PCP) user demographics are significantly different than the resident demographics, and the results mimic prior research regarding race/ethnicity and outdoor leisure and park usage. The survey had 391 respondents who fully answered the questionnaire, and Table 2 examines the breakdown of the race and ethnicity of park visitors.

**Table 2:** Demographic Breakdown of Purgatory Creek Park (PCP) Visitors

<b>Race/Ethnicity</b>	<b>Number of Visitors</b>	<b>Park User Percentage</b>
<b>Native American</b>	2	0.51%
<b>Asian</b>	4	1.03%
<b>Black</b>	13	3.32%
<b>Hispanic</b>	89	22.77%
<b>Pacific Islander</b>	0	0%
<b>White</b>	258	65.98%
<b>Mixed/Other</b>	25	6.39%
<b>Total</b>	391	100.0%

The raw numbers appear to support the hypothesis that the park user demographics would not mirror the demographics of the city of San Marcos, and that white people would be overrepresented in park users. The Chi-Squared test was performed, comparing the number of park users in each demographic group against the number of people expected if the park's users mirrored the official census numbers. For the test, the "Pacific Islander" category was omitted, since there were zero respondents, and for the analysis, the census percentage for that category were included under "Asian", being the closest group geographically. The census categories for "Mixed Race" and "Other" were combined into the single category of "Other" for the analysis, due to similar issues of differentiation. The results are shown in Tables 3 and 4.

**Table 3** Chi-Squared demographic results

<b>Demographics of Purgatory Creek Park Users</b>			
	Observed N	Expected N	Difference
Native American	2	3.0	-1.0
Asian	4	4.8	-0.8
Black	13	21.6	-8.6
Hispanic	89	142.7	-53.7
White	258	141.0	117.0
Other	25	77.9	-52.9
Total	391		

**Table 4** Chi-Squared test results

<b>Test Statistics</b>	
	Race/Ethnicity
Chi-Square	157.246 <sup>a</sup>
df	5
Asymp. Sig.	<0.001

Table 3 demonstrates that the numbers for each group of park users, apart from "White", are underrepresented when compared to the census data. Asians and Native

Americans are fairly close to the official census numbers, while Hispanics are the most underrepresented, followed by the “Other/Mixed Race” category, while white people are quite overrepresented. Figure 3 shows that the high Chi-Square value indicates a high discrepancy between the expected and observed results, and the p-value of <0.001 indicates significance, and so the null hypothesis is soundly rejected.

Having rejected the null hypothesis, SPSS was used to conduct log-linear analysis of various interactions between race/ethnicity, age, annual income, education level, and affiliation with Texas State University. Tables of the variables with categories and category totals is appended to the end of this report (App. 1-2).

Initially, the analysis was conducted with the variables as-coded with their original categories and number of respondents, and the results revealed an issue with the data. In order to get the most accurate and applicable model, log-linear analysis requires that there be no zero-counts on a variable or category, and that less than twenty percent of the counts are less than five. Since some of the variables either featured excessive zero-counts, or were heavily skewed in one direction, the variables were re-coded into simpler categories in order to consolidate the response counts. When the simplified variables were run, the resulting data echoed earlier tests, but the results were far easier to tabulate, resulting in Table 5.

**Table 5** Log-linear analysis results with backwards elimination

	Df	Deviance	Resid. Df	Resid. Dev	Pr(>Chi)
<b>NULL</b>			107	676.29	
<b>Age</b>	2	149.466	105	526.82	< 2.2x10 <sup>-16</sup>
<b>Education</b>	1	16.832	104	509.99	4.084x10 <sup>-5</sup>
<b>Income</b>	2	35.527	102	474.46	1.930x10 <sup>-8</sup>
<b>Race</b>	2	143.517	100	330.95	< 2.2x10 <sup>-16</sup>
<b>TXST_Affiliation</b>	1	6.576	99	324.37	0.0103345
<b>Age*Education</b>	2	80.259	97	244.11	< 2.2x10 <sup>-16</sup>
<b>Age*Income</b>	4	108.99	93	135.12	< 2.2x10 <sup>-16</sup>
<b>Education*Income</b>	2	1.681	91	133.44	0.4314011
<b>Age*Race</b>	4	2.05	87	131.39	0.7266226
<b>Education*Race</b>	2	7.229	85	124.16	0.0269367
<b>Income*Race</b>	4	6.966	81	117.2	0.1376707
<b>Age*TXST_Affiliation</b>	2	15.888	79	101.31	0.0003548
<b>Education*TXST_Aff</b>	1	3.442	78	97.87	0.0635731
<b>Income*TXST_Aff</b>	2	3.153	76	94.71	0.2066565
<b>Race*TXST_Aff</b>	2	2.294	74	92.42	0.317646
<b>Age*Education*Income</b>	4	12.367	70	80.05	0.0148193
<b>Age*Educ*TXST_Aff</b>	2	6.698	68	73.35	0.0351158
<b>Age*Race*TXST_Aff</b>	4	12.674	64	60.68	0.0129831
<b>Educ*Race*TXST_Aff</b>	2	4.448	62	56.23	0.1081955
<b>Inc*Race*TXST_Aff</b>	4	9.877	58	46.36	0.0425426

First, the interaction between five variables of park users was looked at. Race/ethnicity, age, income, education level and affiliation with Texas State University were analyzed using a saturated log-linear model with backwards elimination and stepwise selection with Akaike information criterion (AIC). Then, variables were removed and the effect of the variable recorded. When looking at the resulting model, the individual variables are all significant, with race/ethnicity and age having the most significance.

When two-way interactions are analyzed, there were significant correlation with age and the factors of income, education level, and Texas State affiliation. This makes sense for San Marcos, being a college town and young people in San Marcos overwhelmingly being (broke)

college students at Texas State, and working towards undergrad degrees. There was weaker correlation between education level and both race and Texas State affiliation, with a number of respondents from all racial/ethnic categories having degrees, but no affiliation with the university.

All but one three-way interaction showed various degrees of significance, with the interaction between age, race/ethnicity, and Texas State affiliation being the best fit for the observed results. Even though most of these interactions indicate significance, none exhibit high significance, with the values all falling between 0.05 and 0.01.

So, while the given data indicates that the demographics of Purgatory Creek Park users do not line up with the demographics of San Marcos as a whole, analysis of the variables does not indicate a clear reason why.

## **VI. Discussion and Conclusions**

Testing the data indicates that the demographics of Purgatory Creek Park users do not line up with the demographics of the city of San Marcos, so the null hypothesis was rejected. However, supplementary analyses of the results did not reveal an obvious reason, with no standout correlations between race/ethnicity, park visitation habits and variables such as income, education, and age.

The answer may lie in how different groups use parks based on activities preferred. Many parks in San Marcos are formally or informally “dedicated” to a certain activity or series of activities, and the users of those parks tend to patronize them for a specific purpose. For example, the parks that allow river access are primarily used for water recreation, and though many people use them and never get in the water, most do. The river is considered by many to

be the “crown jewel” of the city and a large part of the city’s tourism and recreation industry is built around it. In the same vein, Purgatory Creek Park is a natural area with trails, as opposed to a more traditional “park” with large green spaces, play areas and facilities for various activities such as picnicking, sports and parties. The range of activities possible and permissible at Purgatory Creek Park are therefore limited in scope, being more geared towards allowing close access to nature via hiking, biking and other low-impact activities. The survey results bear that out, with the vast majority of users reporting only hiking, with the remainder performing another activity such as dog walking or bird watching in addition to hiking, the exception being bicyclists, so unless a user is bicycling, they are (also) hiking in addition to whatever other activity they are participating in.

Based on this general usage, the demographic disparity can perhaps be at least partially explained by the Tinsley (2002) and Sasidharan (2005) studies. The usage patterns of Purgatory Creek Park and other parks in San Marcos tend to bear those results out. Many white users of Purgatory Creek Park were alone or with a single companion, while ethnic minorities were usually with at least a single companion or their family. Patronizing other parks in San Marcos, such as the parks with water access, which allow more group activities and are more kid-friendly, one can observe people from all demographic categories attending in (large) groups, and the demographic makeup is more diverse. While not a formal measure, this is observable. This lends credence to those studies’ conclusions that white people tend to prefer solo recreational activities that center around exercise, while ethnic minorities tend to prefer recreation in larger groups, and that Hispanics tend to prefer water-based activities (Sasidharan et al. 2005).

This differing preference for recreational activity which falls along racial/ethnic lines, but is driven largely by cultural differences, could likely be a prime mover in explaining the reasons for the divide between San Marco's demographics, and the demographics of Purgatory Creek Park users. According to those studies, a strong argument could be presented that white people tend to prefer Purgatory Creek Park because it is designed around activities that are best performed solo, or in small groups, and is centered around exercise. Hiking in large groups is tougher than small ones, as is dog walking, bird watching, or just trying to find peace and solitude in nature. Since racial/ethnic minorities tend to prefer activities and recreation styles that are difficult or impossible at Purgatory Creek Park, it stands to reason that they would instead patronize parks that allow them to engage in their preferred activities.

As the city of San Marcos and the surrounding areas grow and are further developed, the challenge for city planners to select development space and allocate funds for park projects, and ensure that those projects are geared towards the enjoyment of the most people is quite real. Differing use patterns by different groups mean that choices will have to be made as to what sort of parks are built. Limited-use parks or natural areas certainly have a place and should be built, but more "general use" parks that allow for a wide variety of recreational activities should be considered. Further research into the usage patterns of park users, based on activities, and encompassing more parks, is worthy of consideration, so as to give decision makers a better grasp on the cause or underlying reasons for these preferences and how they affect park usage. This research has confirmed the phenomenon, however, a more complete analysis would be helpful to help guide future development of San Marcos and the surrounding areas.





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**Appendix 1** Table of simplified, consolidated variable totals

<b>Race/Ethnicity</b>		<b>Age</b>		<b>Income</b>	
No Answer	2	No Answer	1	No Answer	51
Hispanic	89	Under 25	196	Under 20k	114
Other	44	25-54	167	20k-60k	158
White NH	257	55 and over	28	60k and over	69
Grand Total	392	Grand Total	392	Grand Total	392
<b>Texas State Affiliation</b>		<b>Education Level</b>			
No Answer	8	No Answer	7		
No TXST	172	Bachelors+	159		
Yes TXST	212	>Bachelors	226		
Grand Total	392	Grand Total	392		

**Appendix 2** Table of original, unconsolidated variable totals

<b>Race/Ethnicity</b>		<b>Age</b>		<b>Income</b>	
Native American	2	Under 25	196	<20k	114
Asian	4	25-34	98	20-40k	92
Black	12	35-44	37	40-60k	66
Hispanic	89	45-54	32	60-80k	19
White	257	55-64	20	>80k	50
Other	26	65+	8	No Answer	51
No Answer	2	No Answer	1	Grand Total	392
Grand Total	392	Grand Total	392		
<b>Texas State Affiliation</b>		<b>Education Level</b>			
No Answer	8	Some HS	4		
No TXST	172	HS Degree	27		
Yes TXST	212	Some College	172		
Grand Total	392	Tech/Assoc.	23		
		Undergrad	132		
		Grad	17		
		Doctorate	10		
		No Answer	7		
		Grand Total	392		

